1961

QUEENSLAND

ANNUAL REPORT

OF THE

UNDER SECRETARY

FOR

DEVELOPMENT AND MINES

TO

THE HONOURABLE E. EVANS, M.L.A.,

MINISTER FOR DEVELOPMENT, MINES, MAIN ROADS AND ELECTRICITY

INCLUDING THE

REPORTS OF THE WARDENS, INSPECTORS OF MINES, GOVERNMENT GEOLOGISTS, AND OTHER OFFICERS,

FOR

THE YEAR 1960

PRESENTED TO PARLIAMENT BY COMMAND

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ANNUAL REPORT OF THE DEPARTMENT OF DEVELOPMENT AND MINES 1960

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REPORT OF THE DEPARTMENT OF DEVELOPMENT AND MINES, QUEENSLAND, FOR THE YEAR 1960

TO THE HONOURABLE E. EVANS, M.L.A., MINISTER FOR DEVELOPMENT, MINES, MAIN ROADS AND ELECTRICITY

SIR,—I have the honour to present my report on the activities of the mining industry in Queensland and concerning the operations of the Department of Development and Mines for the year 1960.

The State's mineral production during 1960 amounted to £54,012,350, which was an increase of £6,823,739 over the 1959 production. This increase was largely due to the increased production of copper.

Gold

The production of gold fell from 91,496 fine oz. valued at £1,429,625 in 1959, to 75,852 fine oz. valued at £1,185,188 in 1960. As in previous years the principal producers were *Mount Morgan Limited* of Mount Morgan and *Golden Plateau N.L.* of Cracow. The price of gold remains fixed at £A15 12s. 6d. per fine oz. and this unsatisfactory price, is no doubt, the main reason that prospecting and development is retarded by lack of investment funds.

Copper

The expanded copper production of *Mount Isa Mines Limited* accounted largely for the record copper production of 80,155 tons valued at £26,002,959, which was well in advance of the previous year's record production of 65,702½ tons valued at £20,523,388.

Lead

The production of lead, 56,029 tons valued at £5,100,747, showed a slight increase over the 1959 figures of 53,120¼ tons valued at £4,825,969. The production of this metal is still restricted by the import restrictions imposed by the U.S.A.

Zinc

Mount Isa Mines Limited still remained the sole producer of this metal and production rose from 13,983 tons valued at £1,452,704 in the previous year to 24,394 tons valued at £2,707,415 during 1960.

Tin

Tin production fell from 1,546¾ tons, valued at £973,393 in 1959, to 1,236¼ tons valued at £787,890 in 1960, but this was due to the dredge of *Tableland Tin Dredging N.L.* being out of action for most of the year. The other major producer was *Ravenshoe Tin Dredging Ltd.*

Silver

The production of silver remained static and the 1960 production valued at £1,954,284 was only worth £4,496 more than the 1959 production.

Uranium

Uranium production showed a slight increase:—1960—production 663 tons valued at £6,509,718; 1959—production 651½ tons valued at £6,449,267. All production came from *Mary Kathleen Uranium Ltd.*

Zircon, Rutile, &c.

There was no increase in the demand for these minerals and rutile production fell to 17,029 tons valued at £970,829 compared with 19,729 tons valued at £1,182,083 in 1959. The production and value of zircon varied slightly from the previous year's figures.

Coal

Production of coal showed a slight increase being 2,656,642 tons valued at £8,002,545 as compared with 2,594,387 tons valued at £7,518,286 in the previous year.

Bauxite

The Commonwealth Aluminium Corporation Pty. Ltd. (Comalco) carried out further testing of the bauxite deposits near Weipa on Cape York Peninsula and during the year arranged to send 30,000 tons of the ore to Japan for testing purposes.

Aluminium Laboratories Ltd. (Alcan) continued testing the area held by it as an Authority to Prospect on Cape York Peninsula.

Other Minerals

Production of the following minerals increased during the year and for the purposes of comparison the 1959 figures are shown in parenthesis:—Brick and pipe clay 334,584 tons (289,931 tons); fireclay 12,571 tons (8,443 tons); ironstone 2,287½ tons (1,443 tons); pyrites 18,720 tons (17,410 tons).

Petroleum

The overseas interest in Queensland's oil potential which was the characteristic of 1959 has been more than maintained in 1960, by very large expenditures by American "Independents" in Queensland.

The estimated expenditure by all companies in oil exploration in Queensland in 1959 was £450,000. In 1960 it was £1,900,000 and in 1961 based on proposed programmes it should be between four and five million pounds.

As at the end of the year, with the exception of the greater part of the Barrier Reef the whole of the State was held under title. The actual area under title at the end of 1960 totalled 807,540 square miles. The seven P.P.P.'s were held by five interests (one interest holding three titles). In respect of the authorities, due to joint interests, these twenty-four are actually held by fifteen separate groups of interests. Eleven of these authorities comprising somewhat less than half the total area of the State were held by solely overseas interests, eight comprising not quite a third of the State were held jointly by overseas and Australian interests whilst the remaining five authorities and all the P.P.P.'s comprising a little less than a quarter of the State's area are held solely by Australian interests.

The dry wells at Betoota, Cooroorah, the Overflow, Corfield, Ooroonoo, Latemore, and Latemore East supplied considerable data which has permitted the re-interpretation of much of knowledge of our sedimentary basins, particularly the Great Artesian Basin. The promise of potential gas fields from the Timbury Hills No. 2, Pickanjinnie No. 1, and Cabawin wells has given tremendous hope for the future. The footage of wells drilled during the year, though not a record, approached with a total of 47,030 ft. the record of 1955. However, the 1960 wells were infinitely better located, and showed some success as against the negligible results of 1955. The total amount of geophysical work done in the State in 1960 was 76½ crew months, which far exceeds any previous year and represents about 75 per cent. of all the similar work done in Australia in this period. It included a record 54 crew months of seismic surveys. The great increase in seismic prospecting gave promise of many well sites in 1961.

The prospective use in 1961 of the gas from A.A.O. No. 4 (Hospital Hill) and A.A.O. Timbury Hills No. 2 to operate gas engines at the Roma Town Council power house is a development of importance that could be a lead to future utilisation of gas for power.

Undoubtedly the highlights of the year were the testing of the 6·25 m.c.f. per day well at Pickanjinnie No. 1 and the discovery early in December of high pressure petroliferous gas at 9,935 ft. in Cabawin No. 1.

The testing of Cabawin No. 1 in 1961 is now awaited with intense interest.

If the rates of expenditure continue, with increased geological and geophysical data obtained and better siting of wells, we should in 1961 be nearer to our goal of commercial oil.

State Mining Operations

The *State Treatment Works* at Irvinebank milled 7,184 tons of ore for a yield of 92 tons of tin concentrates valued at £48,442; while the tonnage milled was some 400 tons greater than in 1959, the amount of concentrates produced and their value were 10 per cent. lower due to the fact that most of the ore was derived from dumps.

At the *Venus* battery at Charters Towers 768 tons of ore and 290 tons of tailings were treated. The *New Queen* silver-lead mine at Liontown was the main supplier of ore and produced 210·7 oz. of gold, 11,999 oz. of silver, and 49·5 tons of lead; gold ores treated yielded 105·6 oz. of gold.

The Government Assay Office at Cloncurry received a record number of 1,471 samples and completed 4,589 assays. The continued interest of Japanese in copper concentrates was mainly responsible for the increase of samples submitted.

Departmental drilling operations in connection with coal exploration were undertaken in the Ipswich, Rosewood, Warwick, Burrum, and Bowen coalfields and totalled 69,646 ft. In connection with other minerals, mainly clay in the Brisbane district, some 14,835 ft. were drilled.

The Department's compressor, pumping and winding plants were engaged in various parts of the State.

Inspection of Mines

The average number of men employed during the year in metalliferous mining was 7,062, an increase of 34 compared with 1959. Increased employment by Mount Isa Mines Limited and by Mount Morgan Limited was largely counterbalanced by decreases on small mines in the Charters Towers and Southern Divisions.

The average number of men employed in quarries gazetted under the Mines Regulation Acts and clay pits declined by 6 to 408, while in sewerage construction subject to the Mines Regulation Acts employment increased by 511 to 1,649.

In metalliferous mines 754 lost-time accidents were reported; of these three had fatal consequences and, in addition, 186 involved more than 14 days' disablement.

In connection with sewerage construction and quarries respectively 72 and 1 accidents involving more than 14 days' disablement were reported; no fatal accidents occurred.

The Lead Board at Mount Isa certified eight cases of lead-poisoning during the year.

In coal mines operating throughout the State a total number of 3,218 men were employed. Of these 2,295 were employed underground and 923 on the surface.

There were 695 accidents of which one had fatal consequences and 226 involved more than 14 days' disablement.

The Geological Survey

During 1960 there was further expansion and diversification of activities in the Geological Survey. The sectionalisation of the Branch was carried further with the appointment of supervising geologists in the field of palaeontology, economic geology and engineering geology. There was a net increase of four in the technical staff, but because of increased requirements for engineering geology services, we were still not able to commence the mapping of the Maryborough 4-mile sheet.

There were eight geologists engaged in coal resources investigations. A programme of exploratory drilling in the southern Darling Downs (Tannymorel) was put in hand, but by the end of the year had achieved no success.

Combined Geological Survey-Bureau of Mineral Resources parties carried out regional mapping in the Bowen Basin and Herberton areas, three 4-mile sheets being completed. A fourth party of Bureau of Mineral Resources geologists mapped five 4-mile sheets in the far south-west.

Geological mapping and investigation of the clay resources of the Greater Brisbane area continued throughout the year, and an intensive programme of shallow drilling using a Proline rig was successful in bringing to light some extensive new clay bearing areas.

Dam and bridge sites and underground excavations were geologically inspected at the request of various Government departments. Two hydrogeological investigations were undertaken, one in the Burdekin Delta at the request of Irrigation and Water Supply Commission and the other for the Co-ordinator-General.

In the metalliferous field the most important investigation was a survey of the manganese deposits of the Mary Valley. Queensland's foremost manganese ore province. Absence of domestic markets for metallurgical grade ore has resulted in a virtual cessation of manganese mining. Departmental drilling was carried out at Liontown and Cracow and the Geological Survey kept a close watch on these operations. The new programme at Liontown has so far been without result. An investigation of the tin mining industry in the Cairns hinterland revealed that mining was declining, notwithstanding good prospects in several of the older mines.

Research on coal petrology was suspended owing to absence of suitable personnel, but it is hoped to resume this most important activity in the near future. Numerous borehole samples of coal and carbonaceous sediments were submitted by oil exploration companies for palynological examination and the value of this section of the survey was amply demonstrated, as it was possible to make reliable datings in sediments otherwise devoid of fossils.

In the field of oil exploration the year was notable for the tremendous increase in the rate of seismic surveying. Results of this and other field work were discussed from time to time with company geologists, and it became apparent that the basement stratigraphy and structure of the Great Artesian Basin was very much more complex than had hitherto been thought.

The Committees on Stratigraphic Nomenclature and Tectonic Maps continued active. The latter produced the first tectonic map of Australia and this has already proved of great value in the search for oil. The Assistant Chief Government Geologist continued to serve on the Coal and Coke Panel of the Standards Association of Australia and the Chief Government Geologist represented the Department at the one plenary meeting of the Great Barrier Reef Committee.

Two Geological Survey Publications were issued and twelve geological reports were published in the *Government Mining Journal*. The paper on oil and natural gas in Queensland was sent to the printer and will be issued in 1961.

Development

The Director of Northern Development carried out investigations for various Government Departments and other special duties associated with the development of this State. The following is a summary of his activities during the year.

Cook Shire

During the year he continued as Administrator of the Shire of Cook.

Commonwealth Aid Road Funds were used to construct permanent work on the Coen to Port Stewart Road, near Nein north of Coen, Laura to Laura Station Road, and Cooktown to Bloomfield Road.

The services of Mr. J. J. Mulheron, Engineer, who was on loan from the Co-ordinator-General's Department from May to 17th October, 1960, proved of great assistance in Cook Shire work. As well as personally directing the Shire's road construction programme Mr. Mulheron carried out investigations into the road requirements of various parts of the Shire.

Mackay Reclamation

An investigation was made into three possible schemes for reclamation of land in the Mackay district, namely (1) Land adjacent to the Mackay Harbour, (2) Land on the south-west side of the Pioneer River in the vicinity of Dump Creek, and (3) East Mackay. Part of the first area is at present being satisfactorily reclaimed by the Mackay Harbour Board. The proposition for the reclamation in the Dump Creek area could be too greatly affected by results of hydraulic model tests of the Pioneer River being carried out by the University of Queensland to complete investigation at this stage. The East Mackay reclamation scheme offered a reasonable chance of financial success and could considerably benefit the City of Mackay.

Fitzroy River Basin Development

An investigation was carried out into the development of the Fitzroy River Basin which has potential for long term water conservation and irrigation development. The proposal of the Rockhampton and District Development Association for accelerating the process of subdivision of holdings to enable the increasing of stock carried to be speeded up was examined and considered to have a lot of merit. It was recommended that it be forwarded to the Lands Administration Commission for detailed study.

Road to Buddabadoo Beach

An inspection was made relative to the possibility of a road being opened to Buddabadoo Beach from the gap in the Murray Prior Range and a report submitted. This proposition is quite feasible but requires the removal of part of the Aboriginal Reserve R. 204 from the reserve. The financing of the road also raises some difficulty but the Forestry Department and the Mulgrave Shire Council would both possibly contribute.

Boonjie to Bartle Frere Road

Mr. J. Mulheron spent several days in this rugged area investigating the possibility of building a road between these two points. In the upper reaches of the Russell River, despite a trial of four possible routes he was unable to obtain a satisfactory location.

Miscellaneous Jobs

Miscellaneous work carried out during the year included reporting on the possibility of a dam at Emuford, the reclamation of Monkey Island, Townsville, for a high school site, and the clean up of work associated with Cyclone Relief following the 1958 and 1959 cyclones. He also attended meetings of the Townsville Industry Advisory Committee and the Committee of North Queensland Development—concerning the proposal to construct roads in the Gulf Country.

Coal Miners' Pensions

"*The Coal and Oil Shale Mine Workers (Pensions) Acts, 1941 to 1960*," provide pensions for retired and incapacitated miners and for widows and dependants of deceased mine workers.

The income of the Fund is derived from the Government, the mine workers and the mine owners, while administration is in the hands of a tribunal representing the three contributing bodies.

The financial statement tabled in Parliament disclosed an accumulated reserve of £1,626,204 as at 30th June, 1960.

Office of the Government Gas Engineer and Chief Gas Examiner

In accordance with the provisions of "*The Gas Acts, 1916 to 1952*," the Government Gas Engineer and Chief Gas Examiner furnishes an annual report up to the 30th June each year. This report for the year ended 30th June, 1960, was duly presented to Parliament and printed.

Government Motor Garage

Whilst the volume of work compares favourably with figures of previous years it will be noted that the increase on the year 1959 has been of a minor nature only.

A summary of the work carried out during the year is as follows:—

(1)	Total number of actual repair jobs ..	5,499
(2)	Average number of jobs per month ..	458
(3)	Average number of vehicles receiving attention per month	351
(4)	Reports on appraisals of existing departmental vehicles	230
(5)	Reports on estimated costs of repairs ..	575
(6)	Reports on new vehicles	348

Due to the limited size of the Government Garage premises it is considered that little improvement on the above figures can be achieved in future.

Legislation

During the year the following Bills were introduced and passed through Parliament—

"The Coal and Oil Shale Mine Workers (Pensions) Acts Amendment Act of 1960." The purpose of this Act was to remove the necessity for the existence of identical amounts of pension and conditions of award to enable another State to be proclaimed as a reciprocating State. This Amendment Act also extended the provisions of the existing legislation to enable a mine worker to qualify, subject to the conditions specified in the Agreement, for a pension under these Acts where his combined service in the Coal Mining Industry as a mine worker in this and in the other reciprocating State is sufficient to satisfy the requirements of these Acts.

"The Mackay Gas Company Limited Act of 1960." To consolidate the position of the company and give them greater security than the agreement they had with the Councils—an Act to enable the company to supply gas within the City of Mackay and the Shires of Pioneer, Mirani, and Sarina.

"Kyle Enterprises Pty. Ltd. Act of 1960."—To enable Kyle Enterprises Pty. Ltd. to supply gas within a defined area in the City of Gold Coast.

General

The outstanding features of this year were the continued increase in copper production by Mount Isa Mines Limited; the increasing interest at the petroleum potentialities of the State by Australian and overseas interests; the continued exploration of iron ore deposits at Constance Range near the Northern Territory border; and the development of the great bauxite deposits at Weipa.

In 1961 we are looking forward to greater development of the above and also the possibilities of exporting large tonnages of coal to Japan, which, all combined should lead to further development and progress of this State.

Attention is drawn to the detailed review of oil and general prospecting activities in Queensland given in the State Mining Engineer's Report and the review of the work of the Departmental drilling section covered by the Assistant State Mining Engineer's report.

In conclusion, I desire to record my appreciation of the loyal support and active co-operation extended to me by the clerical staff, the sub-departments, the engineering and and inspectorial staff, and the Mining Wardens and Mining Registrars throughout the State. This has greatly contributed to the general efficiency of the Department and to the continued cordial relations with the industry in its various phases.

Attached hereto are the annual reports of the Wardens of the gold and mineral fields, the State Mining Engineer, the Assistant State Mining Engineer, the Inspectors of Mines, the Boring and Mechanical Engineers, the Chief Inspector of Coal Mines, the Inspectors of Collieries, the Chief Government Geologist and the Geologists of the Geological Survey which describe in full the activities which have been briefly summarised in this report.

I have &c.,

G. F. CLARK, Under Secretary.

TABLE A

COMPARATIVE STATEMENT OF GOLD YIELD, 1959–1960

Facing Page 4

Goldfield	1959												1960												Increase Fine Gold, 1960	Decrease Fine Gold 1960
	Stone Treated (includes Gold Ore Treated at Smelters)	Product of Stone Treated					Old Tailings		Gold from Copper and Other Ores	Alluvial Gold	Total Crude Gold from all Sources	Total Fine Gold from all Sources	Stone Treated (includes Gold Ore Treated at Smelters)	Product of Stone Treated					Old Tailings		Gold from Copper and Other Ores	Alluvial Gold	Total Crude Gold from all Sources	Total Fine Gold from all Sources		
		Mill Gold	Cyanide Gold	Gold from Concentrates	Total Yield	Value of Other Minerals								Mill Gold	Cyanide Gold	Gold from Concentrates	Total Yield	Value of Other Minerals								
	Tons	Fine oz.	Fine oz.	Fine oz.	Fine oz.	£	Tons	Fine oz.	Fine oz.	Fine oz.	Oz.	Fine oz.	Tons	Fine oz.	Fine oz.	Fine oz.	Fine oz.	£	Tons	Fine oz.	Fine oz.	Fine oz.	Oz.	Fine oz.	Fine oz.	Fine oz.
Alice River	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Anakie	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Balcooma	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Bowen	..	..	..	..	..	..	..	..	..	46	67	46	..	..	..	..	..	..	..	..	..	66	107	66	20	..
Brisbane	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Bundaberg	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	.
Charters Towers	482	241	99	..	340	..	..	2	216	23	1,504	581	141	60	45	..	105	..	..	..	211	49	547	365	..	216
Chillagoe	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Claudie River	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Clermont Fields	..	..	..	..	..	..	..	..	..	91	95	91	..	..	..	..	..	..	..	..	..	35	37	35	..	56
Cloncurry Fields	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..		..	..	..	..	..	..	6	8	6	6	..
Coen	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Cooktown Fields	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Cracow	37,087	15,631	..	..	15,631	7,740	..	..	..	..	38,181	15,631	33,298	13,314	..	..	13,314	6,288	..	..	..	..	32,590	13,314	..	2,317
Croydon	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Eidsvold	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Etheridge	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	4	4	4	..
Gladstone	..	..	..	..	..	..	80	5	..	..	12	5	..	..	..	..	..	..	..	..	..	11	11	11	6	..
Glenbar	Nil	..	..	..	..	..	..	..	..	..	..	..	32	10	..	..	10	1	..	..	..	..	15	10	10	..
Gympie, Kilkivan and Glastonbury	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Hamilton	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Hayes Creek	Nil	..	..	..	..	..	..	..	..	..	..	..	9	20	..	..	20	1	..	..	..	..	26	20	20	..
Herberton	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	.
Horn, Possession and Hammond Islands	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	
Hughenden	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	.
Ingham	..	..	..	..	..	..	..	..	2	55	61	57	..	..	..	..	..	..	..	..	..	19	26	19	..	38
Jordan and Innisfail	69	96	..	..	96	..	..	..	..	..	104	96	61	54	..	..	54	1	..	..	..	..	59	54	..	42
Mackay Fields	..	..	..	..	..	..	..	..	..	49	63	49	50	111	..	..	111	5	..	..	..	..	111	111	62	..
Mareeba	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Maryborough	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	.
Mossman	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	.	..	..	..	..	..	..
Mount Coolon	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Mount Morgan	806,200	..	..	74,795	74,795	2,408,405	..	..	..	..	97,421	74,795	946,300	..	..	61,807	61,807	2,742,950	..	..	..	..	89,775	61,807	..	12,988
Mount Perry Fields	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Mount Peter Prov. Field	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	2	..	..	..	2	2	..
Mount Shamrock, Biggenden, &c.	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	.
Mulgrave	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Nanango	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	.
Oaks	..	..	..	..	..	..	..	..	..	8	9	8	..	..	..	..	..	..	..	..	..	3	3	3	..	5
Palmer	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	
Ravenswood	6	1	..	..	1	..	..	..	..	4	7	5	5	1	..	..	1	..	..	..	..	4	6	5	..	13
Rockhampton	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	2	2	2	1	
Russell	..	..	..	..	..	..	..	..	..	13	14	13	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Stanthorpe and Pikedale	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Toowoomba	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Townsville	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Warwick Fields	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Wenlock	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Woolgar	275	116	..	..	116	8	..	..	..	2	152	118	78	17	..	..	17	..	..	..	..	1	20	18	..	100
Other Sources	Nil	..	..	..	..	..	..	..	..	..	..	..	Nil	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	844,119	16,085	99	74,795	90,979	2,416,153	80	7	218	292	137,690	†91,496	979,874	13,587	45	61,807	75,439	2,749,246	15	2	211	200	123,347	††75,852	131	15,775

† Approximate value in Australian Currency £1,429,625. In addition a distribution of Gold Premium totalling £140 7s. 7d. was made to members in Queensland of Gold Producers' Association Limited in respect of Gold lodged during 1959.

†† Approximate value in Australian Currency £1,185,188. In addition a distribution of Gold Premium totalling £4,283 9s. 3d. was made to members in Queensland of Gold Producers' Association Limited in respect of Gold lodged during 1960.

Less Increase	131
Net Decrease for 1960	15,634

Table B

MINERALS OTHER THAN GOLD, 1959–60

TABLE SHOWING THE QUANTITY AND VALUE OF MINERALS OTHER THAN GOLD WON DURING 1959 AND 1960

Mineral Field or District	1959					1960				
	Nature of Minerals Won	Quantity		Value of Various Minerals	Gross Value of Various Minerals	Nature of Minerals Won	Quantity		Value of Various Minerals	Gross Value of Various Minerals
		Tons	Oz.	£	£		Tons	Oz.	£	£
Anakie	Copper	1/4	..	75		Gems	..	..	..	2,323
	†Silver	..	9	4						
	Gems	..	..	1,062						
					1,141					
Balcooma	Nil	..	..	..	..	Nil	..	..	..	..
Biggenden	Limestone and Lime	363	..	..	1,270	Limestone and Lime	451	..	1,578	..
						Silver		2	1	1,579
Bowen	Coal	478,509	..	..	1,501,009	Coal	411,821	..	..	1,439,573
						Rutile	13,535		796,730	
Brisbane	Rutile	14,816	..	898,585		Zircon	8,193	..	93,041	
	Zircon	8,746	..	97,713		Monazite	52	..	2,303	
	Monazite	24 3/4	..	3,230		Ilmenite	22	..	113	
	Brick Clay ..	204,502	..	63,080		Brick Clay ..	217,217	..	76,433	
					1,062,608	Silica	14,919	..	21,073	
										989,693
Bundaberg	Brick Clay ..	2,319	..	3,478		Brick Clay ..	2,814	..	4,221	
	Building Stone ..	61,564	..	20,522		Copper	1/2	..	102	
					24,000					4,323
Burketown	*Lead	376 1/4	..	30,861		*Lead	466 1/2	..	42,187	
	†Silver	..	7,460	2,955		†Silver	..	9,270	3,810	
					33,816					45,997
Charters Towers ..	†Silver	..	14,257	5,709		†Silver	..	11,999	4,593	
	Lead	16	..	1,574		Lead	49 1/2	..	4,679	
	Tin Concentrates	1 3/4	..	1,052		Tin Concentrates	3	..	1,378	
					8,335					10,650
Chillagoe	Fluorspar ..	460	..	4,600						
	Limestone and Lime	2,555	..	11,730		Limestone and Lime	2,790	..	19,313	
	Tin Concentrates	159 3/4	..	95,677		Tin Concentrates	120 1/4	..	66,397	
					112,007					85,710
Claudie River ..	Nil	..	..	..		Nil	..	..	..	..
Clermont	Coal	175,573	..	..	263,358	Coal	170,606	..	..	255,900
Cloncurry	Copper	280 1/2	..	85,610		Copper	199	..	67,019	..
	Silver	..	29,175	9,037		Silver	..	16,919	5,557	..
	Limestone Flux ..	3,705	..	16,915		Limestone ..	9,436	..	21,585	..
	Limestone ..	16,797	..	39,124		Manganese ..	1,658	..	5,785	..
	Manganese ..	195	..	1,643		Uranium	663	..	6,509,718	
	Uranium	651 1/2	..	6,449,267						6,609,664
					6,601,596					
Coen	Nil	..	..	..	..	Nil	..	..	..	..
Cooktown	Tin Concentrates	17 1/4	..	..	9,236	Tin Concentrates	30 1/4	..	..	16,645
Cracow	†Silver	..	19,661	..	7,740	†Silver	..	15,886	..	6,288
Croydon	Nil	..	..	..	..	Nil	..	..	..	..
Eidsvold	Coal	18,890	..	..	59,831	Coal	17,330	..	..	56,117
Etheridge	Nil	..	..	..	..	Nil	..	..	..	..
Gladstone	‡Copper	17	..	5,472		‡Copper	5	..	1,420	
	†Silver	..	3	1		Limestone ..	5,160	..	28,000	
	Limestone ..	4,200	..	23,100		Manganese ..	339	..	3,866	
	Manganese ..	3,336	..	35,197						33,286
					63,770					
Glenbar District ..	Nil	..	..	..	..	Nil	..	..	..	
Gympie, Kilkivan and Glastonbury	Rutile	1,154	..	93,580		Manganese ..	1,713	..	27,220	
	Zircon	2,395	..	27,995		Limestone and Lime	2,936	..	10,648	
	Monazite	30 1/2	..	3,965		Brick Clay ..	5,791	..	2,896	
	Limestone and Lime	2,412	..	9,637		Pottery Clay ..	1	..	4	
	Manganese ..	6,135	..	92,025		Rutile	916	..	63,575	
					227,202	Zircon	1,887	..	22,446	
						Monazite	52	..	2,080	
										128,869
Hamilton	Nil	..	..	..	..	Nil	..	..	..	..
Hayes Creek ..	Nil	..	..	..	..	Nil	..	..	..	..
Herberton	Tin Concentrates	1,302 1/2	..	..	836,052	Tin Concentrates	1,029 3/4	..	..	677,012
Hughenden	Nil	..	..	..	..	Nil	..	..	..	
Ingham	Tin Concentrates	2	..	1,178		Tin Concentrates	2 1/4	..	1,266	
	*Copper	30 1/2	..	9,487		*§Copper	17	..	4,915	
	†Silver	..	90	37		Brick Clay ..	2,519	..	630	
	Brick Clay ..	2,062	..	516						
					11,218					6,811
Innisfail	Brick Clay ..	4,000	..	..	2,000	Silver	..	2	1	
						Brick Clay ..	1,000	..	500	
										501
Ipswich	Coal	1,520,521	..	4,495,279		Coal	1,628,633	..	4,946,838	
	Dolomite	2,000	..	471		Dolomite	2,139	..	4,632	
	Brick Clay ..	7,964	..	1,840		Brick and Pipe Clay	13,012	..	3,269	
	Fire Clay	8,349	..	2,460		Fire Clay	9,319	..	2,834	
					4,500,050					4,957,573
Kangaroo Hills ..	Tin Concentrates	35 1/2	..	..	14,331	Tin Concentrates	34 1/4	..	..	15,969

* Product of ore concentrates treated at metallurgical works off the field.
† By products from other ores.
‡ From precipitates.
§ This does not include the copper content of ore shipped to Japan during 1960 of which no details are yet available.

Table B—*continued*

MINERALS OTHER THAN GOLD, 1959-60—*continued*

TABLE SHOWING QUANTITY AND VALUE OF MINERALS OTHER THAN GOLD WON DURING 1959 AND 1960—*continued*

Mineral Field or District	1959					1960				
	Nature of Minerals Won	Quantity		Value of Various Minerals	Gross Value of Various Minerals	Nature of Minerals Won	Quantity		Value of Various Minerals	Gross Value of Various Minerals
		Tons.	Oz.	£	£		Tons.	Oz.	£	£
Mackay	Brick Clay	335	..	300		†Silver	..	25	9	
	*Copper	1	..	343		*Copper	1	..	228	
	†Silver	..	40	16		Fire Clay	2,934	..	1,955	
					659					2,192
Mareeba	Brick Clay	7,142	..	2,840		Tin Concentrates	7½	..	3,645	
	Tin Concentrates	4½	..	2,316		Brick Clay	9,567	..	3,830	
	Limestone	57	..	172						7,475
					5,328					
Maryborough	Brick and Pipe Clay	15,597	..	11,175		Brick and Pipe Clay	18,040	..	11,848	
	Coal	122,709	..	451,763		Coal	121,692	..	471,042	
					462,938					482,890
Mossman	Tin Concentrates	¾	..	..	450	Tin Concentrates	¾	..	400	
						Limestone and Lime	80	..	250	
Mount Coolon	Nil	..	..	..	..	Nil	..	..	..	650
Mount Isa	Copper	40,132	..	12,517,124		Copper	42,774	..	13,875,336	
	¶Copper	16,650	..	5,233,284		¶Copper	28,113	..	9,119,933	
	‡Copper	896	..	272,865		‡Copper	652	..	202,442	
	†Silver	..	4,391,902	1,796,408		†Silver	..	4,422,705	1,825,256	
	‡Silver	..	292,001	118,596		‡Silver	..	238,333	97,222	
	Lead	49,555	..	4,400,920		Lead	52,676	..	4,713,423	
	‡Lead	3,173	..	392,614		‡Lead	2,837	..	340,458	
	Zinc	13,983	..	1,452,704		Zinc	24,394	..	2,707,415	
	Limestone Flux	2,455	..	7,972		Limestone	7,486	..	19,100	
	Limestone	23,608	..	91,836						32,900,585
	Beryllium Ore	½	..	78						
					2e,284,401					
Mount Morgan	†Copper	7,695¼	..	2,399,128		†Copper	8,393	..	2,731,403	
	†Silver	..	22,626	9,277		†Silver	..	27,968	11,547	
	Coal	103,718	..	174,387		Coal	126,736	..	213,458	
	Fire Clay	94	..	59		Fire Clay	318	..	196	
	Pyrites	17,410	..	52,230		Pyrites	18,720	..	56,160	
					2,635,081					3,012,764
Mount Perry	Nil	..	..	..	..	Copper	½	..	..	161
Mount Peter and Cairns	Nil	..	..	..	..	Nil	..	..	..	
Nanango	Brick Clay	2,789	..	496		Brick Clay	2,602	..	641	
	Pottery Clay	116	..	453		Pottery Clay	29	..	116	
	Kaolin	20	..	104		Kaolin	37	..	149	
	Marble	164	..	369		Bentonite Clay	173	..	1,730	
	Bentonite Clay	96	..	960	2,382			..		2,636
Oaks	Nil	..	..	..	..	Nil	..	..		
Palmer	Nil	..	..	..	..	Nil	..	..	..	
Ravenswood	Nil	..	..	..	..	Nil	..	..	..	
Rockhampton	Coal	73,636	..	267,185		Coal	75,942	..	293,230	
	Brick Clay	5,167	..	5,167		Limestone and Lime	12,609	..	39,879	
	Ironstone	120	..	840		Brick Clay	5,342	..	5,342	
	Limestone and Lime	6,283	..	35,322		Ironstone	529½	..	4,244	
	Salt	11,054	..	44,216		Salt	9,500	..	27,608	
	Silica	639	..	1,437		Silica	962½	..	2,166	
					354,167			..		372,469
Roma	Coal	21,514	..	..	68,385	Coal	22,519	..	..	76,027
Russell	Tin	¼	..	..	47	Nil	..	..	..	
Southport	Rutile	3,759	..	189,918		Rutile	2,578	..	110,524	
	Zircon	3,980	..	58,884		Zircon	5,065	..	67,577	
	Monazite	30	..	1,655		Monazite	41	..	1,627	
	Ilmenite	25	..	144		Ilmenite	46	..	466	
	Garnet	48	..	348		Garnet	97	..	751	
	Silica	955	..	3,891		Brick Clay	16,220	..	7,498	
	Brick Clay	1,455	..	4,658		Perlite	796	..	438	
	Perlite	708	..	389		Bauxite	2,093	..	6,279	
					259,887					195,160
Stanthorpe	Tin Concentrates	16¼	..	9,944		Tin Concentrates	7	..	4,665	
	Limestone	12,868	..	13,500		Limestone	13,847	..	6,923	
					23,444					11,588
Toowoomba	Coal	60,198	..	172,754		Coal	63,123	..	185,987	
	Brick Clay	23,152	..	5,809		Brick Clay	23,664	..	5,803	
	Building Stone	1,233	..	12,305		Building Stone	907	..	12,328	
					190,868					204,118
Torres Strait Islands and Cape York	Tin Concentrates	5¾	..	..	3,110	Tin Concentrates	1¼	..	513	
						Bauxite	30,000	..	75,000	75,513
Townsville	Brick Clay	12,527	..	1,252		Limestone	90,397	..	65,025	
	Ironstone	1,323	..	3,340		Ironstone	1,758	..	4,395	
	Limestone	92,644	..	55,332		Brick Clay	15,796	..	1,874	
					59,924					71,294
Warwick	Coal	19,119	..	64,335		Coal	18,240	..	64,373	
	Rhodonite	1	..	190		Rhodonite	¼	..	40	
	Limestone	545	..	1,910		Limestone	567		2,268	
	Brick Clay	900	..	60		Brick Clay	1,000		60	
					66,495					66,741
Wenlock	Nil	..	..	..	..	Nil	..	..	..	
Woolgar	†Silver	21	..	..	8	Nil	..	..	..	
Opal Districts	Opal	..	..	..	842	Opal	..	..	..	416
Other Sources	Other Sources	..	..	..	..	Nil	..	..	..	
Total					£45,640,566					£52,827,162

* Product of ore concentrates treated at metallurgical works off the field.
‡ Product of copper-lead dross from Mount Isa Mines Ltd. treated overseas.
¶ The copper content of concentrates sold for treatment overseas.
† By products from other ores.

SYNOPSIS

Minerals	1959 Total Quantity Won Oz.	1959 Total Quantity Won *Tons	1959 Value £	Minerals	1960 Total Quantity Won Oz.	1960 Total Quantity Won *Tons	1960 Value £
Bentonite Clay	..	96	960	Bauxite	..	32,093	81,279
Beryllium Ore	..	½	78	Bentonite Clay	..	173	1,730
Building Stone	..	61,787	32,827	Building Stone	..	907	12,328
Clay, (Brick and Pipe)	..	289,931	102,671	Clay (Brick and Pipe)	..	334,584	124,845
Clay (Pottery)	..	116	453	Clay (Pottery)	..	30	120
Coal	..	2,594,387	7,518,286	Coal	..	2,656,642	8,002,545
§Copper	..	65,702½	20,523,388	Copper	..	80,155	26,002,959
Dolomite	..	2,000	471	Dolomite	..	2,139	4,632
Fire Clay	..	8,443	2,519	Fireclay	..	12,571	4,985
Fluorspar	..	460	4,600	Gems	..	..	2,323
Gems	..	..	1,062	Ironstone	..	2,287½	8,639
Ironstone	..	1,443	4,180	Kaolin	..	37	149
Kaolin	..	20	104	Lead	..	56,029	5,100,747
Lead	..	53,120¼	4,825,969	Limestone and Lime	..	145,759	214,569
Limestone and Lime	..	168,512	307,820	Manganese	..	3,710	36,871
Manganese	..	9,666	128,865	Opal	..	..	416
Marble	..	164	369	Perlite	..	796	438
Opal	..	..	842	Pyrites	..	18,720	56,160
Perlite	..	708	389	Rhodonite	..	¼	40
Pyrites	..	17,410	52,230	Salt	..	9,500	27,608
Rhodonite	..	1	190	Silica	..	15,881½	23,239
Salt	..	11,054	44,216	Silver	4,743,109	..	1,954,284
Silica	..	1,594	5,328	Tin Concentrates	..	1,236¼	787,890
Silver	4,777,245	..	1,949,788	Uranium	..	663	6,509,718
Tin Concentrates	..	1,546¾	973,393	Zinc	..	24,394	2,707,415
Uranium	..	651½	6,449,267	Zircon–Rutile–Ilmenite–Monazite–Garnet Concentrates containing :—			
Zinc	..	13,983	1,452,704				
Zircon–Rutile–Ilmenite–Monazite–Garnet Concentrates containing :—				Rutile	..	17,029	970,829
				Zircon	..	15,145	183,064
Rutile	..	19,729	1,182,083	Monazite	..	145	6,010
Zircon	..	15,121	184,592	Ilmenite	..	68	579
Monazite	..	85¼	8,850	Garnet	..	97	751
Ilmenite	..	25	144				
Garnet	..	48	348				
Total	..	..	£45,758,986	Total	..	..	£52,827,162

Total Value Mineral Production including Gold † 1960 .. .. £54,012,350 ¶

Total Value Mineral Production including Gold † 1959 .. .. £47,188,611 ‖

* Ton = 2,240 lb. † Gold calculated at value in Australian Currency

¶ In addition a distribution of Gold Premium totalling £4,283 9s. 3d. was made to members in Queensland of Gold Producers' Association Limited in respect of gold lodged during 1960

‖ In addition a distribution of Gold Premium totalling £140 7s. 7d. was made to members in Queensland of Gold Producers' Association Limited in respect of gold lodged during 1959

§ This production figure includes 1,414·6 tons valued at £433,477 18s. 9d. the Copper contents of concentrates sold in November and December 1958 for treatment overseas.

Table C

Showing Approximately the Quantity and Value of Minerals Raised since 1860
(Ton = 2,240 lb.)

Year	Copper *		Silver *		Lead *		Antimony Ore		Coal	
	Tons	Value	Oz.	Value	Tons	Value	Tons	Value	Tons	Value
To—		£		£		£		£		£
1950 ..	488,111 1/10	37,330,718	63,850,979	7,913,162	700,226 7/20	24,301,352	4,959 4/5	77,774	61,415,340	49,383,137
1951 ..	4,726 4/5	1,205,597	2,764,755	1,096,375	33,075 3/4	6,520,962	55 17/20	6,610	2,473,775	4,490,154
1952 ..	6,235 9/10	1,902,267	3,435,261	1,323,235	39,395 1/5	6,564,910	43 7/20	4,199	2,742,236	5,905,377
1953 ..	21,409 1/10	6,589,365	2,906,314	1,105,931	36,167 1/2	3,511,906	16 11/20	1,221	2,516,812	5,822,110
1954 ..	27,747 1/2	8,771,738	3,409,439	1,294,261	40,714 3/4	4,919,641	15 1/2	1,376	2,760,810	6,418,388
1955 ..	28,227 1/5	12,171,444	3,775,048	1,512,245	40,681 18/20	5,387,477	23 9/20	1,099	2,747,165	6,857,833
1956 ..	37,167 10/20	16,085,756	3,953,333	1,625,407	43,933 9/20	6,392,714	..	..	2,734,659	7,076,824
1957 ..	35,797 3/5	10,229,661	4,302,649	1,737,553	50,825 1/2	6,141,499	3/10	26	2,701,577	7,263,474
1958 ..	46,931 1/10	12,589,344	5,262,013	2,083,980	60,027 3/20	5,524,580	..	..	2,580,373	7,123,469
1959 ..	65,702 1/2	20,523,388	4,777,245	1,949,788	53,120 5/20	4,825,969	..	..	2,594,387	7,518,286
1960 ..	80,155	26,002,959	4,743,109	1,954,284	56,029	5,100,747	..	..	2,656,642	8,002,545
Totals	832,211 3/4	153,402,237	103,150,462	23,597,221	1,154,196 4/5	79,191,757	5,114 4/5	92,305	87,913,776	115,861,697

Year	Tin Concentrates		Opal Value	Gems Value	Bismuth		Wolfram		Manganese	
	Tons	Value			Tons	Value	Tons	Value	Tons	Value
To—		£	£	£		£		£		£
1950 ..	175,371 4/5	15,259,613	195,435	674,828	808 3/10	147,400	12,403 13/20	1,568,363	23,482 1/5	96,354
1951 ..	487 3/5	308,089	1,117	1,135	..	..	160 1/20	287,824	..	..
1952 ..	471 9/20	328,750	1,150	990	0 1/40	34	233 3/4	386,356	..	..
1953 ..	411 21/40	222,657	1,350	6,725	0 7/20	121	192 9/10	221,231	43	510
1954 ..	1,034 1/20	537,852	950	636	..	..	58 7/10	40,754	137 1/2	1,932
1955 ..	1,089 3/4	603,240	1,350	3,412	..	..	80 3/4	69,319	78 5/20	1,149
1956 ..	883 1/4	531,227	1,337	691	11/20	170	69 13/20	64,602	311	4,890
1957 ..	1,154 7/10	622,555	1,050	20	..	..	29 11/20	16,805	1,239	19,332
1958 ..	1,423 9/10	807,909	1,450	813	..	..	7 3/5	2,397	7,068	97,391
1959 ..	1,546 3/4	973,393	842	1,062	..	..	..	..	9,666	128,865
1960 ..	1,236 1/4	787,890	416	2,323	..	..	..	..	3,710	36,871
Totals ..	185,111 1/40	20,983,175	206,447	692,635	809 9/40	147,725	13,236 3/5	2,657,651	45,734	287,294

Year	Molybdenite, &c.		Limestone and Lime		Ironstone		Sheelite		Graphite	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
To—		£		£		£		£		£
1950 ..	3,470 3/10	634,034	3,498,180	2,079,937	629,610	545,921	94 1/5	20,617	1,888 19/20	16,497
1951 ..	3/5	203	48,518	93,392	1,603	4,374	3	5,134	28 3/5	283
1952 ..	0 1/10	22	51,267	120,804	1,253	3,841	9 9/20	13,102	75 1/5	974
1953 ..	2 3/20	965	55,240	158,779	773	3,092	1/10	3,263	..	..
1954 ..	17/20	404	73,025	238,058	162	584	1/4	102	70	2,100
1955 ..	2 4/5	1,531	120,872 1/2	215,786	924	4,822	1/20	36	..	..
1956 ..	1/10	100	138,456	212,049	4,093	10,761	4 3/4	4,277	9	207
1957 ..	2 3/4	1,872	183,408	259,552	6,010	22,761	2 1/10	1,122	..	..
1958 ..	4 1/2	2,874	227,845	384,201	1,733	7,538	..	..	..	..
1959 ..	..	..	168,512	307,820	1,443	4,180	..	..	..	..
1960 ..	..	..	145,759	214,569	2,287 1/2	8,639	..	..	..	..
Totals ..	3,484 1/10	642,005	4,712,082 1/2	4,284,947	649,891 1/2	616,513	115 9/10	47,653	2,071 3/4	20,061

Year	Fireclay		Arsenic		Scheelite-Wolfram		Fluorspar		Chromite		Marble		Quartz		Whiting	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
To—		£		£		£		£		£		£		£		£
1950	108,895	30,342	4,250 1/2	124,095	2	350	28,255 11/20	97,936	4,331	8,555	6,063 1/4	47,473	976	276	10	80
1951	..	..	..	..	..	..	277	2,768	1,380	4,831	904	4,521	..	..	..	..
1952	9,078	3,250	..	..	..	..	85 4/5	857	625	2,186	801	4,977	..	..	..	..
1953	8,038	3,074	..	..	..	..	206 3/4	2,161	1,046	3,605	550	2,549	..	..	..	..
1954	8,459	3,960	..	..	..	..	18 1/2	332	673	2,694	676	2,954	..	..	..	..
1955	8,812	3,979	..	..	..	..	244 3/20	2,487	..	..	89 1/2	175	..	..	..	..
1956	8,508	4,744	..	..	..	..	628 1/10	6,510	..	..	252	568	..	..	..	..
1957	8,526	3,521	..	..	..	..	601 1/2	6,309	..	..	535	1,150	..	..	..	..
1958	7,161	451	..	..	..	..	918	9,180	..	..	323	704	..	..	..	..
1959	8,443	2,519	..	..	..	..	460	4,600	..	..	164	369	..	..	..	..
1960	12,571	4,985	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Totals	188,491	60,825	4,250 1/2	124,095	2	350	31,695	133,140	8,055	21,871	10,357 3/4	65,440	976	276	10	80

Year	Phosphate Rock		Cobalt		Mica		*Zinc		Magnesite		Silica		Agate		Quartz Crystal	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Cwt.	Value	Cwt.	Value
To—		£		£		£		£		£		£		£		£
1950	434	1,849	766 3/4	157,894	1 27/40	814	304,120 1/4	13,083,190	1,204	1,801	1,884	1,117	7	67	15	124
1951	..	..	..	..	..	..	21,743	4,550,686	12 1/2	50	..	..	..	..	..	..
1952	..	..	..	..	..	..	23,682 17/20	4,471,637	13 7/20	53	..	..	..	..	..	..
1953	..	..	..	..	..	..	19,944 2/5	1,817,123	..	..	..	..	..	..	..	..
1954	..	..	..	..	..	..	19,615	1,912,208	..	..	..	..	..	..	..	..
1955	..	..	..	..	..	..	17,151	1,940,315	..	..	10	25	..	..	..	..
1956	..	..	..	..	..	..	16,331	2,005,243	..	..	..	..	..	..	..	..
1957	..	..	..	..	..	..	19,445	1,984,568	..	..	3,129	10,058	..	..	..	..
1958	..	..	..	..	9 7/10	152	17,484	1,436,921	20	600	4,280	15,588	..	..	..	..
1959	..	..	..	..	..	..	13,983	1,452,704	..	..	1,594	5,328	..	..	..	..
1960	..	..	..	..	..	..	24,394	2,707,415	..	..	15,881 1/2	23,239	..	..	..	..
Totals	434	1,849	766 3/4	157,894	11 3/8	966	497,893 1/2	36,362,010	1,249 17/20	2,504	26,778 1/2	55,355	7	67	15	124

For details of individual years prior to 1951—see Annual Reports for 1959 and previous.

Table C—continued

Showing Approximately the Quantity and Value of Minerals Raised since 1860—*continued*
(Ton = 2,240 lb.)

Year	Alunite		Mercury		Diatomite		Dolomite		Bentonitic Clay		Zircon-Rutile-Ilmenite-Monazite-Garnet Concentrates		Beryllium Ore		Tantalite	
	Tons	Value	Lb.	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Lb.	Value
		£		£		£		£		£		£		£		£
To—																
1950	3 3/20	38	20,006	11,948	2,439	7,479	40,725	70,745	1,466	6,510	99,124	1,289,044	40 7/20	1,651	182	60
1951	..	..	..	..	400	1,000	7,365	15,757	370	2,960	19,703	391,001	10 9/10	934	..	..
1952	..	..	..	..	450	1,111	8,074	29,012	240	2,120	24,104	652,146	..	..	..	..
1953	..	..	..	..	100	500	8,300	26,740	200	1,600	27,918	969,983	..	..	..	..
1954	..	..	..	..	676	1,352	2,680	1,746	126	908	32,136	890,836	7 1/5	1,251	..	..
1955	..	..	..	..	531	3,592	5,318	3,630	125	1,000	35,555 13/20	1,154,257	..	..	..	..
1956	..	..	..	..	77	404	5,510	6,807	..	..	44,728	1,823,370	..	..	..	..
1957	..	..	..	..	53 1/2	133	5,493	6,919	114	1,368	55,389 1/20	2,523,852	1/10	170	..	..
1958	..	..	..	..	29	73	2,779	5,837	86	860	38,546	1,761,266	11 9/10	1,902	..	..
1959	..	..	..	..	..	..	2,000	471	96	960	35,008 1/4	1,376,017	1/2	78	..	..
1960	..	..	..	..	..	..	2,139	4,632	173	1,730	32,484	1,161,233	..	..	..	..
Totals	3 3/20	38	20,006	11,948	4,755 1/2	15,644	90,383	172,296	2,996	20,016	444,695 19/20	13,993,005	70 1/5	5,986	182	60

Year	Kaolin, Pottery Clay and other similar Clays		Bauxite		Clay (Bricks and Pipe)		Cadmium		Pyrites		Tin (from Slag)		Tin-Lead (from Slag)		Perlite	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		£		£		£		£		£		£		£		£
To—																
1950	253 1/2	941	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1951	2,949	3,794	..	..	213,767	76,399	4 4/5	7,754	*32,092	61,332	..	..	..	..	..	..
1952	861	1,828	..	..	194,716	64,741	2 3/20	1,948	66,750	186,233	8	2,453	14 1/2	7,347	..	..
1953	1,831	3,423	..	..	251,771	72,181	10 1/5	2,664	35,480	97,059	..	..	..	..	..	..
1954	1,104	2,623	‡5,590	8,690	277,468	84,818	10 1/2	2,099	85,750	245,451	..	..	..	..	..	..
1955	576	1,759	1,725	5,661	264,711	102,533	..	..	77,400	232,200	..	..	..	..	..	..
1956	558	2,842	875	2,391	264,260	121,378	..	..	10,250	30,750	..	..	..	..	339	2,361
1957	195	608	988	2,791	204,841	100,830	..	..	25,160	75,480	33 1/2	4,000	..	..	..	..
1958	159	598	1,191	3,838	223,738	110,398	..	..	7,890	23,670	..	..	..	..	300	165
1959	136	557	..	..	289,931	102,671	..	..	17,410	52,230	..	..	..	..	708	389
1960	67	269	32,093	81,279	334,584	124,845	..	..	18,720	56,160	..	..	..	..	796	438
Totals	8,689 1/2	19,242	42,462	104,650	2,519,787	1,160,794	27 13/20	14,465	376,902	1,060,565	41 1/2	6,453	14 1/2	7,347	2,143	3,353

* Comprises sales of Pyrites from 1949 to 1951 and not previously recorded
‡ Includes 4,775 tons valued at £7,165 being production for 1941 to 1953 inclusive and not previously recorded

Year	Rhodonite		Uranium		Salt		Building Stone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		£		£		£		£
1958	..	..	250 9/10	2,566,818	1,253	6,265	25,198	17,900
1959	1	190	651 1/2	6,449,267	11,054	44,216	62,787	32,827
1960	1/4	40	663	6,509,718	9,500	27,608	907	12,328
Totals ..	1 1/4	230	1,565 2/5	15,525,803	21,807	78,089	88,892	63,055

Synopsis of Value of Minerals Raised each Year, since 1860

Year	Value	Year	Value	Year	Value	Year	Value
	£		£		£		£
1860	9,294	1886	327,767	1912	2,697,376	1938	2,664,465
1861	11,372	1887	446,449	1913	2,729,113	1939	3,166,532
1862	29,585	1888	456,214	1914	1,916,606	1940	3,786,815
1863	45,000	1889	417,519	1915	2,264,158	1941	4,173,138
1864	75,500	1890	459,331	1916	3,107,056	1942	4,055,575
1865	77,865	1891	320,145	1917	3,251,338	1943	3,582,738
1866	113,121	1892	366,582	1918	3,173,554	1944	3,976,097
1867	93,766	1893	374,579	1919	1,957,924	1945	3,727,566
1868	84,539	1894	272,559	1920	2,972,513	1946	4,131,657
1869	82,137	1895	285,089	1921	1,284,932	1947	7,829,151
1870	93,132	1896	287,649	1922	1,482,980	1948	8,534,239
1871	184,022	1897	231,363	1923	1,823,896	1949	11,046,392
1872	321,936	1898	212,362	1924	1,846,610	1950	15,085,936
1873	814,211	1899	301,501	1925	1,815,559	1951	‡19,145,036
1874	544,491	1900	308,355	1926	1,564,827	1952	21,987,910
1875	375,054	1901	572,810	1927	1,484,670	1953	20,651,888
1876	360,887	1902	589,961	1928	1,330,521	1954	25,390,698
1877	327,034	1903	846,283	1929	1,666,929	1955	30,282,356
1878	145,169	1904	989,307	1930	1,230,012	1956	36,018,380
1879	178,266	1905	1,208,980	1931	1,209,383	1957	31,039,069
1880	190,146	1906	1,885,183	1932	1,685,684	1958	34,589,132
1881	259,528	1907	2,153,225	1933	1,713,148	1959	45,758,986
1882	332,734	1908	1,868,933	1934	1,791,296	1960	52,827,162
1883	333,816	1909	1,721,386	1935	2,050,193		
1884	262,826	1910	1,835,267	1936	2,625,373		
1885	322,319	1911	2,020,740	1937	3,337,734	Total £	473,891,595

‡ Amended figure following adjustment of 1951 production Zircon-Rutile concentrates

Table D

Yield of Gold in the Several Australian States for the Years 1959 and 1960 (from Returns Kindly Furnished by the Commonwealth Government Statistician, Canberra).

State or Dominion	Gold	
	1959	1960
Western Australia	860,969	869,967
Queensland	91,496	75,852
Victoria	34,662	28,566
New South Wales	13,275	13,628
Tasmania	21,000	23,994
Northern Territory	63,141	72,030
South Australia	16	36
Total Australia ..	1,084,559	1,084,073
New Zealand	37,662	33,326

Table H

Comparative Statement of Revenue Collected During the Years 1959 and 1960

1959	1960
£366,765 19s. 9d.	£466,578 9s. 0d.

Increase, 1960 = £99,812 9s. 3d.

Table M

Estimated Yield of Gold in Queensland to the end of 1960

Year	Estimated Yield	Total of Each Field
	Fine Oz.	Fine Oz.
Croydon Goldfield		
To end of 1947	772,374	
During 1952	6	
„ 1957	14	
„ 1958	4	
		772,398
Cloncurry, Calliope, Clermont, Paradise, Normanby, and other small Goldfields		
To end of 1950	1,038,939	
During 1951	4,668	
„ 1952	6,612	
„ 1953	5,252	
„ 1954	3,225	
„ 1955	621	
„ 1956	725	
„ 1957	833	
„ 1958	435	
„ 1959	357	
„ 1960	334	
		1,062,001
Hamilton Goldfield		
To end of 1950	47,434	
During 1951	40	
„ 1955	2	
„ 1956	2	
		47,478
Chillagoe Field		
To end of 1948	56,153	
During 1955	65	
		56,218
*** Mareeba Field**		
To end of 1950	134	
During 1951	14	
„ 1953	17	
„ 1954	2	
„ 1955	13	
„ 1957	1	
„ 1958	3	
		184
Gympie Goldfield		
To end of 1950	3,425,503	
During 1951	1,056	
„ 1952	1,409	
„ 1953	858	
„ 1954	332	
„ 1955	72	
„ 1956	24	
		3,429,274
Hodgkinson Goldfield †		
To end of 1908 †	†229,706	
		229,706
Palmer Goldfield		
To end of 1950	1,333,971	
During 1951	4	
„ 1952	4	
„ 1954	5	
„ 1955	10	
„ 1956	15	
„ 1957	28	
		1,334,037
Charters Towers and Cape River Goldfields		
To end of 1950	6,795,882	
During 1951	1,782	
„ 1953	377	
„ 1953	474	
„ 1954	512	
„ 1955	859	
„ 1956	1,336	
„ 1957	1,088	
„ 1958	853	
„ 1959	581	
„ 1960	365	
		6,804,109
Rockhampton and Mount Morgan Goldfields**		
To end of 1950	6,014,613	
During 1951	64,110	
„ 1952	65,828	
„ 1953	52,233	
„ 1954	80,673	
„ 1955	47,933	
„ 1956	52,018	
„ 1957	45,847	
„ 1958	54,608	
„ 1959	74,796	
„ 1960	61,809	
		6,614,468
Mount Coolon Goldfield		
To end of 1942	178,944	
		178,944
Eidsvold Goldfield		
To end of 1950	101,114	
		101,114
Cracow Goldfield		
To end of 1950	284,750	
During 1951	6,669	
„ 1952	10,242	
„ 1953	12,769	
„ 1954	13,961	
„ 1955	15,707	
„ 1956	16,135	
„ 1957	16,992	
„ 1958	15,550	
„ 1959	15,631	
„ 1960	13,314	
		421,720

Year	Estimated Yield	Total of Each Field
	Fine Oz.	Fine Oz.
Etheridge, Oaks, and Woolgar Goldfields		
To end of 1950	670,125	
During 1951	38	
„ 1952	52	
„ 1953	64	
„ 1954	22	
„ 1955	6	
„ 1956	22	
„ 1957	28	
„ 1958	47	
„ 1959	126	
„ 1960	25	
		670,555
Coen Goldfield		
To end of 1950	55,934	
During 1951	16	
„ 1955	8	
„ 1956	12	
		55,970
Ravenswood Goldfield		
To end of 1950	900,373	
During 1951	183	
„ 1952	112	
„ 1953	151	
„ 1954	22	
„ 1956	5	
„ 1957	3	
„ 1958	11	
„ 1959	5	
„ 1960	5	
		900,870

Synopsis

	Fine Oz.
Total yield to end of 1880	3,019,057
For the year 1881	225,431
Ditto 1882	185,009
Ditto 1883	173,460
Ditto 1884	250,127
Ditto 1885	250,137
Ditto 1886	279,488
Ditto 1887	348,890
Ditto 1888	397,972
Ditto 1889	634,605
Ditto 1890	513,819
Ditto 1891	477,976
Ditto 1892	509,541
Ditto 1893	510,342
Ditto 1894	548,595
Ditto 1895	506,285
Ditto 1896	502,146
Ditto 1897	600,949
Ditto 1898	647,487
Ditto 1899	668,227
Ditto 1900	676,027
Ditto 1901	598,382
Ditto 1902	640,463
Ditto 1903	668,546
Ditto 1904	639,151
Ditto 1905	592,620
Ditto 1906	544,636
Ditto 1907	465,882
Ditto 1908	465,085
Ditto 1909	455,577
Ditto 1910	441,400
Ditto 1911	386,164
Ditto 1912	347,946
Ditto 1913	265,735
Ditto 1914	249,468
Ditto 1915	249,711
Ditto 1916	215,162
Ditto 1917	179,305
Ditto 1918	133,571
Ditto 1919	121,030
Ditto 1920	115,230
Ditto 1921	40,376
Ditto 1922	80,584
Ditto 1923	88,726
Ditto 1924	98,841
Ditto 1925	46,406
Ditto 1926	10,339
Ditto 1927	37,979
Ditto 1928	13,277
Ditto 1929	9,476
Ditto 1930	7,821
Ditto 1931	13,147
Ditto 1932	23,263
Ditto 1933	91,997
Ditto 1934	115,471
Ditto 1935	102,990
Ditto 1936	121,174
Ditto 1937	127,281
Ditto 1938	151,432
Ditto 1939	147,248
Ditto 1940	126,831
Ditto 1941	109,064
Ditto 1942	95,117
Ditto 1943	62,838
Ditto 1944	51,223
Ditto 1945	63,223
Ditto 1946	62,733
Ditto 1947	72,281
Ditto 1948	69,646
Ditto 1949	76,282
Ditto 1950	88,249
Ditto 1951	78,580
Ditto 1952	84,642
Ditto 1953	71,818
Ditto 1954	98,754
Ditto 1955	65,296
Ditto 1956	70,294
Ditto 1957	64,834
Ditto 1958	71,511
Ditto 1959	91,496
Ditto 1960	75,872
Total	22,679,046

* Previously included in Chillagoe Field. Mareeba constituted a new field from 1–1–49.

† Included in Chillagoe from 1909 and in Mareeba from 1949.

** Prior to 1883 the gold won from Rockhampton District was included in returns under the heading of "Cloncurry, Calliope, and other small Fields."

Total value of gold won to end 1960 (calculated at £4 4s. $11^{5}/_{11}$d. per fine oz.) .. £97,197,305.

For details of individual years prior to 1951—see Annual Reports for 1959 and previous.

WARDENS' REPORTS ON GOLD AND MINERAL FIELDS FOR 1960

BOWEN FIELDS

The production of coal remains the principal mining operation on the Bowen Fields, and as in previous years, the *State Coal Mine* at Collinsville and the *Bowen Consolidated* mine and the *Open Cut* at Scottville were the producers. Total production was down by 66,688 tons for the year as compared with 1959, this being due to a drop at the *Open Cut,* which was to some extent counter-balanced by an increase in production at the *State Mine* and *Bowen Consolidated* mine.

Operations on dredging leases on the Mount Wyatt Goldfield were conducted mainly on a tribute basis. Work on Dredging Leases Nos. 11, 12, and 26 has been mainly confined to exploratory work. These leases now stand in the name of Ukalunda Development Pty. Ltd.

Gold Mining Lease No. 292 (H. R. Nutt) sank to a depth of 25 ft. in several places in the gully, all in wash, but obtained no prospects. This lease has now been surrendered.

Mineral Lease No. 147.—A considerable area of over burden was removed by bulldozer. Primary and secondary crushers were installed as well as concrete vats for precipitation of low grade copper. Trial runs only have been made on the precipitation process. Approximately 250 tons of high grade copper ore have been stockpiled.

There were no mining operations carried on at the *Dittmer* leases on the Normanby Field during the year.

There was no further activity during the year on Mineral Leases Nos. 150 and 152 (silver-lead).

The lessee (J. J. H. Zentner) of *Graphite Consolidated* mine on the Bowen Field reported that during the year the mine and pumping plant were kept in good working order ready for immediate use in the event of orders for graphite being received. Between 25 and 30 tons of mixed graphite ore was brought to the surface during the year, but as there was no market in Australia for the product, no sales were made. Orders were received from England and America but the prices offered were far below the production and shipping costs.

There was some activity in copper prospecting in the Bowen area towards the end of the year.

STATE COAL MINE

Both tunnels produced coal for 236 working days throughout the year for a total output of 157,129 tons. As coal won from No. 1 Tunnel was by mechanical units, and that from No. 2 by hand, each tunnel is dealt with separately.

No. 1 Tunnel

Mining conditions throughout the year were extremely difficult, and development was severely retarded by bad roof conditions, excessive faulting, and 8 major outbursts. However, at the close of the year, development of the proposed 5 drives to the dip, and 4 drives to connect with No. 2 Tunnel had progressed to a satisfactory stage, and it is anticipated that mining conditions will improve during 1961, to enable the acceleration of this work particularly the connection to No. 2 for ventilation and supply purposes. This tunnel commenced the year with Jeffery L600-C Loaders loading on to scraper chain conveyors, the coal being prepared for loading by full face firing using instantaneous detonators and being fired from a safe distance while all men were withdrawn from the workings. Whilst the preparation method is still the same, two Joy 10SC-AC Shuttle Cars were introduced in July, and the scraper chains eliminated which has resulted in greater safety by the reduction of coal spillage on the underground roadways. During October a new 42-in. troughed conveyor belt was installed in line with the existing belt system, and equipped with a 45-h.p. Mavor and Coulson Drivehead. A third Joy 10SC-AC Shuttle Car was purchased and placed into service in November, and all units are operating satisfactorily.

No. 2 Tunnel

This tunnel commenced the year with 31 pair of contractors in three sections, No. 3 East with 7 pair, No. 2 West with 8 pair, and No. 4 West with 16 pair. As high gas pressures had been obtained from advance holes in No. 3 East section, it was decided to introduce full face firing in this area for greater safety as regards outbursts, and this was placed in operation on 14th March. However as additional labour was required for the mechanised units in No. 1 Tunnel, this section was abandoned on 25th March, and the labour absorbed in No. 1 Tunnel. No. 2 West section, which was obtaining all its output from top coal was also abandoned on 12th August, the labour being absorbed in the mechanised section. The number of contractors in No. 4 West section was also reduced to 14 pair and has remained at this figure for the rest of the year.

General

With the introduction of T.R.E.B. power to Collinsville in September, the colliery power-house ceased operation, and the change over was effected on the 11th September. However, one boiler was kept alive to operate the steam winder for No. 1 Tunnel, and all displaced labour was absorbed into the mine.

On 26th September, a prospect shaft 4 ft. x 5 ft. was commenced to prove the Garrick Seam and obtain washability samples. The shaft was sited to strike the seam at 110 ft., and at the close of the year 68 ft. of sinking had been completed.

BOWEN CONSOLIDATED COAL MINES LTD.

The following is a resume of operations for the year ended 31st December, 1960:—

	Tons
Production	154,872
Days worked	233

All production was won from No. 3 East Dip and the Top Section. Production from the top section has now ceased. A winch has been installed in the Slant Dip to feed the No. 3 East Dip winch. Ventilation improvements now give the No. 3 East Dip section two intake and two return airways.

B.C.C. Mine No. 2.—Concreting and roofing of the trenches to the two tunnels has been completed. The multi-purpose building, including the bathroom, has been completed. Excavation for three shallow air shafts has been completed.

Open Cut—

	Tons
Production	99,820
Days worked	150

Output varied considerably due to sudden changes in demand.

Table A

GOLD PRODUCTION—ALL SOURCES, 1960

ALLUVIAL GOLD—MOUNT WYATT FIELD

Name of Party	Bullion	Fine Gold	Value at £4 4s. $11^{8}/_{11}$d. per oz.
	Oz.	Oz.	£ s. d.
W. G. Horne and others (Ukalunda)	106·89	66·32	280 7 0

Table B

MINERAL PRODUCTION OTHER THAN GOLD—1960

SILVER

Name of Party	Weight	Value
	Oz.	£ s. d.
J. Rudis and J. Betteridge (Ukalunda)	0·88	0 5 9

Table C

COAL PRODUCTION—BOWEN FIELD—1960

Name of Colliery	Tonnage	Value
	Tons	£ s. d.
State Coal Mine	157,129	597,891 0 0
Bowen Consolidated Coal Mines		
Deep Mine	154,872	591,296 0 0
Open-cut	99,820	250,386 0 0
Totals	411,821	1,439,573 0 0

A. OLE, Warden.

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BUNDABERG FIELD

BUNDABERG

M.L. 28 (C. J. Vandenberg).—2,814 tons of clay—production therefrom 944,460 bricks (for the year). Approximate value of the bricks being £15,500.

Copper, Gold and Silver—Woco Creek

Prospecting Claim No. 59 (K. J. Cantle and V. Cantle).—1-1-60 to 30-6-60—25 bags of copper concentrates and 14 drums of copper ore—Gross value was £102 4s. 1d. Recovery value £64 16s. 5d. An application for a Mineral Lease has now been lodged over this area.

M.L. Nos. 51, 52 *and* 57.—No production has been reported from these Leases.

ROSEDALE FIELD

There was no production from this Field.

MOUNT PERRY FIELD

M.L. Nos. 87 *and* 88 (P. M. Hodson).—Reported 17 bags of copper precipitates of a gross value of £100 0s. 5d., gross weight being 0.5143 tons for the period ended the 30-6-60. For the period ended 31-12-60 these leases revealed 4 tons 12 cwt. of copper of a gross value of £61. These leases are under option to Mr. K. Salgo.

M.L. 107 (W. P. Sergeyeff).—This lease has been worked by the Molybdenite Mining (Australia) N.L. since 4th January, 1960. No production has been reported from this lease.

M.L. Nos. 110 *and* 111 (K. A. Salgo).—Reported no production. These leases were surrendered as at the 31-12-60.

M.L. 108, *M.L.* 114 *and G.M.L.'s* 118 *and* 119.—Reported no production.

M.L. 112 (A. G. Laidlaw).—No production reported. Developmental work being carried out on this lease.

G.M.L. 84 (P. Smith).—No production reported. During the twelve months the lease was cleared with a hired dozer and most of the area was tyned to a depth of two feet. Samples of rock have been selected for assay and to date no information is available in this regard.

A great deal of developmental work has been carried out on the Mount Perry Field and there have been seventeen men employed in mining.

F. S. WILL, Warden.

BURKETOWN

Only the one mine, the *Silver King,* operated on the Field during 1960. It is stated that heavy transport and treatment costs influenced production of the field. The *Silver King* reported an increased production and yield over the 1959 figures. Wet weather and plant breakdown restricted operations at this mine. A quantity of 929 tons of ore treated by *Mount Isa Mines Limited* yielded 466.6 tons lead and 9,270 oz. silver. An area of 40 acres near the western border of the State has recently been applied for as a Mineral Lease for mining for tin. No reports of any development work have yet been received.

PRODUCTION OF LEAD ORE—YEAR ENDED 31ST DECEMBER, 1960

Producer	Mine	Ore	Yield		Estimated Gross Value	
			Lead	Silver	Lead	Silver
		Tons	Tons	Oz.	£ s. d.	£ s. d.
Silver King Syndicate ..	Silver King	929·2374	466·5622	9,269·7884	42,187 0 6	3,810 3 7

J. A. B. NOLAN, Warden.

CHARTERS TOWERS FIELD

The total value of recorded production from all sources amounted to £16,350 11s. 8d. representing a decrease of £1,125 8s. 5d. on the previous year. Gold produced aggregated 364.8179 fine oz. valued at, with premium, £5,699 13s. 1d., a decrease of 216.7959 fine oz. on 1959 production. The milled gold ores treated decreased by 341.25 tons to 141.25 tons yielding 105.6334 fine oz., this figure being 234.3277 fine oz. less than last year's production from that source. Silver recovered amounted to 11,999 oz. 5 dwt. 23 gr. valued at £4,593 4s. 9d. Lead recovery was 49 tons 10 cwt. 1 qr. 26 lb. valued at £4,679 8s. The quantity of lode and alluvial tin produced was 2 tons 17 cwt. 2 qr. 17 lb. valued at £1,378 5s. 8d.

The Venus Battery again operated throughout the year, the *New Queen* mine being its main customer.

Chapman's Mount Leyshon (G.M.L. No. 2912—J. V. and E. J. Chapman).—An option to purchase by *Mount Isa Mines Limited* has been extended for six months from 7th February, 1961. No work has been done.

Black Jack (G.M.L. No. 2945—Navin and Higgins).—Early this year this mine was acquired by Messrs. T. D. Navin and T. J. M. Higgins and work has been confined to the following rehabilitation:—Seven months were spent installing machinery and owners expect that another three months will elapse before this work is completed. Mining operations are not expected to be commenced for several months. During the year from 2 to 7 men were employed on surface work. No production was recorded.

New Queen (M.L. No. 123—Olsen and party).—No. 1 West Shaft was sunk a further 17 ft. making its total depth 134 ft. No. 2 East Level was driven a distance of 24 ft. making its total length 120 ft. Owners report lead carbonates going under foot in No. 2 East Level. 627 tons of ore were raised for an estimated content of 89 tons. During the year from 3 to 4 men were employed.

Highway (M.L. No. 129—Olsen and Beresford).—No. 1 North East level was driven 34 ft. No. 1 South West level was driven 34 ft. South East cross-cut driven 61 ft. and North West cross-cut driven 21 ft. Costean was bulldozed to a length of 60 ft. and approximately 4 ft. in depth. 200 tons of ore were raised for an estimated content of 6 dwt. gold per ton.

Loraldo (Claim No. 1595—G. Irlam and party).—No further work on this mine has been reported.

The Morning Sun (Claim No. 1600)—G. Irlam and party).—Sank shaft to a depth of 8 ft. Lode became too small to work. 16 tons of ore were raised and treated at Stockyard Battery for an estimated content of 4 cwt. tin.

Second Last (Claim No. 1605—G. Irlam and party).—Sank shaft to a depth of 45 ft. where a drive in a southerly direction was put in to an approximate length of 15 ft. Absence of tin ore and wet weather caused work to cease.

COMPARATIVE STATEMENT OF PRODUCTION

GOLD

GOLD ORES

—	1959		1960	
	Treated	Yield—Gold	Treated	Yield—Gold
	Tons	Fine Oz.	Tons	Fine Oz.
Milled	482·5	241·2374	141·25	60·4698
New Tailings	437	98·7237	212	45·1636
Old Tailings ..	½ cwt.	2·2639	Nil	Nil
Alluvial ..	..	23·3391	..	48·4720
	..	365·5641	..	154·1054

Gold from all Sources

1959	1960
Fine Oz.	Fine Oz.
581·6138	364·8179

White Line (Claim No. 1607—G. Irlam and party).—Drove from shaft at 12 ft. level in a southerly direction a distance of 22 ft. Approximately 70 tons of ore were raised and treated at Stockyard Battery for an estimated content of 1 ton 2 cwt. tin.

Vital Link (Claim No. 1603)—J. F. McCann).—An old underlie shaft was cleaned out to about 27 ft. and was abandoned on account of bad ground. Vertical shaft was sunk to a depth of 25 ft. and a cross-cut put in 16 ft. but failed to cut the reef. A new shaft has been commenced about 35 ft. west of the Underlie shaft.

OTHER ORES

Nature of Ore	1959				1960			
	Yield				Yield			
	Gold	Silver	Lead	Tin	Gold	Silver	Lead	Tin
	Fine Oz.	Oz.	Tons	Tons	Fine Oz.	Oz.	Tons	Tons
Silver-Lead ..	216·0479	14,256·6208	15·942	..	210·7125	11,999·2979	49·5241	..
Tin ..	..	..	..	1·8245	..	..	..	2·8826

A. N. JACOBS, Acting Warden.

CHILLAGOE

The main mineral produced was tin, being lode tin, valued at £59,374 and alluvial tin valued at £7,022 13s. There was no production of tungsten ores, owing to the low prices offered for the metals. Several copper and iron leases were taken up during the year, with the expectation of selling either the ore or concentrates to Japanese buyers. However, there were no sales of such during the year. Negotiations for the sale of these ores are at present proceeding. The total value of all production on the Field for the year was £85,709 13s. compared with £12,006 11s. for the year 1959. Information obtained on operations at the various mines is as follows:—

ANTIMONY

M.L's. Nos. 1058, 1066, 1067 (Antimony Gold Mines Pty. Ltd.).—Two large mining companies examined the mine during the year but no option was taken on the leases. The problem of this mine is that it is too small for large companies and too large for small companies. The lessees are investigating the possibility of using a mobile flotation plant at this mine, which could process 50 tons of ore per day. This type of plant would be ideal for mines with a limited life, but sufficient ore to warrant a plant. The mobile flotation plant mentioned, consists of primary and secondary crushers, small ball mill, classifiers, flotation cells and power plant to drive the machines. The entire plant can be assembled in a short time. After mining and treatment is completed, the plant can be unbolted and shifted to another mine.

TIN

"Gilmore Mines" (Clutha Development Ltd.).—The manager reports that during the year, 4,461 tons of mullock were raised, and 1,062 tons of ore mined, estimated to contain 49 tons of concentrates. Battery returns indicate that 776 tons 2 cwt. of ore were treated for a yield of 39 tons 5 cwt. 23 lb. of concentrates, valued at £23,504. The shaft was sunk 173 ft. and

RETURN FOR THE YEAR ENDED 31ST DECEMBER, 1960

TIN ORE

Mine	Ore Treated				Yield				Value		
Treated at Batteries off the Field											
State Treatment Works, Irvinebank—	T.	C.	Q.	L.	T.	C.	Q.	L.	£	*s.*	*d.*
Midas ..	18	18	0	0	0	18	2	17	540	0	0
Gilmore ..	17	8	0	0	1	1	3	5	652	0	0
Gilmore ..	30	2	0	0	2	5	3	27	1,372	0	0
Walker Great Northern Tin Enterprise Battery, Herberton—											
Gilmore ..	203	11	0	0	13	9	0	0	8,070	0	0
Gilmore ..	258	11	0	0	9	0	2	11	5,400	0	0
Emuford Battery, Emuford—											
Dover Castle ..	34	0	0	0	3	9	1	14	2,100	0	0
Gilmore ..	148	0	0	0	5	13	3	6	3,390	0	0
Midas ..	19	0	0	0	0	16	3	16	480	0	0
Dover Castle ..	77	0	0	0	4	3	0	1	2,490	0	0
Ironclad ..	20	10	0	0	1	17	1	8	1,110	0	0
Gilmore ..	118	10	0	0	7	14	0	2	4,620	0	0
Dover Castle ..	24	0	0	0	1	9	2	12	900	0	0
Totals ..	969	10	0	0	52	0	0	7	31,124	0	0
Treated at Batteries on the Field											
Sunnymount Battery, Petford—											
Dover Castle ..	125	0	0	0	12	0	0	0	6,000	0	0
Dover Castle ..	105	0	0	0	6	10	0	0	3,500	0	0
Dover Castle ..	100	0	0	0	7	0	0	0	4,200	0	0
New Year's Gift ..	27	0	0	0	3	10	0	0	2,100	0	0
Big Hope ..	48	0	0	0	1	0	0	0	600	0	0
Dover Castle ..	74	0	0	0	8	6	0	0	4,000	0	0
Dover Castle ..	72	0	0	0	7	14	0	0	3,850	0	0
Dover Castle ..	80	0	0	0	8	0	0	0	4,000	0	0
Totals ..	631	0	0	0	54	0	0	0	28,250	0	0

ALLUVIAL TIN

	T.	C.	Q.	L.	Value £	*s.*	*d.*
Purchased by ore and concentrates buers from small producers on the field ..	14	3	3	22	7,022	13	0

LIMESTONE

	£	*s.*	*d.*
Crotty Lime Works; Ootann. (3,610 tons treated yielding 1,150 tons of pulverised lime and 1,640 tons of burnt lime)	19,313	0	0

TOTAL VALUE OF PRODUCTION

	£	*s.*	*d.*
Tin—Lode ..	59,374	0	0
Tin—Alluvial ..	7,022	13	0
Limestone ..	19,313	0	0
Totals ..	£85,709	13	0

D. C. WOLFGANG, Warden.

in addition 360 ft. of rising and 1,790.5 ft. of driving and cross-cutting were completed. A total of 534 ft. 2 in. of diamond drilling was also carried out.

"Dover Castle" (C. J. Bagdan).—This mine produced good quantities of ore during the year. Battery Returns indicate that 691 tons of ore were treated, for a yield of 58 tons 11 cwt. 3 qrs. 27 lb. of concentrates, valued at £31,040. Seven men were employed.

New Year's Gift (O'Shea and Coleman).—The owners report that during the year 100 tons of mullock were mined and 50 tons of ore raised, estimated to contain 6 tons 15 cwt. of concentrates. No. 1 shaft was sunk to 50 ft., No. 2 shaft to 40 ft., and No. 3 shaft (main shaft) to 50 ft. The owners at present are sinking-in the main shaft, on a small body of relatively rich ore. It is intended to sink the main shaft on ore, in an effort to pick up ore along the line of lode under Nos. 1 and 2 shafts.

Midas, Petford (L. N. Rice).—During the year 300 tons of mullock were raised and about 70 tons of ore were mined estimated to contain 10 per cent. concentrates. The main shaft was sunk from 140 ft. to 170 ft. and No. 2 shaft from ground level to 80 ft. The main shaft was abandoned due to water, low prospects, and dirty mineral zone. No. 2 shaft was abandoned due to presence of lead. Further work in 1961 will be confined to removing backs.

Rio Sarmento, Tate Tin Mines (Blis Gainza).—This is a new mine, and work consisted of general prospecting.

Mountain Maid, Sunnymount (H. Bird & Sons).—Work consisted of prospecting and sampling.

Gladstone, west of Ord (F. M. Hall).—Work consisted of geological sampling and testing.

Jedda, California Creek (K. H. Stafford).—During the year 700 yards of wash were treated. During the coming year, if the values come up to standard, a dam will be built on New Zealand Creek.

COPPER

Eclipse, Muldiva (D. L. Walker).—General sampling and exploratory work has been carried out with a view to bringing this mine into production.

LIMESTONE

Crotty Lime Works, Ootann (Graham Bros.).—This mine continues to produce good quantities of limestone and during the year the production was 3,610 tons of limestone, which yielded 1,150 tons of pulverised lime and 1,640 tons of burnt lime valued at £19,313.

CLERMONT AND ANAKIE FIELDS

CLERMONT FIELD

Gold

Production has dropped to 35 fine oz. (all alluvial) and was obtained mostly by specking along creeks and gullies after flooding. A little over 3 oz. was won from Miclere Dumps. Towards the end of the year J. L. Webster and party applied for three Gold Mining Leases over an area of 9 acres at Miclere. It is the intention of the party to dewater several of the old shafts and after cleaning up, continue driving on the false bottom.

The Mint has been abandoned and T. J. M. Higgins has the *Southern Cross* under exemption as present day economic conditions are against the profitable working of small mines. No work was available for the *Miclere Battery* and the battery is only on a care and maintenance basis.

Gold produced was valued at £544 8s. 2d. including premium.

During the year 41 Miner's Rights were issued and £186 in prospecting assistance paid to four men.

Coal

Production has dropped again by 4,967 tons to 170,606 tons. Total number of men employed by both mines dropped to 76 men—nine less than the previous year. Population of Blair Athol has dropped by 12 to 430.

Blair Athol Coal and Timber Co.—There were no developments of major importance during the year. At the end of the year 29 men were employed on the surface and 14 men underground.

Blair Athol Open-cut Collieries Ltd.—The decline in coal orders continued during the year. While no retrenchments were made, several men took long service leave and notice of dismissal was given to seven men effective from the termination of their annual leave in January, 1961. Nitrex explosive is in use in the overburden and tests in the coal were carried out in 1960 under the supervision of the Mines Inspector.

The New Brace, incorporating the Norton Pick Breaker, was opened late in March by the Hon. the Minister for Mines. During an overseas trip, the General Manager, Mr. Jonasson visited open-cuts in the U.S.A. and the United Kingdom and suppliers of heavy equipment in both countries. Having regard to the scale of operations Mr. Jonasson reports that the methods and types of equipment used at the Opencut closely follows those in use overseas. At the close of the year 17 men were employed above and 16 men below the surface. No fatal accidents occurred during the year—no work was lost through industrial causes or mechanical breakdowns.

Copper

Permits to enter private land (Parish of Copperfield) were issued to Western Construction Coy. Ltd. to search for copper but no action was taken.

Petroleum

A Mineral Oil Prospecting Area over about 1,920 acres in the parish of Avonmore, county of Drummond, held by James H. Julin expired during the year and was not renewed.

ANAKIE FIELD

Gems

Prospecting for Sapphires continues on the Anakie and Willows Fields. Ten men were working at the end of the year. Reported sales amounted to £2,323 but there is no doubt that other gems were found and disposed of privately. The demand has improved and the bulk of the amount reported came from overseas sales. There is now a market for second-grade stone.

Prospecting assistance amounting to £1,082 10s. was paid to 19 men during the year and 55 Miner's Rights were issued.

Messrs. Gartrell and Hagan continued test boring with the Proline rotary boring machine, provided by the Department of Mines. During the year 59 holes were put down with a total footage of 1,186 ft. As a result of this work several areas were worked and about 4 oz. of first blues recovered in addition to other coloured sapphires.

Drilling is to be carried out on Bedford's Hill this year in deeper ground (30-40 ft.) and any prospects found will be followed up.

Gold

No reported prospecting for gold was carried out during the year.

Table A

PRODUCTION (OTHER THAN COAL)—YEAR, 1960

Locality	Yield	Yield—Bullion
	Oz. dwt. gr.	Oz. dwt. gr.
GOLD—ALLUVIAL		
Copperfield and Sandy Creeks	22 0 7	..
Blair Athol	1 18 22	..
Miclere	3 12 0	..
Elgin Downs	0 8 2	..
Miscellaneous	8 11 17	36 11 0
	..	36 11 0

Fine Gold Oz. 35.

	£	s.	d.
Value of Gold	148	0	0
Premium on Gold	396	8	2
Total Value of Gold ..	£544	8	2

Table B

COAL PRODUCTION—YEAR, 1960

Colliery	Quantity Produced (Saleable Coal) Tons	cwt.	Value £	s.	d.
Blair Athol Coal and Timber Company Limited	87,225	6	130,828	9	9
Blair Athol Open-cut Collieries Limited ..	83,380	17	125,071	5	6
Total	170,606	3	£255,899	15	3

Table C

ANAKIE MINERAL FIELD—YEAR, 1960

GEMS (Sapphires)

	£	s.	d.
Sales (reported)	2,323	0	0

C. H. SMITH, Warden.

CLONCURRY FIELD

The most significant feature during the year was the revival of interest in the potentialities of the Cloncurry Field as a copper producing district. This interest is reflected in the increased number of applications lodged for Mineral Leases for copper. Copper Concentrates Limited have commenced work on the erection at Cloncurry of a plant to upgrade copper ore. During the year representatives of the Nippon Mining Company with headquarters at Tokyo, Japan, made two visits to Cloncurry to investigate the possibilities of purchasing not less than 300 tons monthly of 10 per cent. copper ore, for shipment to Japan. On their second visit the representatives conferred with the Cloncurry Copper Co-operative Advisory Committee. This Committee was formed at a public meeting during the year for the purpose of forming a co-operative whose aim is to develop the resources of the Cloncurry and neighbouring fields. This Advisory Committee is hopeful that the gougers will supply the co-operative when established with sufficient copper ore to warrant the construction by the Japanese interests of an ore buying centre in Cloncurry.

MARY KATHLEEN URANIUM LTD.

Production

Production statistics are summarised in tabular form as follows:—

—	Year, 1960	To Date
1, Mining	Long Tons	
Ore	389,801	1,191,868
Marginal Material	65,622	179,443
Waste	909,420	2,329,473
Total	1,364,843	3,700,784
2, Milling	Long Tons	Long Tons
Ore treated	427,345	1,057,249
U_3O_8 produced	662·82	1,577·61

Value of U_3O_8 produced in 1960—£6,509,718.

Development tonnage from outside of open-cut totalled 14,675 Long tons.

Stockpiles

	Long Tons
Ore stockpiled at 31st December, 1959	172,163
Ore from Open-cut in 1960	389,801
Total	561,964
Less ore treated in 1960 ..	427,345
Ore stockpiled, 31st December, 1960	134,619
Marginal material stockpiled at 31st December, 1959	113,821
Marginal material from open-cut in 1960 ..	65,622
Marginal material stockpiled at 31st December, 1960	179,443

Manganese

Manganese ore mined at, and trucked from, the *Overhand* lease to Mary Kathleen during 1960 totalled 1,658 long tons valued at £5,785.

Labour

The average manpower position for the year was as follows:—

Average Number of Employees

Mine	82
Mill	88
Workshops	163
Surface and Miscellaneous	163
Total	496
Contractors	3

Exploration

Radiometric gridding and detailed geological mapping was continued on leases north of the ore-body.

Diamond Drilling

During the year, a total of 2,834 ft. was drilled in developmental diamond drilling. This footage was drilled in three holes; one of these being collared in 1960.

Blast-Hole Drilling

Percussion blast-hole drilling footages and consumption of explosives in the open-cut were as follows:—

Total footage drilled	221,719 ft.
Tonnage broken per foot drilled ..	6.89 long tons
Total consumption of explosives ..	359,500 lb.
Tonnage broken per lb. of explosive	4.25 long tons

Rainfall

Rainfall for the year was 13.39 in. over 40 days.

BALLARA AREA

Ala's Hope (H. Armstrong and party).—Two men were employed at Ala's Hope during 1960 and 30 tons of ore were raised. Twenty-eight tons were treated at Mount Isa Mines Limited, at an estimated 10 per cent. copper content. A shaft called No. 1 shaft was sunk to a depth of 29 ft. on the lode. The ore seems to have pinched out at the bottom of the shaft, however it is intended to sink deeper as there is every indication that there is more ore below the 29-ft. level. A drive at the southern end of the shaft along the lode is in 9 ft., but very little ore has been encountered, mostly white iron. The drive was filled up with mullock and timbered off in readiness for sinking.

A block of ore was taken out of the southern end of the shaft and averaged 10 per cent. copper.

Wallaroo (D. H. Laing).—Two men were employed on this mine, and during the year 114 tons of ore were raised and treated for a return of over £3,400. Shafts were sunk to various levels, and at the 95-ft. level, 150 ft. of tunnelling was cleaned out. Forty feet of the main haulage shaft was cleaned out and collared, and the shaft was also dewatered to a depth of 80 ft. Mr. Laing tried precipitating the mine water and returning same to the mine, with successful results. Mr. Laing is of the opinion that this process warrants further trials.

Rosebud (D. H. Laing).—Two men are working this mine. The main work done during the year was the raising of 300 tons of mullock, and the main shaft was cleaned out to the 100-ft. level and also dewatered to the same level. This lease is under option to Mary Kathleen Uranium Limited, who are examining the old workings with a view to establishing an ore reserve and so to warrant the installation of an upgrading plant.

Copper Blonde (D. H. Laing).—As there was no market for Copper Limestone during 1960, no production took place.

Megaphone (L. H. Rodal).—Three men were engaged in work on this mine and 280 tons of ore were raised and forwarded to Mount Isa Mines Limited for treatment. Some geo-chemical work was carried out on the northern extremity of the workings of the surface. If results are positive costeaning will be commenced.

Sunset North and *Little Sunset* (W. H. Watson).—Very little work was carried out on these mines during 1960. Some samples were taken from the Little Sunset and tested for nickel. The assay went .017 and the ore was not acceptable to Mount Isa Mines Limited. Two shafts are being timbered, and it is expected that there will be some market for the ore later.

Kangaroo Rat (K. A. Morgan and party).—Development work which took place from June to the end of 1960 is as follows:—

A vertical shaft 17 ft. deep and 30 ft. west of the centre of the old workings was deepened to 58 ft. depth, where a break through and flooding from the bottom of an old stope occurred.

The party then proceeded to build No. 2 shaft into the end of an old stope, 50 ft. north of No. 1. Six tons of ore were raised before abandoning this shaft, because the previous workings and the water had made the ground very loose.

CLONCURRY AREA

Great Australia Mineral Freehold (Copper Concentrates Limited).—This Mineral Freehold is situated approximately 1 mile south of Cloncurry and a little over a quarter of a mile from the Shire Council's new water tank. Copper Concentrates Limited commenced the erection of a copper ore upgrading plant on this site during the year.

As at the end of December, 1960, there was only one man on the job, and not much activity was taking place. There is no ore on hand, and the actual commencement date of treatment operations is indefinite.

Dolomite (S. H. and S. J. Martell).—During 1960 a 5-man party was producing approximately 200 tons of limestone per week for railage to Mount Isa.

Mount Glorious (M. C. Sheil).—During 1960, 3 men were engaged in cross cutting in a siliceous outcrop south of the old shaft. Some 15 per cent. copper was hand picked from the open-cut.

Carolina (V. G. Hooper and J. R. Emmet).—During the year on this mine approximately 9 tons of 8 per cent. ore were raised.

Ethelene (J. R. Emmet and D. Stuart).—Four tons of 6 per cent. ore has been raised. The outcrop has been costeaned to a depth of 4 to 5 ft. over a width of 25 ft. exposing seams of ore and an encouraging formation.

The Chum (W. H. Nicholson—on sub-lease from G. Cummins).—The east shaft was cleaned out and sunk 10 ft. to approximately 50 ft. The west shaft was cleaned out and sunk to about 35 ft. There is no ore-body in sight at present. Work was stopped early in December because of a high nickel content.

Fairfield (W. H. Nicholson—on sub-lease from G. Cummins).—Development work consisted of stripping on sides of shaft and open-cut for safety purposes. The floor at the 50-ft. level was levelled in readiness for mining operations. There appears to be several hundred tons of low grade 7 to 9 per cent. copper ore in open-cut.

KURIDALA AREA

Silver Phantom (J. L. Tunny).—This lease was under exemption for most of the year. Only costeaning work was done, and results were not encouraging.

DOBBYN AREA

Because suitable ore was not forthcoming, the smelter plant which was being erected by J. and J. R. Stainkey was dismantled. The Stainkeys have now transferred their attention to the *Little Eva* mine where they are now making up their own Jack Head Pump to dewater the *Little Eva* shaft.

Mr. R. W. Moren, applicant for *Crusader South, Crusader North, Dobbyn South* and *New Dobbyn* mineral leases, forwarded a small tonnage of copper ore to Mount Isa Mines Limited, however the ore failed to reach the same payable grade which was obtained for ore from the same place a few years ago, and as a result of rail charges, &c., he found it very unprofitable to continue to forward his ore to Mount Isa Mines Limited. Mr. Moren has purchased plant and machinery to the value of about £10,000 with a view to erecting a plant to upgrade ore, so that he will be able to pay the higher rail charges to ports where the ore is shipped overseas or to other parts of Australia for smelting. It is Mr. Moren's intention to purchase even more plant, to enable a mill with a capacity of 50 tons per day to be erected.

MOUNT COBALT AND HELAFELS

(Mining Corporation (Aust.) No Liability)

Mt. Cobalt.—The leased areas were allowed to lapse after a careful examination of all available information proved the prospect to be uneconomic.

Helafels.—The uranium prospect which was held jointly with South Alligator Uranium No Liability was allowed to lapse after it was mutually agreed that the prospect was uneconomic.

AUTHORITY TO PROSPECT

(Dugald River—170M (Consolidated Zinc Pty. Ltd.))

No actual work was carried out on the field during 1960, but the result of earlier investigation is being re-examined and it is proposed shortly to carry out further diamond drilling.

RIO TINTO SOUTHERN PTY. LIMITED

The headquarters of this company was moved from Cloncurry to Mary Kathleen in early 1960. During the year the name "Rio Tinto Australian Exploration" was changed to "Rio Tinto Southern". Plans are in hand to at least partially dewater the *Trekelano* mine workings as a preliminary step in assessing the future ore potential, if any, of this mine area. Results of drilling done in late 1958 and 1959 in the Silver Phantom area near Kuridala have been re-appraised and additional field work may be done in this general area during 1960.

Table A

COMPARATIVE RETURN SHOWING THE PRODUCTION AND VALUE OF MINERALS FOR 1959 AND 1960

Mineral	1959 Yield	1959 Value	1960 Yield	1960 Value
		£ s. d.		£ s. d.
Gold	..	..	6 fine oz.	93 13 4
Silver	29,174·72 oz.	9,036 12 11	16,918·7271 oz.	5,557 6 10
Copper	260·5139 tons	79,505 3 11	198·9002 tons	67,018 19 4
Copper Limestone	3,705·3470 dry tons; 20·0835 Copper tons	16,915 3 11	nil	nil
Limestone	16,797·46 tons	39,124 0 7	9,435·85 tons	21,584 11 9
Manganese	195 tons	1,643 0 0	1,658 tons	5,785 0 0
Uranium Oxide	651·59 tons	6,449,267 0 0	662·82 tons	6,509,718 0 0
		6,595,491 1 4		6,609,757 11 3

Table B

SILVER PRODUCTION—INDIVIDUAL MINES—1960

Producer	Mine	Type of Mineral	Quantity T. C. Q. L.	Silver Oz. per Ton	Gold Oz. per Ton	Value £ s. d.
J. Tunny and Sons ..	Silver Phantom ..	Silver Ore	14 19 1 19	1,130·10	·006	5,557 6 10

Table C

COPPER PRODUCTION 1960—INDIVIDUAL MINES

Producer	Mine	Ore Tons	Yield Tons	Value £ s. d.
Armstrong, H.	Ala's Hope	28·5545	2·8004	913 4 2
Barnes, A. S.	Docherty	25·2640	2·1057	652 12 4
Barnes, A. S. and Walley, H. W.	Mount Kalkadoon	5·8364	1·0856	326 4 5
Conder, R. and Green, A.	Lost Weekend	101·7907	7·8401	2,549 1 5
Docherty Mining Syndicate	Peggy and Docherty	2·9782	0·1846	58 8 6
Greenwood, R.	Labour Victory	179·1466	11·0188	3,570 8 5
Hiron, F. L.	Betty May	7·1877	0·8050	235 13 3
Jones, R. and Wright, L.	Non Pariel	8·0289	0·5577	171 4 3
Laing, D. H.	Wallaroo	114·8044	10·4975	3,444 14 2
Mining Producing Development Syndicate	Blockade	714·0808	92·5156	29,342 2 8
Moren, R. S.	Crusader	54·1374	4·2144	1,267 14 3
Parker, W.	Jasper	24·2762	2·8202	896 14 6
Rina Tribute	Rina	3·7696	0·1508	49 19 1
Rodal, L. H.	Megaphone	165·9531	21·6483	7,037 17 7
Shaw, A. T. and Windus, E. A.	Marion Ivy	16·1286	1·2865	430 13 9
Shiel, M. C.	Mount Glorious	17·0513	1·8060	544 7 6
Stainkey, J. and J. R.	Crusader	39·2615	3·8136	1,256 8 8
Lane, L.	Labour Victory	12·3358	1·0115	303 19 1
Tunny, J. L., F. P., and G.	Young Australian	147·3767	13·9207	4,312 0 10
Watson, W. H.	Sunset	13·7204	2·4049	752 7 3
Watts and party	Snow Queen	6·3252	0·4934	150 14 8
Windus, S. M. and E. T.	King's Cross	125·0845	15·9189	8,752 8 7
		1813·0925	198·9002	67,018 19 4

Table D

LIMESTONE PRODUCED DURING 1960

Supplier	Tons	Value		
		£	*s.*	*d.*
M. C. Sheil	5992·85	13,675	16	11
Dolomite Mining Co.	425·95	990	6	7
Martell, S. H. and S. J.	3017·05	6,918	8	3
	9435·85	21,584	11	9

Table E

URANIUM OXIDE PRODUCTION—1960

Producer	Quantity	Yield	Value
	Tons	Tons	£
Mary Kathleen Uranium Limited	1,364,843	662·82	6,509,718

Table F

MANGANESE PRODUCTION—1960

Producer	Mine	Yield	Value
		Tons	£
Mary Kathleen Uranium Limited	Overhang	1,658	5,785

J. S. CALLAGHAN, Acting Warden.

COOKTOWN AND CAPE YORK PENINSULA FIELDS

Gold

Gold mining activity has been limited to prospecting by two parties on the Claudie River field, but results were not encouraging, and a small crushing on the Hayes Creek field.

CLAUDIE RIVER FIELD

G.M.L. 316 (D. and V. J. Ward).—A party of three men carried out prospecting in the form of costeaning during the latter part of the year. No ore was treated.

HAYES CREEK FIELD

Second Chance—Extended Gold Reef Claim 170, Coen (C. Tonker).—Five tons of ore were crushed at the end of 1959. The details of the Mint return were given in June, 1960, monthly report, under the heading of "Try Again" (C. Tonker). A further four tons were crushed during the current year. The total return being 20 fine oz. gold and 4 oz. silver.

ALICE RIVER, COEN AND ROCKY, POTALLAH CREEK, WENLOCK, BLUE MOUNTAINS, COOKTOWN, HAMILTON, PALMER AND STARCKE FIELDS

No work was carried out on these fields during the year.

Tin

Production of tin was confined to the Cooktown Field and the total quantity produced during 1960 was considerably more than was produced in 1959. Last year's annual report recorded as notable the event of the commencement of operations by Jubilee Tin Pty. Ltd. at Romeo Creek. Machinery valued at £85,000 was installed and some preparatory work carried out. The installation of the machinery proved unsatisfactory and only a small quantity of poor quality tin was recovered. A Receiver (A. G. Sims Ltd.) was appointed early in July, 1960, to manage the Company's affairs and since that time a lot of equipment has been moved off the leases to Cairns for re-sale. It is proposed to recommence operations after the wet season by a different mining operation.

Figures showing production of alluvial tin from the various areas within the Cooktown field during 1960 with 1959 figures for comparison are set out in Table A.

COOKTOWN FIELD

Dredging Lease No. 12 (Romeo Creek—Jubilee Tin Pty. Ltd.; Receiver appointed).—Several shafts and costeans were excavated with the traxcavator. Approximately 20,000 cu. yd. of ore were raised for a return of approximately 10½ tons of tin valued at £4,595.

D.L. No. 13 (Romeo Creek No. 2—Jubilee Tin Pty. Ltd.).—This lease was worked in conjunction with D.L. No. 12.

D.L. No. 14 (Rossville Creek No. 1—Jubilee Tin Pty. Ltd.).—Tests were carried out to ascertain ore reserves. This is not a very rich area and could be worked only if the price of tin should rise.

D.L. No. 15 (Crooked Creek No. 1—Jubilee Tin Pty. Ltd.).—This is a shallow area showing fair reserves. It is expected this lease will be worked as soon as an economical method is established.

D.L. No. 16 (Leswell Creek No. 1—Jubilee Tin Pty. Ltd.).—This is not a rich area and could be worked fairly economically because of its close proximity to Jubilee. Several shafts have been sunk.

D.L. No. 21 (Alexandra Creek—John Vancea).—Three men were employed for a short term and some costeaning carried out. Samples taken indicated 3 lb. of tin per cu. yd.

D.L. No. 22 (Roaring Meg Creek Junction—John Vancea).—Three men employed for four days dug a costean 15 ft. long by 1 ft. 6 in. deep. Samples showed 2½ lb. of tin per cu. yd.

D.L. No. 23 (Roaring Meg Creek Falls—John Vancea).—Three men employed for two months took 27 surface samples and did some costeaning. Three hundred cubic yards of alluvial dirt were pumped with estimated contents of 700 lb. of tin.

"The Hornet" (M.L. No. 307—J. H. Forman).—Ground sluicing only was carried out; approximately 150 cu. yd. sluiced for a return of about 4½ cwt. of tin valued at approximately £140.

"Brass Bottle" (M.L. 302—M. J. Johns).—Efforts by costeaning have been carried out during the year with a view to locating the elusive leader without success.

"Four Mile No. 1½" (Ext. Alluv. Tin Claim 1987—J. Hartley).—Approximately 100 cu. yd. of dirt sluiced for a return of approximately 3½ cwt. of tin.

"Jubilee" (Ext. Alluv. Tin Claim 1895—R. Russell).—Ground sluicing was carried out with a nozzle and pipe line; 600 cu. yd. being treated for a return of about 6 bags of tin worth about £153. Development work included timber clearing, deepening of tail race and clearing sand from head race.

"Sure Thing Extended" (Ext. Alluv. Tin Claim 1920—Boyle and Boyle).—This claim was properly worked by Messrs. E. R. Boyle, V. Cummings and J. Cartaar, with suitable machinery during the year and good results obtained. All payable dirt has been treated and the claim was abandoned in December. Alluvial dirt totalling 9,500 tons, was treated for a return of 12 tons 3 cwt. 2 qr. 12 lb. worth £7,565 14s. 2d.

OTHER MINERALS

No production of any other mineral was reported from any field during the year.

GENERAL

Prospecting Assistance was paid to three persons and a total of £72 was paid. A road grant of £100 was also paid to Mr. E. R. Boyle for repairs to the Mt. Poverty road. Seventy-two Miners' Rights were issued. There were no accidents in or around a mine and no Mining Inquiries were held. Prospects for increased mineral production during 1961 are not bright.

Table A

COOKTOWN FIELD—1960

TABLE OF PRODUCTION OF ALLUVIAL TIN WITH 1959 FIGURES FOR COMPARISON

Producer and Mine (or locality)	1959							1960						
	Quantity				Value			Quantity				Value		
	T.	C.	Q.	L.	£	s.	d.	T.	C.	Q.	L.	£	s.	d.
Jubilee Tin Pty. Ltd.—Romeo Creek	0	19	3	21	71	17	1	10	6	0	1	4,595	15	0
Boyle, Cummings and Cartaar—"Sure Thing Extended," Mount Poverty	2	1	2	8	1,297	0	4	12	3	2	12	7,565	14	2
Small Producers—														
Ayton, Bloomfield, China Camp	1	9	3	13	857	7	4	1	10	1	25	836	12	3
Big Tableland	0	16	2	10	508	4	2	0	5	2	11	170	5	11
Four Mile		..			..			0	2	1	7	62	8	0
Grasstree		..			..			0	1	0	0	29	11	7
Home Rule	0	13	0	11	402	6	9	0	13	1	21	395	17	7
Leswell Creek	0	4	1	24	128	6	8	0	0	3	8	24	10	0
Mount Amos	0	11	0	27	327	3	1	0	12	0	26	345	7	1
Mount Poverty	0	11	0	6	347	4	3	0	8	1	21	249	9	3
Mount Romeo	0	7	3	2	231	6	0	0	3	0	6	66	2	4
Rossville	4	8	2	3	2,673	15	0	3	16	0	10	2,242	11	11
Shipton's Flat		..			..			0	2	1	7	60	12	7
Total	17	4	0	25	9,236	5	6	30	5	0	16	16,644	17	8

J. O. LEE, Acting Warden.

CRACOW AND EIDSVOLD FIELDS

CRACOW

The Golden Plateau N.L. mine crushed 33,298 tons of ore for a return of 13,314 fine oz. of gold valued at £56,561 13s. 2d., which with premium of £151,496 17s. 7d., amounted to £208,058 10s. 9d., and 15,886.25 oz. of silver worth £6,288 5s. 11d., making a grand total of £214,346 16s. 8d.

A total depth of 5,298 ft. 10 in. was drilled in 47 bores which were sunk to locate further lodes.

The average number of persons employed by the company during the year was 47 above ground, and 48 below ground.

Other Leases.—No reports received of any work done on the few other leases.

EIDSVOLD

Production was restricted to coal at Selene. Total production for the year was 17,330.3375 tons of a value of £56,116 11s. 6d. This tonnage shows a decrease of 1,560 tons on the previous year, and is a continuation of the downward trend which has been evident for some years past.

Gold.—Some prospecting was done during the year but apparently with no results.

H. J. BRADSHAW, Warden.

CROYDON AND BALCOOMA FIELDS

CROYDON

No mining was carried out on this field during the year.

BALCOOMA

No mining was carried out on this field during the year.

S. M. POWE, Acting Warden.

CUNNAMULLA DISTRICT

During the months from May to October there was a renewed interest in Opal mining in the area and during the twelve months 55 Miners' Rights were issued.

Most of the activity on this field was concentrated in the vicinity of the old Yowah Mines situated about 28 miles WNW of Eulo. This area was worked extensively about sixty years ago and detailed information as to the work then carried out is available in the Jackson Report on "The Opal-mining Industry and the Distribution of Opal Deposits in Queensland." In October of this year there were about 14 men in that area—numerous shafts were sunk to a depth of 30 to 40 ft. but no reports of payable Opal were received.

There were reports of buyers visting the field but no information is available of any stone sold.

Other miners were operating at this time without much success in the area of the "Black Gate" on Dynevor Downs and in the vicinity of the "Karoit" mines about 40 miles WNW of Cunnamulla.

Eleven claims were applied for on the field.

Miners operating in the vicinity of old diggings near Toompine and Duck Creek seem to have met with the most success—reliable reports have been received of Opal to the value of £500 having been won. It would appear that the Toompine area offers the best opportunities for prospectors in this district.

ROY N. NILSON, Acting Warden.

ETHERIDGE AND OAKS FIELDS

ETHERIDGE

Gold

One man was engaged prospecting and disposed of gold through the local bank. £15 4s. 6d. was received for 3.91 oz. of standard gold plus premium of £40 15s. 7d. and 1s. 4d. for silver.

Copper

Central (M. H. Limkin).—A trial parcel of 12½ tons of ore was shipped to Japan through Northern Traders Ltd. of Cairns. No payments have been received for this ore but advice has been received that it contained 7.3 per cent. copper. A further 20 tons has been raised by sinking a shaft to a depth of 52 ft. and driving 8 ft. from the 52 ft. level. This ore is at grass and is estimated at 7 per cent.

Ortona, Eight Mile and Twelve Mile (E. H. Gundry).—Preliminary surveys only have been carried and samples of the ore have been taken for testing.

OAKS

Gold

Alluvial.—Two men were engaged in prospecting with the dish near Kidston for various periods during the year. Payment was received for 2.95 oz. standard gold from the mint, being £11 9s. 9d. plus premium £30 15s. 4d. and 1s. for silver.

S. M. POWE, Acting Warden.

GLADSTONE DISTRICT

CANIA AND KROOMBIT FIELD

Claim 493 *Appletree* (A. B. Goody).—The tunnel and underlie shaft were repaired and cleaned out. The drains around the tunnel entrance were put in order and some prospecting was done.

C. Bartlett confined his operations to sluicing material obtained from gullies and recovered 4 oz. 15 dwt. of gold valued at £64 12s. 9d.

Claim 489 (J. J. E. Nicholas).—Results of tests have proved disappointing, only a few grains of gold per yard were recovered.

M.L. 337 (Clark and Brewer).—At the beginning of the year, the copper precipitates plant was destroyed by a flash flood, taking with it about 1 ton of precipitates, estimated at 70 per cent. copper. Work has been confined to reconstructing the launders and the building of a road to the lease.

MILTON FIELD

Claim 488 *Frampton* (J. Davis).—Due to shortage of water, operations were restricted, and 2 oz. 10 dwt. of gold valued at £28 16s. 5d. only, were recovered.

MOUNT CANNINDAH FIELD

M.L.'s 334, 383, 384 (K.C.E. Mining Pty. Ltd.).—Approximately 10 tons of copper precipitates containing 5 tons of copper, valued at £1,420 were obtained. Two men were employed. Mount Isa Mines are continuing with drilling operations on these leases. The field again experienced drought conditions, and as successful operations are dependent on an ample supply of water, the company's future is uncertain.

Claim 96 *Blue Bag, M.L.* 339 *South End, M.L.* 340 *North End* (W. F. Hamilton).—These areas are under option to purchase by Mount Isa Mines Ltd. and exploratory work has been carried out by that Company. In addition to work performed by Mount Isa Mines Ltd., surveys and road construction were carried out by the holder.

Mount Cannindah Authority to Prospect No. 163M.—The area granted to Mount Isa Mines was enlarged to 1,120 square miles, to include Mount Kroombit and Glassford Creek prospects. Three more core holes were completed at Mount Canindah, while two others were commenced and were in progress at the end of the year. Results of this drilling were sufficiently encouraging to warrant further investigation.

LANGMORN FIELD

M.L. 290 (Ambrose Lime Works Pty. Ltd.).—For the year under review, 12 men were employed and produced 5,160 tons of burnt lime of a value of £28,000.

M.L.'s 263, 318, 319 (Ulam Carrara Marble Quarries Pty. Ltd.).—Due to the fact that the stocks of marble at grass and at Bajool Railway yard were sufficient to take care of requirements, no work was done at the quarry during the year.

GLADSTONE

G.M.L. 299 *Tucker's Gulley* (D. C. Allen).—Little work, other than prospecting, was carried out on this lease one and a-half ounces of gold were obtained by means of a dry blower.

M.L. 386 (M. F. Partridge).—Work in the open-cut was continued. Approximately 339 tons of manganese ore was recovered, of a value of £3,866. Very little work has been done on this lease in recent months.

D.L. 1 (E. Reichart).—No mining operations were carried out on this lease but research was concentrated on the development of suitable methods for treating the material.

D.L.'s 5, 6, 7, 8 *and* 9 (Mineral Deposits Pty. Ltd.).—No work has been done on these leases, which have been under exemption throughout the year.

D.L. 11 (G. F. Hansen).—No work was done on this lease during the year. Its development is dependent on improved prices for rutile, zircon and ilmenite and the availability of suitable machinery.

Prospecting Assistance.—One application for prospecting assistance was received at this office during the year under review.

Miner's Rights.—Forty-nine miner's rights, including nine at Monto, and four at Many Peaks, were issued.

L. MONAGHAN, Warden.

GYMPIE, GLASTONBURY, KILKIVAN AND YABBA FIELDS

Gold

No mining operations on any organised scale were carried out on the Gympie, Glastonbury, Kilkivan or Yabba Fields during the year and there was no production. Approximately 14 prospectors applied for Permits to Enter on Private Land and for Prospecting Areas on Crown Land and two new Gold Mining Leases were applied for during the year.

Lime

Developmental work was carried out by *The Tamaree Lime Works,* Curra, on their leases and comprised solely of removal of overburden. 2,936 tons of ore were treated for the year and the value of such production was £10,648.

Manganese

For some years past manganese has been one of the main ores mined in the District, but due to cancellation of orders from B.H.P. Newcastle about April, production has mainly come to a standstill. Sanders Brothers of Amamoor, working leases held by them, and leases on tribute for W. J. O'Neill and Campbell Brothers were the main producers during the year. Other producers were H. Coop; Coop & Marshall; L. W .C. Coop and H. B. Soanes; C. P. and S. A. Roberts and Messrs. J. and P. M. Rasmussen, but their production figures for the year were low. 1,713 tons of manganese valued at £27,200 were sold during the year.

Rutile, Zircon and Monazite

The only producer for the year was Titanium Corporation of Australia Pty. Ltd., Brisbane. No prospecting work was carried out during the year. The future workings of the Company are uncertain due to the present uneconomic price of rutile. Reduced operations are being carried out for the time being. 2,871 tons were produced for the year and the value of such production was £85,500.

Silver Lead

Interest arose in the district during 1960 on account of the reported discovery of this mineral by Messrs. E. J. Morrow and Others who applied for Mineral Lease No. 265, Gympie, over part of State Forest Reserve 424, parish of Widgee, and containing 200 acres. However, these persons report that there has been no production for the year and their lease is still only in the prospecting stage. Sixteen prospectors applied for Permits to Enter on Private Land and Prospecting Areas in search of this mineral and other Mineral Leases were applied for during the year. All of these leases are still in the prospecting stage.

Copper

This mineral appears to have drawn some interest during the year. Ten prospectors were granted Permits to Enter on Private Land and Prospecting Areas during the year and two copper leases were applied for. However, these are only in the prospecting stage at present.

Clay

There has been good production in the district for the year by the Cooroy Brickworks Pty. Ltd., at Cooroy. A further 7 odd acres were taken up by this firm under a new Mineral Lease. 5791 tons of clay were treated for the year and the value of such production was £2,896.

V. G. KITT, Warden.

HERBERTON AND RUSSELL FIELDS

The total value of production from the Herberton Gold and Mineral Field for the year amounted to £677,012 compared with £836,052 for the year 1959 and £713,941 for 1958. There was a decrease both in the production of lode tin and alluvial tin. The decrease in alluvial tin was due to the partially capsizing of the No. 2 dredge of Tableland Tin Dredging No Liability on the 25th January. The chief producers of lode tin during the year were: *Elaine Mary* (Watsonville) 8 tons 8 cwt. 3 qr. 8 lb. of tin concentrates from 60 tons of ore; *Rainbow* (Irvinebank) 10 tons 12 cwt. 3 qr. 15 lb. of tin concentrates from 173 tons of ore; *Great Southern* (Irvinebank) 5 tons 16 cwt. 1 qr. 7 lb. of tin concentrates from 303 tons 18 cwt. of ore; *Rip and Tear* (Herberton) 3 tons 8 cwt. 1 qr. 17 lb. of tin concentrates from 15 tons 16 cwt. of ore. A total of 928 tons 3 cwt. 1 qr. 8 lb. of alluvial tin was sold for a value of £630,977; the chief producers being Ravenshoe Tin Dredging Ltd. with a yield of 720 tons 7 cwt. 3 qr. 4 lb. of tin concentrates valued at £489,880 and Tableland Tin Dredging No Liability with a yield of 192 tons 10 cwt. 2 qr. 15 lb. of tin concentrates valued at £123,451.

Again there was no production of wolfram recorded during the year as there is no market for same.

There were four mills which crushed dring the year, namely the State Treatment Works, Irvinebank; Walker's Great Northern Tin Battery, Herberton; Emuford Battery (J. W. Green & Son) Emuford and the Brownville Battery (A. R. Dunmall) Brownville.

On the Russell Field there was some prospecting carried out and preparations made to commence sluicing.

Reports of activities from the various mines and detailed statements are appended hereunder.

LODE TIN

Herberton

Rip and Tear (C. E. & J. E. Wyatt).—Fifteen tons of stone were treated for a return of 3 tons 8 cwt. 1 qr. 17 lb. of concentrates, valued at £2,081. A further 10 tons of 15 per cent. ore have been raised.

Welcome Home (Leet & Smith).—The mine has now been cleared to a depth of 72 ft. below adit level and a total depth of 97 ft. from the surface. Two tons eighteen hundredweight of ore from this mine were crushed at Walkers Battery for a return of 5 cwt. 6 lb. of tin concentrates value at £136. It is proposed to bore this mine using long hole steel in the near future.

New Chum (F. L. Stamp).—This mine was bailed by hand to 50 ft. Ten tons of mullock were lifted. No tin was located.

Canberra (F. L. Stamp).—During the year 22 tons of headings were screened and 17½ tons treated for a return of 5½ cwt. of concentrates valued at £152.

Great Northern Freehold (F. L. Stamp).—During the year 10 tons of screenings were crushed for 4½ cwt. of concentrates and 90 lb. of alluvial tin were produced from Prospectors's Gully. Fifty-four feet of crosscutting and 167 ft. of opencutting were completed on the southern extension of the *Defiance* lode into the Great Northern Freehold without revealing payable tin.

Watsonville

Elaine Mary (Morris Bros.).—A shaft was sunk to a depth of 40 ft. below the Bottom Tunnel. Twenty feet of driving was carried out on the bottom of this shaft. One hundred feet of driving was carried out on the Bottom Tunnel level. No worth-while values were found from this work. Sixty-one tons of ore were crushed during the year for a yield of 8 tons 8 cwt. 3 qr. 8 lb. of tin valued at £4,971.

Little Western (Walker & Evans).—The prospecting drive in the northerly direction was driven to a total distance of 36 ft. The winze on the northern side of the porphyry was sunk a further 10 ft. and the skidway strengthened. On the southern side of the porphyry stoping and driving were undertaken on low grade ore. Sixty-eight tons of ore were treated at the Herberton Battery for a return of 4 tons of concentrates, valued at £2,222.

Bakerville

Peacemaker (Petersen Bros).—A large quantity of overburden was removed and stoping was carried out. The approximate depth of the mine is 70 ft. Four hundred and eighty tons of ore were treated for a yield of 5 tons 7 cwt. of concentrates, valued at £2,872.

Hales Siding

Irish Guard (J. Douglas).—One hundred and fifty-eight tons 4 cwt. of ore were treated for a return of 1 ton 11 cwt. 3 qr. 11 lb. of concentrates, valued at £892.

Stannary Hills

Gladstone (C. Manoni).—During the year 5 tons 3 cwt. of ore was recovered from this mine and treated for a return of 7 cwt. 23 lb. of tin concentrates valued at £201. No other work was carried out.

Kitchener (A. W. F. Lockyer).—During the year 360 tons of surface material yielded 1 ton 16 cwt. 1 qr. 26 lb. valued at £888.

Irvinebank

Rainbow (J. Peters and party).—No. 2 tunnel was driven on for a distance of 48 ft. to test the lode but with negative results. Seventy-three tons of stullings were brought down through a pass from above, which was then treated for a return of 2 tons 8 cwt. 24 lb. of tin concentrates. Work was next commneced on No. 1 winze where a seam of ore had been left years previously. Results from stoping were 99 tons of ore for a return of 8 tons 4 cwt. 3 qr. 11 lb. of tin concentrates. The total value of all tin produced for the year was £6,199. Depth of the mine would be approximately 450 ft. from the surface where work was first began 26 years ago.

Great Southern (W. Byrne and party).—A good deal of surface prospecting was done on the *Red King* line of the lode, on the Great Southern side. A promising lode of about 1½ per cent. was located, but has not had further development. On the same location a 30 ft. winze was cleaned out and winch installed. This was proved unpayable. Close by, the *Yellowstone* shaft was cleaned and a parcel of 32 tons raised for 1 ton of concentrates. A further 15 ft. of sinking was carried out and approximately 15 tons of ore are waiting haulage at present. A lode formation was sunk on for a depth of 25 ft. in the crosscut at 328 ft. in No. 2 tunnel. 43 tons of ore yielded 2 tons of tin. In all 303 tons 18 cwt. of ore were crushed for a yield of 5 tons 16 cwt. 1 qr. 17 lb. valued at £3,002. 40 tons of ore estimated at 1½ per cent. were at the mine when worked ceased for the year.

Streak (F. R. L. Collins).—A winch was installed and 8 ft. of sinking was done in No. 1 winze on a small seam of tin. 10 ft. of driving was done in No. 5 winze at the 30 ft. level. The main tunnel was driven a further 10 ft. to connect with No. 4 winze. 15 feet of driving was done in No. 4 winze at the main tunnel level. Benching and also 10 ft. of sinking was done at the east end of No. 2 stope. The *White Angel* tunnel was cleaned out. A small seam is still showing in the bottom of No. 1 winze. Prospects are very good in No. 4 winze. 257 tons 4 cwt. of ore were treated for a yield of 2 tons 8 cwt. 3 qr. 10 lb. of tin valued at £1,332.

Submarine (Armstrong Bros.).—At the 120-ft. level a sink on the first head was carried out to a depth of 20 ft. Then a drive of 25 ft. in a westerly direction along the 2nd and main head, then a shaft was sunk at the head of the drive following the main head down. At that depth heavy mineral was encountered with small patches of tin. Truck and rails were installed.

Town Talk (Buckley and party).—Approximately 470 tons of dump and stullings were carted to the State Treatment Works and treated yielding 4 tons 2 cwt. of tin. During the year a drive and open cut were cleaned out and stullings crushed. Further prospecting is now being carried out. Depth of the mine is 150 ft.

Phoenix (Buckley and party).—159½ tons of dump material were prepared and carted and treated yielding 24 cwt. 1 qr. 10 lb., valued at £458. A road was put into this lease and prospecting was also carried out.

Lamb (F. Baker).—A total of approximately 40 ft. of driving was carried out on the line of lode. 88 tons 14 cwt. of ore were treated for a yield of 11 tons of concentrates.

Anniversary (A. W. Wilesmith).—A shaft was sunk to a depth of 21 ft. Five tons of 12 per cent. ore were raised and with two tons 14 cwt. raised from other various leaders yielded 16 cwt. 1 qr. 8 lb. of concentrates, assaying 72.8 per cent. for metal, and valued at £500. Six feet of sinking was carried out on a small rich pipe 1½ chains along the line in a westerly direction. Two cwt. of 10 per cent. ore raised.

Nolan (F. and G. Smith).—18 tons 7 cwt. of ore were treated for a yield of 17 cwt. 2 qr. 4 lb. of concentrates, valued at £509.

Law King (Ludlow and Brodie).—136 tons 11 cwt. of ore were treated for a return of 1 ton 8 cwt. 2 qr. 8 lb. of concentrates, valued at £754.

Patrick (G. J. Ellson).—The open-cut workings have been cleaned out and a nice seam of tin bearing lode has been uncovered at one end. Approximately 100 tons of dump and 110 tons of stullings pulled from the open-cut and down at the 60 ft. level. This material was treated for a return of 2 tons 15 cwt. of concentrates, valued at £1,603.

Elizabeth (Perkes and party).—154 tons of ore were treated for a return of 3 tons 1 cwt. of concentrates valued at £1,611.

Silver Valley

Great Divide (Arthur and Gatenby).—85 tons 6 cwt. of ore were mined and treated for a yield of 19 cwt. 3 qr. 7 lb. valued at £569.

White Elephant (Tin Lodes Pty. Ltd.).—The White Elephant area near Mowbray Creek was open-cut and approximately 61 tons 16 cwt. were sent to the Battery and yielded 5 cwt. 3 qr. 7 lb. valued at £166. 10 tons of dumps were also sent to the battery for treatment and yielded 3 qr. 15 lb. of concentrates, valued at £24.

Black Widow (J. H. Ludlow).—Approximately 50 tons of ore were raised and treated through the Dead Finish Mill for the return of one ton of tin. Approximately 70 tons of mullock were raised.

Innot Hot Springs

Good Luck (F. Konig).—Work till the end of the year consisted of prospecting work alongside of the old workings. No ore is showing in the rock laid bare and only sinking along the old shaft after dewatering through a new approach at 17 ft. level will decide continuation of possible ore bodies. No ore was raised.

Nymbool

Halls (C. Senz).—This mine has been sunk to 60 ft. Portion of the drive on the 55 ft. level has been cleaned out.

Midnight (C. Senz).—The mine has been cleaned out to 50 ft., when it went down a further 50 ft. underlay. The mine is in granite and the lode is in white quartz, and was previously worked for wolfram and has now turned to tin. Approximately 50 tons of rock was removed from the mouth of the shaft.

ALLUVIAL TIN

Mount Garnet

Tableland Tin Dredging N.L.—On the 25th January, No. 2 Dredge partially capsized. The dredge was refloated on 26th March and rehabilitation work commenced immediately. Dredging recommenced on 24th September.

The Poison Gully Bunded area was used for settling heavy colloidal clay and the top settled water was returned to the dredge pond via pumps and water channels.

Boring and prospecting continued on Authority to Prospect No. 142 M. One plant was continually engaged in drilling and sampling for dredge-course within D.L. 6.

Due to the partial capsize of the dredge in January, only 1,237,800 cubic yards of material were treated for a return of 259 tons 8 cwt. of black tin. Value of tin won is approximately £163,579.

A total of 80 men were employed in all departments.

Ravenshoe Tin Dredging Ltd.—All mine plant and machinery operated satisfactorily throughout the year. Mining operations were carried out on Dredging Lease No. 4, and 33.7 acres were dredged. 2,611,000 cubic yards of material were treated for a recovery of 689 tons 6 cwt., representing 9.4 oz. per cu. yd., approximate value £460,000.

The various shore pumps and settling areas for the retention of slimes operated with the utmost satisfaction.

Staff and employees averaged 70 through the year.

Nymbool

Nymbool Tin (Nymbool Tin Pty. Ltd.).—No mining operations were carried out during the year. Work was confined to building up the sides of the dams and reconditioning of old machinery. The company is awaiting delivery of new machinery.

Kalunga

Bernboro Extended (J. Byrne).—The shaft was cleaned and timbered to the bottom at 42 ft. No ore was raised.

Bernboro (J. Byrne).—A shaft has been sunk to a depth of 19 ft. No ore was raised.

COPPER

Stannary Hills

Atlanta and Atlanta No. 1 (Atlanta Mining Co. Pty. Ltd.).—Work was commenced 1st June. The main shaft was retimbered to tunnel level, a depth of 80 ft. Skids, ladders, air and water lines were put in to 125 ft. A poppet head was erected. No ore has been broken to date.

RUSSELL EXTENDED GOLD FIELD

Gold/Tin

Astronomer (Turner and party).—Three and a half miles of water races were cleaned out. A tractor is being shifted to the mine. No further work has been carried out due to lack of water.

Table A

LIST OF TIN CRUSHINGS ON THE HERBERTON GOLD AND MINERAL FIELD FOR THE YEAR, 1960

Name of Mine or Owner	Ore Treated T.	C.	Q.	L.	Yield T.	C.	Q.	L.	Value £
A.C.T. Minerals Development Ltd.	173	7	0	0	0	17	1	18	473
Adventure	287	12	0	0	2	18	0	14	1,630
Allen and Crome	466	7	0	0	3	11	1	26	2,060
Anniversary	7	14	0	0	0	16	1	8	500
Armstrong Bros.	31	15	0	0	0	10	1	6	289
Armstrong Bros. and Flavell	13	17	0	0	0	18	3	7	557
L. Arnell	7	5	0	0	0	1	3	8	56
Austral American Enterprise Pty. Ltd.	255	9	0	0	1	11	1	23	848
F. Baker	18	7	0	0	0	3	1	21	88
Baker and Gaul	38	18	0	0	0	7	0	6	191
L. C. Bendon	189	0	0	0	2	1	0	0	963
Black Widow	20	0	0	0	0	12	0	0	356
Brown and Douglas	51	5	0	0	0	5	3	11	153
W. Byrne	24	3	0	0	0	3	1	15	95
Elaine Mary	60	0	0	0	8	8	3	8	4,971
Elizabeth	154	3	0	0	3	1	3	13	1,611
G. J. Ellson	103	18	0	0	1	5	1	11	752
Endeavour	288	9	0	0	2	0	3	7	1,180
Excelsior	60	0	0	0	0	8	3	0	199
Flannagan	51	5	0	0	0	7	1	23	195
A. Gaul	14	3	0	0	0	2	3	9	64
T. Gaul	28	8	0	0	0	4	2	21	117
Gaul and Kerr	25	9	0	0	0	4	1	20	123
General Gordon	2	10	0	0	0	0	2	0	15
Good Luck	50	0	0	0	0	10	2	0	267
Great Divide	85	6	0	0	0	19	3	7	569
Great Northern	25	19	0	0	0	9	3	11	272
Great Southern	303	18	0	0	5	16	1	7	3,002
Green and Son	60	0	0	0	0	8	2	16	204
Hawk	172	17	0	0	1	13	1	6	1,021
Irish Guard	158	4	2	0	1	11	3	11	892
Ivy	65	0	0	0	1	5	0	23	559
W. Kemp	17	4	0	0	0	7	1	24	199
Lamb	49	16	0	0	1	3	2	17	652
Law King	136	11	0	0	1	8	2	8	754
J. Lean	153	19	0	0	1	11	0	17	800
Little Western	68	1	0	0	4	0	1	15	2,222
F. H. Low Choy	196	18	0	0	1	12	3	3	921
W. Ludlow	185	7	0	0	1	7	2	24	817
R. Manning and Party	360	0	0	0	1	16	1	26	888
C. Manoni	5	3	0	0	0	7	0	23	201
Manoni and Weinert	24	0	0	0	0	8	3	6	199
Mount Ormonde	265	7	0	0	2	2	1	7	1,233
W. A. Newburn	168	0	0	0	1	18	1	19	1,023
Nolan	18	7	0	0	0	17	2	4	509
Patrick	97	0	0	0	1	9	0	21	851
Peacemaker	480	4	0	0	5	7	0	19	2,872
Perks and Hooley	27	3	0	0	0	4	2	1	106
Perks and Jones	51	0	0	0	0	15	0	16	440
Phoenix	59	18	0	0	0	9	3	8	282
Python	11	8	0	0	0	5	0	15	158
Rainbow (Irvinebank)	172	19	0	0	10	12	3	15	6,199
Rainbow (Herberton)	26	0	0	0	0	6	3	18	158
Richardson and Party	5	9	0	0	0	2	3	8	77
Rip an Tear	15	16	0	0	3	8	1	17	2,081
Skennar and Morris	25	0	0	0	0	17	1	5	301
G. Smith	8	8	0	0	0	4	0	13	53
G. and F. Smith	25	6	0	0	0	9	1	16	204
Stallan and Arthur	60	0	0	0	0	8	1	16	243
Stallan and Tutay	48	0	0	0	0	7	3	0	213
State Treatment Works	8	0	0	0	0	1	3	22	45
Streak	257	4	0	0	2	8	3	10	1,332
Submarine	10	8	0	0	0	4	1	3	124
Tin Lodes Pty. Ltd.	10	0	0	0	0	0	3	15	24
Town Talk	592	1	0	0	5	3	1	21	2,782
J. Turner	129	9	0	0	0	15	3	2	474
Turner and Perkes	36	2	0	0	0	7	1	24	198
Tyrconnell	20	11	0	0	0	4	0	9	109
Valetta	115	12	0	0	1	6	2	27	734
G. Ward	8	10	0	0	0	2	1	4	61
Ward and Gaul	139	17	0	0	1	4	1	8	659
Welcome Home	2	18	0	0	0	5	0	6	136
White Elephant	61	16	0	0	0	5	3	7	166
Worlds Fair	82	5	0	0	0	9	2	0	263
	7,531	5	2	0	101	12	0	27	56,035

Table B

LIST OF WOLFRAM TREATED AT MILLS ON THE HERBERTON GOLD AND MINERAL FIELD FOR THE YEAR, 1960

Nil.

Table C

MINERAL OTHER THAN LODE TIN WON ON THE HERBERTON GOLD AND MINERAL FIELD DURING THE YEAR—1960.

Mineral	Yield	Value
	Tons	£
Alluvial Tin	928·1066	620,977

RUSSELL EXTENDED GOLDFIELD

Nil.

Table D

*RETURN OF ALLUVIAL TIN RECOVERED FROM THE HERBERTON GOLD AND MINERAL FIELD DURING THE YEAR—1960.

Tableland Tin Dredging N.L.	192	10	2	15	123,451
Ravenshoe Tin Dredging Ltd.	720	7	3	4	489,880
Nymbool Tin	0	4	2	16	148
Sydney Smelting Co. Pty. Ltd. (Purchased)	9	12	2	24	4,606
O. T. Lempriere and Co. Ltd. (Purchased)	5	7	2	5	2,892
	928	3	1	8	620,977

*These figures are based on recorded purchases by ore buying firms.

RUSSELL EXTENDED GOLDFIELD

Nil.

Table E

MINERALS OTHER THAN GOLD—1960

TREATED AT MILLS ON THE FIELD

Minerals	Treated Tons	Yield Tons	Value £
Tin Ores (Lode)	7,531·275	101·6121	56,035

TREATED AT MILLS OFF THE FIELD

Nil.

J. C. DILLON, Warden.

INGHAM DISTRICT

The number of men engaged in mining activities at the end of the year totalled 62, including eight engaged in the production of clay. During the year 76 miner's rights were issued and four alluvial claims (three tin and one gold) were registered. One prospecting area (gold) was also taken up but later abandoned. Seven applications for mineral leases (five copper and two silver-lead) were recommended for approval.

Gold (Alluvial)

The claim registered is in the vicinity of Gray Creek near Pandanus Station. Surface work yielded 26.28 crude oz. of gold valued at £295 15s. 8d. The claim-holders report that a shaft is being sunk in the hope of striking a reef.

Tin

Work in the production of tin was confined to alluvial ground at Garrawalt and Perry Creeks and at Blue Range and was carried out by small claim holders and tin scratchers. Total production of tin from all sources was 2 tons 2 cwt. 2 qr. 23 lb. valued at £1,266 4s. 9d.

Bismuth

Prospecting work was carried out on Prospecting Area No. 2/59 (Hi-Crest) by A. Redwood.

Silver-Lead

Work on the two leases taken up during the year has been confined to surface prospecting only.

Clay

Ingham Brick and Pottery Works (M.L. 291).—During the year clay produced totalled 2,518 tons 11 cwt. valued at the grinding mill at £629 12s. 9d.

Copper

Work on four of the leases taken up was confined to surface prospecting only. On the other lease (M.L. 300)—J. H. and H. D. Atkinson—a prospecting shaft was put down to 25 ft. but this shaft was filled with rain water prior to any result being obtained.

Halls Reward (M.L. 288—J. H. and H. D. Atkinson).—Ore produced from this mine during the year was shipped to Japan and a concentration plant was erected and started production towards the end of the year. Complete details of the copper content of the ore have not been obtained.

Table A

TIN (ALLUVIAL)

Locality	Yield	Value
	T. C. Q. L.	£ s. d.
Blue Range	0 12 1 16	387 8 2
Garrawalt Creek	0 26 2 7	760 7 8
Perry Creek	0 3 3 0	118 8 11
Total	2 2 2 23	1,266 4 9

W. C. BARLOW, Warden.

INNISFAIL AND JORDAN FIELDS

JORDAN GOLD AND MINERAL FIELD

Reports received in respect of the year ended 31st December, 1960, reveal a further reduction in gold production on this Field. As shown on the attached Production Table gold recovered amounted to 58.66 oz., the gross value of which was £840 3s. 3d.

Following are the details of reports received:—

G.M.L. No. 44 *Missing Link* (E. J. Stoker).—About 3¼ tons of ore were taken out and crushed for a return of 17.74 oz. Prospects are not bright.

G.M.L. No. 55 *Miyee* (J. F. Bock).—Drove 109 ft. on tunnel and timbered and stoped same. Have 40 tons of ore at grass. Treated 25 tons of ore for a return of 28.42 oz.

G.M.L. No. 56 *Wha-Ha* (L. C. Withers, N. T. Hanley and H. Amatt).—Work done during the year was of a prospecting nature only.

G.M.L. No. 58 *Try Again* and *G.M.L. No.* 64 *Huh* (J. S. Ball and C. Macdonald).—The two leases are being run as one. Most of the work has been of a developmental nature. Approximately 25 tons of material have been treated for a return of approximately 8½ oz.

G.M.L. No. 60 *The Timber Ramp Lease* (J. F. Bock).—Prospecting cuts done by bulldozer. No ore treated.

G.M.L. No. 66 *Recovery* (C. Bruck and K. Dzenis).—Sampling ores and prospecting on Lease and surroundings with poor results. 8 tons of ore crushed for a return of 4.04 oz.

G.M.L. No. 67 *Shadow* (F. G. Smith, P. G. Wilson and N. Wild).—Further prospecting and sinking done during the year, fair values obtained at about 70 ft.

G.M.L. No. 71 *The Juliana* (C. Macdonald).—Work carried out to date has been entirely developmental, consisting of water race improvement, water deviation and prospecting over the lease area. No gold values recovered.

Alluvial Gold Claim No. 165 *Lucky Kitten* (F. A. and S. Nolan).—Have done 25 ft. of driving and timbering on to alluvial wash showing values. No payable returns.

INNISFAIL DISTRICT

Mourilyan Harbour—Iron Ore

M.L. No. 4 *The Heather Leigh* and *M.L. No.* 5 *The Heather Leigh No.* 2 (Clifford and Party).—There was no work done on these leases during the year. Investigations into the development are now taking place.

Talc

M.L. No. 8 *The Thistle Mine* (A. S. Clark).—The only work carried out was of an exploratory nature and the taking of samples for submission to prospective buyers.

Silkwood—Brick Clay

M.L. No. 3 (P. and A. Tarditi).—Work carried out during the year by Silkwood Brickworks. 1,000 tons of clay processed.

Miners Rights issued during the year totalled 43.

PRODUCTION TABLE—JORDAN GOLDFIELD

YEAR ENDED 31ST DECEMBER, 1960

Mine	Lessee	Ore Treated	Standard Gold Recovered	Value	Premium	Total Value
		Tons	Oz.	£ s. d.	£ s. d.	£ s. d.
G.M.L. 44 "Missing Link" ..	E. J. Stoker	3¼	17·74	69 1 6	185 0 4	254 1 10
G.M.L. 55 "Miyee" ..	J. F. Bock	25	28·42	110 13 2	296 7 10	407 1 0
G.M.L. 58 "Try Again" ..	J. S. Ball and C. McDonald	25	8·46	32 18 9	88 4 6	121 3 3
G.M.L. 66 "Recovery" ..	C. Bruck	8	4·04	15 14 7	42 2 7	57 17 2
Totals	..	61¼	58·66	228 8 0	611 15 3	840 3 3

Gold in fine ounces—53·771 oz.

Value at £4 4s. $11^{5}/_{11}$d.—£228 8s. 1d.

P. M. O'CONNOR, Warden.

IPSWICH DISTRICT

As reported in previous years, the production of coal on the Ipswich field was the principal mining operation throughout the year.

Fifty-four mines operated for a total production of 1,628,633 tons of coal, valued at £4,946,838.

To a much lesser extent dolomite, brick, fire and pipe clay were also produced as shown:—

Product	Tons	Value
		£
Dolomite	2,139	4,632
Brick Clay	3,380	780
Fire Clay	9,319	2,834
Pipe Clay	9,632	2,489
Total	24,470	10,735

At present on the Ipswich Field there are one hundred and forty-eight current Coal Mining Leases and Applications. Five applications for Coal Mining Leases were dealt with during the year and recommended for approval. In addition there are current twenty-eight Mineral Leases. Eighteen Permits to Enter Private Land were issued during the year. Practically all of these permits were in relation to areas subsequently applied for as Coal Mining Leases. A total of three hundred and two accidents occurred in the several mines in the district and of which there were ten that might be termed of a serious nature reported to me as Warden during 1960. There were no fatalities. Four Inquiries under the provisions of Section 74 (1) of *"The Coal Mining Acts, 1925 to 1952,"* were held and the services of experienced miners were used in the course of such inquiries. There was an extension of mechanisation in the mines throughout the area.

P. T. NOONE, Warden.

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KANGAROO HILLS FIELD

The total recorded production for the year was 34 tons 5 cwt. 3 qr. 15 lb. of tin, valued at £15,969 4s. 1d. This represents an increase of £1,637 19s. 10d. in the value of production as compared with that of 1959.

A considerable amount of prospecting work was carried out on this field during the year and 42 prospectors were assisted by the Department to the extent of £3,522.

Shrimp Battery (Reddie Bros).—One hundred and thirty-five tons Sardine and Shrimp ore and stullings were crushed for a yield of 5 tons 6 cwt. 1 qr. 23 lb. tin oxide. Fourteen tons public ore treated yielded 1 ton 9 cwt. 3 qr. 26 lb. Ores purchased were 2 tons 9 cwt. 2 qr. 23 lb. of alluvial tin and 13 tons 18 cwt. 1 qr. 27 lb. of battery tin.

Shrimp Mines (Reddie Bros.).—Main Opencut. This opencut is badly situated, being subject to flooding each season. Length of lode formation exposed in the cut is about 40 ft. Twenty-two tons 10 cwt. ore were crushed for a yield of 6 cwt. 1 qr. tin oxide.

No. 2 Opencut.—A little prospecting work has been done here, disclosing a ferruginous formation with low tin values.

No. 3 Opencut.—Testing of the decomposed porphyry dyke discloses low tin oxide values.

No. 4 Opencut.—A little payable ore has been located here but is not workable until the adit tunnel has been cleaned out.

Sardine Mines (*Reddie Bros.*).—Surface. No. 2 (copper) shaft has been sunk to 52 ft. and levels driven north-easterly 3 ft. and south-westerly 22 ft. 9.5 tons of ore yielded 9 cwt. 2 qr. fairly clean tin oxide. A further 38 tons of copper/tin ore on hand at the end of the year.

Sardine No. 3 North and South Levels.—About 95 tons stullings were treated for 1 ton 7 cwt. tin oxide also 17 tons 10 cwt. high-grade ore for a yield of 3 tons 14 cwt. 0 qr. 25 lb. tin oxide, the latter included 1 ton 6 cwt. prill ore assaying at Smelter 57.8 per cent. tin (metal).

Trial Cat Extended (Claim No. 1627—D. C. Becke).—Approximately 1 ton 5 cwt. of tin was recovered.

Northumberland (Claim No. 1783—C.L. and R. Wilcox).—This claim was applied for in August and 128 tons of ore were treated for a return of 10 ton 3 cwt. 1 qr. 8 lb. Owners expect lode to be 96 ft. long averaging from 5 to 6 ft. wide and average about 8 per cent. tin when fully opened up.

Patricia (Claim No. 1778—Garth and Furber).—Sank shaft to an approximate depth of 30 ft. and stripped the shaft, raising 42½ tons of ore for a yield of 5 ton 10 cwt. 3 qr. 24 lb. tin. Claim was abandoned and later on taken up by Messrs. S. J. and G. Watts as Claim No. 1781.

Firefly (Claim No. 1777—S. H. O. Sack).—Eleven and a half tons ore were treated for a return of 17 cwt. 1 qr. 27 lb. tin.

Sunrise Claim (H. Young and D. Maas).—Shaft was sunk to a total depth of 15 ft. Two tons of ore were raised.

Dolcoath (C. J. and W. Reddie).—The manager advises that only general prospecting work has been done on this claim.

Sardine Peak (Jones and Sons).—No. 1 Shaft sunk 23 ft. Thirty feet of driving was done in No. 2 shaft. A new shaft was sunk 40 ft. to meet No. 2 shaft. Two hundred and nineteen tons of ore were treated for a recovery of 12 tons 19 cwt. 3 qr. of tin concentrates.

Deep Down (Claim No. 1749—J. H. Summers).—Seven hundredweight of tin, valued at approximately £200 were recovered.

Hector (Claim No. 1758—W. J. Pullar).—Approximately 11 tons of ore were treated for a recovery of 1 ton 12 cwt. 3 qr. tin.

Mount Isa Mines Limited have an Authority to Prospect in Garawalt Creek area, the object of examination being to locate tin-bearing alluvial flats. Quite a number of these have been surveyed and some drilling done but results of the work are not yet to hand.

COMPARATIVE STATEMENT OF PRODUCTION

Nature of Ore	1959		1960	
	Treated	Tin	Treated	Tin
	Tons	Tons	Tons	Tons
Milled—				
Tin ..	327·15	30·8919	434·45	28·6540
Alluvial—				
Tin ..	..	4·6982	..	5·6393

A. N. JACOBS, Acting Warden.

LONGREACH DISTRICT

There was no mining activity on the Longreach Field during the year ended 31st December, 1960.

Four applications were made for an Authority to Prospect for Petroleum, and twenty-two Miner's Rights were issued during the year.

There are no indications at present that mining activity of any great proportion is likely on this field in the near future.

J. V. CAVANAGH, Warden.

MACKAY DISTRICT

Gold

Very little activity to report. Messrs. L. G. Sgiarovello and L. T. Cowan mining at Mt. Brittain crushed 50 tons of ore which yielded 11.28 oz. fine, valued at £472 14s. 1d. with premium amounting to £1,266 2s. 2d. and 14.14 oz. silver, valued at £4 18s. 11d.

Copper

Pine Vale Mines Ltd.—No work done at this mine.

Isons Mine (Mount Orange).—Messrs. Styles and party sold 15.3795 tons of ore to The Electrolytic Refining and Smelting Co. of Australia Pty. Ltd. for a yield of .9719 tons of copper, valued at £228 6s. 5d. and 10.5026 oz. silver, valued at £4 6s. 8d.

Mr. H. R. Barenthien continued work of a spasmodic nature at Bong Bong but had no production.

Fire Clay

Pindi-Pindi Brickworks (A. R. Porter).—During the year 2,634 tons of shale, valued at £1,580, were produced and 300 tons of fire shale, valued at £375. Average monthly production of bricks was 56,580. Fourteen men employed.

General

Four prospectors received assistance during the year.

T. W. EITE, Warden.

MAREEBA FIELD

The value of production was £7,474 13s. 7d., compared with £5,327 14s. 6d. for the year 1959.

Information obtained on operations at the various mines, is as follows:—

Clay

M.L's. Nos. 76 and 90, Clohesy River (Northern Brick & Pipe Co. Ltd.).—From M.L. No. 76, 7,092 tons of clay was mined, and from M.L. No. 90, 2,476 tons of clay was mined. The total value of production was £3,830. The clay was used in the manufacture of bricks, and was excavated from an open pit.

Tin

D.L., Blackrock (McElligott and Kennedy).—1,250 yards of material were treated for a return of 33½ bags of tin. This was obtained from an open-cut.

London Mixture (Schofield and Perrott).—50 tons of mullock were raised, and 20 tons of ore mined, estimated to contain 3 per cent. tin. An open-cut was made for a distance of 60 ft. Water races were constructed.

Wolfram

Three Leaved Shamrock and Three Leaved Shamrock Extended (H. W. B. Flanagan).—During the year a compressor and jackhammer were purchased and installed.

Kitty (E. Koll).—200 tons of mullock were raised and one ton of ore mined, estimated to contain 5 per cent. wolfram.

Sunset (E. Koll).—380 tons of mullock were raised and one ton of ore mined, estimated to contain 7 per cent. wolfram. One and a quarter tons of ore were treated at Rumula, for a return of £82.

The Corker (C. H. Vince).—Twelve tons of ore were mined and 12 tons treated for a return of 18 cwt. of wolfram, which has not been sold.

TOTAL VALUE OF PRODUCTION FOR YEAR

	£	s.	d.
Tin	3,644	13	7
Clay	3,830	0	0
	£7,474	13	7

D. C. WOLFGANG, Warden.

MARYBOROUGH AND BIGGENDEN DISTRICT

Coal

During the year *Burgowan Nos.* 7, 11 and 12, *Churchill, Churchill Extended, Globe* and *Victory East* Collieries operated and details of operations appear in the report of the Inspector of Coal Mines.

Clay

Maryborough Drain Pipes Pty. Ltd. (*Mineral Lease No.* 58).—The tonnage of clay mined was 1,480 tons. Six men were employed on this particular lease for 60 hours of the year. The value of clay mined was £2,960 at a cost of £2 per ton to mine.

Mineral Lease No. 73.—Eight worked 80 hours during the year mining clay from this lease, and the amount of clay mined was 1,160 tons at a cost of £2 per ton. The total value of the clay mined was £2,320.

Mineral Lease No. 75.—730 tons of clay was mined at a cost of 30s. per ton, the total value of clay mined therefore being £1,095. In working this lease eight men worked for 50 hours of the year. The total clay mined from the three leases mentioned above was £6,375.

Maryborough Sugar Factory Ltd. (*Mineral Lease No.* 67).—14,670 tons of clay for the manufacture of bricks was taken from this lease during the twelve months ended 31st December, 1960. The value of same was £5,472 11s. 4d. Two men were employed.

Zircon, Rutile, &c.

Mineral Deposits Pty. Ltd.—No mining operations were carried out on Dredging Leases 1, 2, 3, 4, 7, 8, 9, 10, 11, and 12 during 1960 but research and developmental work on new concentration methods were continued in the Company's workshop at Southport. Work was continued on the new type low-grade, primary concentrator which underwent test-stand trials during the year. Little was achieved in the field of wet magnetic separation, which is essential to the economic development of the high ilmenite bearing sands in the Gladstone area at present day metal market prices. Research undertaken to bring about the profitable working of the abovementioned leases is continuing.

Crescent Rutile N.L.—The leases held by this company have been under exemption during the year.

COAL PRODUCTION, 1959-1960

HOWARD AND TORBANLEA.

Colliery	Tonnage				Value						Men Employed	
	1959		1960		1959			1960			1959	1960
	Tons.	cwt.	Tons.	cwt.	£	s.	d.	£	s.	d.		
Burgowan No. 7	27,896	0	26,350	5	100,752	13	2	100,405	8	8	58	54
Burgowan No. 11	31,180	0	33,731	19	115,078	14	0	130,984	5	0	59	56
Churchill	14,235	0	9,337	9	52,797	14	2	35,638	18	6	21	14
Globe	25,997	0	23,818	9	96,390	3	11	92,558	0	10	41	42
Churchill Extended	178	0	5,220	3	665	5	6	20,424	13	5	4	8
Victory East	23,222	0	23,233	19	86,078	4	2	91,030	9	5	54	52
Burgowan No. 12	..		..		..			..			..	3
Totals	122,708	0	121,692	4	451,762	14	11	471,041	15	10	237	229

BIGGENDEN

Lime

The Didcot Lime Co. Pty. Ltd. (*M.Ls. Nos.* 23, 24, and 29).—For the year ended 31st December, 1960, the company sold 451 tons earthy lime valued at £3 10s. per ton and totalling £1,578.

The increased sales for 1960 are largely due to a trial order by Fairymead Sugar Co. and the above company hopes that this delivery will be the forerunner of larger orders.

Dominion Lime and Mineral Industries (*M.Ls. Nos.* 33, 36, and 41).—No work of a productive nature has been done during the past year.

Gold

Mount Scougal Mining Syndicate, Glenbar (*G.M.Ls. Nos.* 54, 55, 56, and 57).—32 long tons of ore were treated at Monkland, Gympie, for a return of 10.86 oz. of gold valued with premium at £155 11s. 1d. and 1.7 oz. of silver valued at 11s. 11d.

Silver-Lead

Smith, M. L. and Braun, E. (*M.L. No.* 46).—Developmental work was carried out but no production reported.

Manganese

Heilbronn, H. (*M.Ls. Nos.* 43, 45, and 53).

Mineral Lease 43 (Bluff Mine).—About 2½ tons of ore was produced and Mr. Heilbronn reports that it would appear to be of required quality, and about 1½ tons of inferior quality.

Mineral Lease 45 (Redhill Mine).—No work was done on this lease.

Mineral Lease 53 (Alascan Mine).—About 1 ton of ore of apparently good quality was mined and about 3½ tons of inferior quality.

H. J. BRADSHAW, Warden.

MOSSMAN DISTRICT AND MOUNT PERSERVANCE FIELDS

Gold

There was no gold mined during the year.

Tin

Zarda No. 1 (G. Ford).—Mr. Ford reported that, owing to the scarcity of water, he has been working by hand. Production for the year was 14 cwt. of ore valued at approximately £400.

Wolfram

There was no mining activity in that part of the Mount Perseverance area within this District, due to the low price being paid for wolfram.

Limestone

Application M.L. 19.—Mr. A. T. McDowall reports that about 80 tons of limestone were removed from the lease during 1960, and, of this, 30-40 tons have been transported to the Crushing Plant. He estimates the value of the limestone uncrushed at approximately £250.

E. K. BUCHAN, Acting Warden.

MOUNT ISA GOLD AND MINERAL FIELD

The value of mineral production of the Field for the year 1960 is reported as £32,900,585, an increase of over £6½ million on the 1959 figure. This increase in value of production has come from the operations of Mount Isa Mines Limited. No gold was reported having been won during the year. No uranium ore is reported as having been mined. Testing of deposits by means of drilling was continued and the majority of leases are held under exemption from labour conditions. Interest was maintained in small copper shows during the year resulting in a slight increase in value of copper production from small shows. A few new mines commenced production but the results are not above average. Prospecting for beryllium ore around Mica Creek was continued. It is estimated that a quantity of less than one ton was produced but none was sold.

MOUNT ISA MINES LIMITED

A summary of operations for the year ended 31st December, 1960, supplied by the Company, contains the undermentioned particulars:—

Exploration

Outside S.M.L. 3937—*Leichhardt,* Authority to Prospect.—Surface geological mapping was carried out in the southern portion of the Authority. Geophysical surveys assisted in this work which is continuing.

Beryl, Authority to Prospect.—Preliminary work was carried out to select suitable areas for traversing with the Berylometer.

Within S.M.L. 3937—*Surface.*—Iw4S drill-hole was completed at 4,000 ft. without intersecting significant mineralisation. Mw5S diamond drill-hole was commenced but was abandoned owing to extreme flattening and tendency to proceed west. Gw20S and Ew10 were commenced late in the year.

Underground.—A large part of the underground core drilling was planned to confirm ore limits for future stope designs and to delineate operating stopes. Deep exploratory drilling was carried out to prove extensions of the southern copper lodes.

Mine

Total ore production for the year was 2,834,540 tons made up as follows:—

	Tons	Tons
Lead-Zinc sulphides	793,242	
Lead carbonates	12,534	
		805,776
Copper sulphides	1,980,079	
Copper oxides	48,685	
		2,028,764
Total		2,834,540

Diamond Drilling

Exploratory Drilling.—A total of 72,595 ft. of exploratory drilling was completed for the year, made up as under:—

	Ft.
Underground S.M.L. 3937 ..	67,246
Surface S.M.L. 3937	5,349
	72,595

Blasthole Drilling.—A total of 831,357 ft. of blasthole drilling was completed for the year, made up as follows:—

	Ft.
Blasthole diamond drilling ..	2,720
Blasthole percussion drilling ..	828,637
	831,357

Miscellaneous Drilling.—A total of 37,782 ft. of miscellaneous drilling was completed for the year for the purpose of water and drainage and pilot holes for raises.

Long Hole Bench Drilling.—A total of 58,024 ft. of long hole bench drilling was completed for the year.

Development Footage

Inside Lease—	Ft.
Exploration and Main Development	33,905
Stope Development—Pb	12,695
Stope Development—Cu	15,400
	62,000

Stope Fill

Fill placed totalled 908,524 cu. yd. made up as follows:—

	Cu. yd.
Hydraulic fill	173,854
Slag	72,187
Development mullock	92,225
Overburden	570,258
	908,524

Stockpile Balance

	Cu. yd.
Slag	124,481
Development mullock and overburden	860,891
Underground	32,022
	1,017,394

Mill

The quantity of ore treated during 1960 was an increase of approximately 13.2 per cent. on the previous year's figures. Rate of treatment of lead-zinc ores was stabilised and all remaining capacity utilised for copper sulphide ores. The lead sulphides assayed 6.6 oz. silver, 8.2 per cent. lead and 5.6 per cent. zinc. The copper sulphides assayed 3.8 per cent. copper.

Expansion and modification.—Design of a new 150,000 tons per period lead-zinc mill is in progress. This will be centred approximately 1,000 ft. north and west of the existing crude ore bins.

Progress was made in the installation of additional flotation middlings regrind equipment on the south-western corner of the existing Mill. This area was previously occupied by concentrate thickeners, which have been removed.

Production and Performance

Lead-Zinc Ore Treatment.—Tonnage throughput was lower than for 1959. However, slightly higher lead tenor for lead and zinc and improved recoveries were reflected in higher tonnages of lead and zinc concentrate. Railing and supplying of zinc concentrate during 1960 reduced Mount Isa stock-piled zinc concentrate tonnage by over 40,000 tons.

Copper-ore treatment.—Tonnage throughout was higher by 19.8 per cent. compared with the figure for 1959 reflecting the increased capacity of equipment installed late in 1959. Improved recovery on a head higher than in 1959 resulted in much higher copper concentrate tonnage figures. Copper concentrate in excess of smelter capacity was railed to Townsville for export.

Lead Smelter

Production of lead bullion was 53,095 tons with a silver content of 4,431,578 oz. In addition 4,003 tons of dross were produced.

Copper Smelter

The production of blister copper was 43,395 tons, compared to 40,625 tons in the previous year.

Smelting rates were slowed down at the end of the year due to shortage of concentrates, caused by shipping commitments of copper concentrates. During the year 98,217 dry tons of concentrates were shipped to Japan and 4,859 dry tons to E.R. & S., Port Kembla.

Expansion work in the new smelter continued. The 500-ft. stack was completed. The first stage of the new converter aisle is almost completed, and the two 60-ton cranes have been erected. Work is well ahead on the roaster building, reverberatory furnace and boilers, and also on the converter balloon flue. Foundations for converters, cottrells and silica slurry plant are almost complete.

Employment

The average number of employees for the year was as under:—

Mine	1,093	
Geology	55	
Mill	261	
Smelting and Metallurgical Works	474	
Workshops	648	
Surface—Miscellaneous	1,090	
		3,621
Contractors		268

Personnel employed (average) on ore production for the year was:—

Silver-Lead-Zinc.	Copper
311	782

MINING CORPORATION (AUST) NO LIABILITY

On S.M.L. 5364 the Company continued drilling from January to May, 1960. No. 5 hole was extended to a depth of 2,452 feet and hole No. 6 completed at a total depth of 2,679 ft. without either hole encountering economic mineralisation. Geochemical surveys were conducted over portion of A. to P. 70M and a geochemical anomaly was located. This was costeaned and tested by diamond drilling hole No. 7 which reached a completed length of 962 ft. and indicated weak uneconomic mineralisation.

QUEENSLAND MINES LIMITED

This Company completed drilling at their various uranium leases in the Mt. Isa district during July following which local operations were suspended.

Mammoth Mine (Foschi and Angeli).—Work was concentrated on the Mammoth open-cut. Towards the end of the year a start was made to deepen the old shaft 200 ft. NNW. of the Mammoth open-cut. 1,365 tons of ore treated by Mount Isa Mines Limited yielded 109 tons copper.

Mount Oxide (E. and A. Mannik).—Two parcels of ore totalling 140 tons treated by Mount Isa Mines Limited yielded 15.6 tons copper.

Mount Hope (Mount Hope Syndicate).—Production for the year was 457 tons of ore for a yield of 39.4 tons copper.

Rio Tinto Southern Pty. Limited.—During 1960 the company known as "Rio Tinto Australian Exploration" was changed to Rio Tinto Southern and the headquarters of the Company is now at Mary Kathleen.

During 1960 drilling was continued on the *Hero* leases to a depth of 650 ft. 9 in. and is in progress.

Geological and geochemical investigations were extended to the Calton Hills area and the results of the current drilling programme will govern any future drill-testing of these areas.

Plans are in hand for at least partially dewatering the Trekelano mine workings as a preliminary step in assessing the future ore potential, if any, of this mine area.

COPPER CORPORATION OF AUSTRALIA PTY. LTD.

Lady Annie.—In March 1960 a gravity treatment plant was started but due to the very poor recoveries obtained it was closed down after a period of six weeks. 400 ft. of costeaning was undertaken without any beneficial result. The old workings were reopened, systematically sampled and assayed.

A shaft 6 ft. by 4 ft. in the clear was sunk in a position 165 ft. SE. from the collar of the old main incline shaft. This was sunk to a depth of 114 ft. 6 in. A level was cut at 98 ft. and 70 ft. of driving with 74 ft. of crosscutting carried out. At the end of the crosscut a 40 ft. rise was put in. During the year approximately 740 tons of ore was mined which was put through a dry screening stage. The upgraded ore was then sold to Mount Isa Mines Limited.

GENERAL

Prospecting Assistance.—No prospecting assistance was applied for during the year.

Departmental Plant.—There has been a steady demand for the hire of departmental plant by the holders of small shows. Two additional quick winches were provided for use during the year.

Table A

PRODUCTION FIGURES, 1960. MOUNT ISA MINES LIMITED ORE ONLY

LEAD ORE YIELD

Mined	Treated	Lead	Value	Zinc	Value	Silver	Value
Tons	Tons	Tons	£ s. d.	Tons	£ s. d.	Ozs,	£ s. d.
805,774	803,468	52,676	4,713,422 17 6	24,394	2,707,414 14 0	4,422,705	1,825,256 2 7

COPPER ORE YIELD

Mined	Treated	Copper	Value
Tons	Tons	Tons	£ s. d.
2,028,764	2,029,828	*70,577	22,897,892 9 6

*Includes copper content of concentrates railed—28,113 tons—£9,119,933 4*s*, 0*d*,

Table B

PRODUCTION FIGURES, 1960—MOUNT ISA MINES LIMITED (Inclusive of all Purchased Ores)

—	Yield	Value
	oz.	£ s. d.
Silver	4,431,578	1,828,916 17 10
	tons	
Copper content of Blister	43,007	13,952,150 8 6
Copper content of copper concentrate railed	28,113	9,119,933 4 0
Lead	52,723	4,753,864 18 3
Zinc	24,394	2,707,414 14 0
Copper-Lead Dross (*See* detail below. Table C)	4,670	640,122 0 0
		£33,002,402 2 7
Fluxes—		
Limestone purchased		
Mount Isa Field	7,486	19,099 14 8
Cloncurry Field	9,436	21,584 11 9

Table C

DROSS EXPORTED, 1960

Gross	Net	Payable Content						Total Value
		Lead		Silver		Copper		
		Yield	Value	Yield	Value	Yield	Value	
Tons	Tons	Tons	£	Oz.	£	Tons	£	£
4,767.375	4,670·49	2,837·15	340,458	238,333	97,222	652·39	202,442	640,122

Table D

COPPER PRODUCTION, 1960—INDIVIDUAL MINES TREATED BY MOUNT ISA MINES LIMITED

Producer	Mine	Tons	Copper	Estimated Gross Value
				£ s. d.
Mammoth Syndicate	Kabunga	142·3832	9·2933	2,990 14 0
Kabunga Syndicate	Kabunga	41·7933	4·2929	1,290 0 4
Copper Corporation of Australia Pty. Ltd. ..	Lady Annie	495·7060	42·8810	13,170 4 9
Mammoth Syndicate	Mammoth	1,365·7251	109·0767	34,428 9 4
Mammoth Syndicate	Mammoth Extended	34·6427	4·8015	1,525 3 0
A. Vohland and Party	Manxman	387·7701	32·6703	10,427 0 10
A. and H. R. Groom	Mount Hope	42·8345	2·6107	820 6 9
Mount Hope Syndicate	Mount Hope	414·3885	36·7987	11,680 18 0
S. Czerna	Mount Maggie	156·2693	13·5188	4,315 12 5
E. and A. Mannik	Mount Oxide	140·0341	15·6084	4,732 7 11
O. G. Phillips	Mount Gordon	249·0448	25·6899	8,077 3 6
D. H. Laing	Nob Hill	38·7350	1·4261	443 3 2
D. Glendinning	Sunrise	16·6377	1·2716	390 7 8
A. Vohland and Party	The Olive	63·3616	5·2539	1,680 2 5
C. Cummins	Yammamiller	50·9339	4·6966	1,405 2 10
		3,640·2598	309·8904	£97,376 16 11

Table E

TABLE SHOWING QUANTITY AND VALUE OF MINERALS WON DURING 1959 AND 1960—MOUNT ISA FIELD

Mineral	1959			1960		
	Yield		Value	Yield		Value
	Tons	Oz.	£	Tons	Oz.	£
Copper	40,132	..	12,517,124	42,774	..	13,875,336
*Copper	16,650	..	5,233,284	28,113	..	9,119,933
†Copper	896	..	272,865	652	..	202,442
Silver	..	4,391,902	1,796,408	..	4,422,705	1,825,256
†Silver	..	292,001	118,596	..	238,333	97,222
Lead	49,555	..	4,400,920	52,676	..	4,713,423
†Lead	3,173	..	392,614	2,837	..	340,458
Zinc	13,983	..	1,452,704	24,394	..	2,707,415
Limestone Flux	2,455	..	7,972	..	..	..
Limestone	23,608	..	91,836	7,486	..	19,100
Beryl	½	..	78	..	..	..
			£26,284,401			£32,900,585

* Copper content of concentrates railed and sold for treatment overseas.

† Product of copper-lead dross from Mount Isa Mines Ltd. treated overseas.

J. A. B. NOLAN, Warden.

MOUNT MORGAN AND DAWSON FIELDS

Production in this district was again practically limited to the operations of big producers, Mount Morgan Ltd. (Gold, copper, silver, pyrites, coal); Thiess Callide Coal Pty. Ltd. (Coal); and Thiess Bros (Q'ld.) Pty. Ltd. (Coal).

GOLD

Mount Morgan Ltd. was the main producer of reef gold.

The production for the year of fine gold (reef) was 61,806.7 oz., of a value of £262,538, taking fine gold at £4 4s. 11 5/11ths d. per oz. The added value of gold, taking the value at £15 12s. 6d. per oz., returned a further £703,192, making a total value of £965,730. The gold production figures for 1960 reveal a sharp decrease of 12,988.3 oz. in comparison with 1959's figures.

Mount Morgan Limited

As at 31st December, 1960, 1,156 men were employed by Mount Morgan Ltd. and the average of men in employment for the year was 1,120, with little fluctuation in the total number employed at any time. Operations were continuous, and no hold-ups were experienced by way of industrial strikes or other causes during the year.

Mine.—Total material mined was 4.54 million tons (last year 4.57). Production was affected by rain in January, February and May.

Prospecting at Mount Morgan.—Prospecting for a possible faulted extension of the main ore-body below the Linda Fault was continued and seven diamond drill holes were sunk for a total length of 9,553 ft.

Outside Prospecting.—Testing of the "Ajax" prospect near Bajool, under option to the Company, was continued.

Production figures on combined milling operations for the years 1960 —v— 1959 show a further improvement in gold metallurgy.

Combined Mills

Year		1960	1959
Tons milled		946,300	806,200
Head assay	Au.	1·82 dwt/ton	2·58 dwt/ton
	Cu.	1·05 per cent. Cu.	1·07 per cent. Cu.
Recovery per cent.	Au.	74·4 per cent.	72·2 per cent.
	Cu.	92·8 per cent.	93·4 per cent.

Mount Morgan Only

The following quantities of material were handled:—

	Tons
Ore to Sulphide Mills	957,775 net
Waste to Dumps	3,586,161 gross
	4,543,936

Treatment.—

Sulphide Mills—Treated 946,300 tons of ore averaging 1·82 dwt. of gold and 1·05 per cent. copper for the production in concentrate of 64,191 fine oz. gold and 9,187 tons of copper and 27,967·90 oz. of silver.

Copper Smelter	Production from Mount Morgan Ore Only	Production from All Purchased Ores
	Tons	Tons
Blister Copper	8,473·20	4·06
Copper	8,392·91	4·02
	Oz.	Oz.
Gold	61,806·70	3·30
Silver	27,967·90	17·10

Purchases of ores from Mount Morgan Field only—nil.

PYRITES—PRODUCTION AND SALES

—	Production	Sales
Tons Pyrite	18,720	9,556
Tons Sulphur	9,575·7	4,863·1
Assay—per cent. S	51·15	50·9
Value	£56,160	£28,667

Price of Copper.—The weekly price of copper ex store refinery Port Kembla fluctuated between £290 and £357 a ton.

Price of Gold.—£15 12s. 6d. an ounce.

COAL

Baralaba.—Mount Morgan Ltd.'s Dawson Valley Colliery at Baralaba produced 18,890 tons of coal during the year. Sales of coal amounted to 16,614 tons, of an estimated value of £64,475 13s. 4d.

Thiess Callide Coal Pty. Ltd. and Thiess Bros. (Q'ld.) Pty. Ltd.—(M.L.'s 83, 85, 87, 88, 92, 104, 105 and 108 to 112).—The above companies are contractors carrying on the mining and selling of coal from these leases. Production was mainly from C.M.L. 83 in the Callide area.

Callide.—The total amount of coal mined and sold at Callide during the year was 70,769 tons 14 cwt., valued at £91,943 7s. 7d. Overburden removed was 123,180 cu. yd. The number of employees rose from twelve in the early part of the year to eighteen at the end of the year. No orders were received from outside the State.

A further fourteen bores totalling 2,537 ft. were put down with the Macarthy Drill to the west of the Open-cuts, so that a clearer assessment of reserves in that area could be made.

Kianga.—A further three shipments of coal were loaded at Gladstone for Japan, a total of 30,294 tons. At the end of the year, a further quantity of some 8,000 tons was at Gladstone ready for a boat to be loaded for Japan in January, 1961. A total amount of 39,352 tons of coal was mined, of a value of £57,038 16s. 11d. The number of employees varied from 24 to 33 during the year. The overburden removed during the year was 158,050 cu. yd. and about 13,200 tons of coal was uncovered at the mine at the end of the year. Further drilling round the Open-cut at Kianga has been carried out to give further information on the "A" and "C" seams, in addition to the "B" seam being worked at present. Some nineteen bores totalling 2,810 ft. were put down. Bores on the coal and face samples are continually being taken to ensure that the quality remains constant, and 27 of these have been sent for analysis.

Prospecting was continued in the area to the north between Gibihi Road and Mount Ramsay, and seventy-three bores totalling 11,271 ft. were put down, and two shafts were completed—one in Mungi Road and one in Moura Road.

GENERAL

No prospecting assistance was paid during the year. Mining collections for the year totalled £2,723 2s. 4d. Eighty-four Miner's Rights were issued, of which the majority were to the holders of Residence Areas.

MOUNT MORGAN AND DAWSON FIELDS AND CALLIDE AND KIANGA COAL AREAS

PRODUCTION FROM ALL SOURCES FOR THE YEAR ENDED 31ST DECEMBER, 1960

GOLD

Source	Ore Treated	Yield	Value (Standard at £4 4s. $11^5/_{11}$d. per oz.)
	Tons.	Fine Oz.	
Mount Morgan Ltd., Mount Morgan	946,300	64,191	£262,538 0s. 1d. (Added value of gold taking value at £15 12s. 6d. per oz. was a further £703,191 13s. 8d. making a total value of £965,729 13s. 9d.)

COPPER

By-product of material treated above—8,392.91 tons, valued at £2,731,403. (Based on monthly prices supplied by Mount Morgan Ltd.)

SILVER

By-product of material treated above—27,967.9 oz., valued at £11,546 19s. 4d. (Based on monthly prices supplied by Mount Morgan Ltd.)

COAL

Mine	Tons Produced	Tons Sold	Value
			£ s. d.
Mount Morgan Ltd's. Dawson Valley Colliery	18,890	16,614	64,475 13 4 (sales)
Thiess Callide Coal Pty. Ltd. (C.M.L. 83)	70,769·7	70,769·7	91,943 7 7
Thiess Bros. (Qld.) Pty. Ltd. —Kianga	39,352·45	30,294 (further 8,000 awaiting shipment)	57,038 16 11 (production)

PYRITES

Mine.	Produced.	Sulphur Content.	Value.
	Tons.	Tons.	£
Mount Morgan Ltd., Mount Morgan	18,720	9,575·7	56,160
Sales	9,556	4,863·1	28,667

FIRECLAY

Mine.	Produced.	Value.
	Tons.	£ s. d.
R. Cousins and Coy. Pty. Ltd. M. L.'s 76, 113 and 114	318	195 15 0

N. F. APPLIN, Warden.

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MOUNT PETER AND MULGRAVE FIELDS

MULGRAVE FIELD

The only activity on this field during the year was prospecting and subsequent application for a Mineral Lease by Guiseppe Pezzelato, for the purpose of mining for limestone. The applicant reports that the grade of limestone is good, but there is quite a lot of preliminary work to be done before actual mining operations commence.

MOUNT PETER FIELD

G.M.L. 34 *Lady Lyn* (Gainza and Campbell).—No work was done on this area during the year.

G.M.L. 44 (L., L. and G. Fantin).—The applicants carried out superficial excavation of the area applied for and also carried out prospecting. Good traces of gold are reported to have been found.

G.M.L. 45—*New Chum* (A. J. Jordan):—Prospecting activities have been carried out in various parts of the lease in an attempt to find the source of the gold found in a nearby dry creek.

G.M.L. 47 *Talisman Extended* (Wolff and Milligan).—Tunnel was cleaned out, there being approximately 90 tons of fallen mullock being removed from stope to enable the next 200 ft. to be prospected.

M.L. 32 *Birthday* (G. Pezzelato).—Work was commenced on this area during the year and 20 tons of limestone was recovered of a value of approximately £100 but has not been disposed of, it being only for test purposes. A test carried out by the Bureau of Sugar Experiment Stations, Brisbane, revealed the limestone to be of extremely good quality and very suitable for agricultural purposes.

Departmental Battery (Mount Chalmers (previously Bouldercombe)).—Fifteen tons of ore was crushed during the year for a yield of 2 oz. gold.

AREAS NOT ON A FIELD

M.L. 30—*Kardor* (D. and K. A. Drinan).—Prospecting activity only.

K. L. HALL, Acting Warden.

NANANGO DISTRICT

The mining of clays has provided the only source of production in this district. The total value of clays produced was £2,635 19s.

Five new leases were applied for during the year (four for silver lead and one for kaolin). Prospecting assistance was paid to one person prospecting for gold in the Nanango Goldfield reserve (Seven-mile diggings) area.

Twelve miner's rights were issued during the year.

A table showing production is attached and hereunder is set out the activities at the various mines during the year:—

GOLD

G.M.L. 59 (Clapperton and Wilson).—No production during the year.

CLAYS

Bentonite

M.L. No. 64 (G. C. Margrie).—One hundred and seventy-three tons was produced, valued at £1,730. One thousand tons of overburden was removed.

M.L. No. 87 (G. C. Margrie).—There was no production from this lease during the year.

Kaolin

M.L. No. 71 (Campbell Brothers Pty. Ltd.).—There was no production from this lease during the year.

M.L. No. 72 (Hansen and Bjelke-Petersen).—There was no production from this lease during the year.

M.L. No. 74 (L. A. Welch) and *M.L. No.* 75 (Hansen and Bjelke-Petersen).—Production from these leases amounted to 5 tons 15 cwt., valued £23 at grinding mill.

M.L. No. 105 (A. N. Hansen).—Some overburden was removed during 1960 and it is intended to carry on this work in 1961. Production amounted to 31½ tons valued £126 at grinding mill.

White Pottery Clay

M.L. No. 82 (Hansen, Bjelke-Petersen and Langton).—Some overburden was removed during the year and it is proposed to carry on this work in 1961. Production was 29 tons 2 cwt., valued at grinding mill at £116 8s.

Felspar

M.L. No. 100 (A. N. Hansen and Bjelke-Petersen).—There was no production from this lease during the year.

Brick Clay

M.L. No. 80 (Wondai Brick and Tile Pty. Ltd).—Production figures show a drop of 87 tons on last year. The 1,602 tons processed is valued at grinding mill at 5s. 6d. per ton.

M.L. No. 101 (B. T. Lipscombe).—Production this year was 1,000 tons, valued at £200 at grinding mill.

SILVER LEAD

M.L. 99 (S. W. Sanderson).—Developmental work has continued.

VERMICULITE

M.L. 103 (Hansen and Langton).—Although no work was carried out during the year it is intended to remove overburden and clay during 1961.

MARBLE

Murgon No. 1 (T. R. Lowth) *M.L. No.* 84.—No work was carried out during the year but it is hoped to resume production during 1961.

Murgon No. 2 (T. R. Lowth) *M.L. No.* 85.—There was no production from this lease during the year.

NANANGO GOLD AND MINERAL FIELD

TABLE OF PRODUCTION FROM ALL SOURCES—YEAR 1960

CLAYS

Bentonite

Producer	Tonnage	Value
	Tons cwt.	£
G. C. Margrie (M.L. No. 64)	173 0	1,730

Kaolin

Producer	Tonnage	Value
	Tons cwt.	£
L. A. Welch (M.L. No. 74), Hansen and Bjelke-Petersen (M.L. No. 75)	5 15	23
A. N. Hansen (M.L. No, 105)	31 10	126

White Pottery Clay

Producer	Tonnage	Value
	Tons cwt.	£ s. d.
"Snow Queen" (Langton, Hansen and Bjelke-Petersen) (M.L. No. 86) ..	29 2	116 8 0

Brick Clay

Producer	Tonnage	Value
	Tons	£ s. d.
Wondai Brick and Tile Pty. Ltd., (M.L. No. 80)	1,602	440 11 0
B. Lipscombe (M.L. No. 101)	1,000	200 0 0

Total production for year £2,635 19s.

E. W. KINSMAN, Warden.

RAVENSWOOD FIELD

With the exception of a small crushing of approximately 5 tons from Kirk River, mining on this field was confined to alluvial. Total production recorded was 1 oz. 8 dwt. 14 gr. valued at £4 11s. 1d., from a crushing of 4 tons 15 cwt. by G. L. Wellington and party and 4 oz. 10 dwt. 19 gr. of alluvial gold, valued at £17 13s. 1d. North Broken Hill Pty. Ltd. drilled an area known as Barrabas. No results are known.

A. N. JACOBS, Acting Warden.

ROCKHAMPTON FIELDS

During the past year there was some increase in the mining activities in the district and a number of leases were taken up for limestone for the purpose of investigation as to the possibilities of establishing cement works in the District. There has not yet been any production from these areas although the production from the other mines which have worked for a number of years has increased over the previous year. A local syndicate helped by the hire of a Departmental compressor plant, which they have since purchased, is endeavouring to build up a trade with Broken Hill Pty. Ltd. and also Mount Isa Ltd. in chrome ore from the Tungamull area and produced over 500 tons during the year. The silica requirements of Mount Morgan Ltd. resulted in an increase of approximately 50 per cent. in the silica production during the year whilst the coal and brick production has been approximately the same as in the previous year. Considerable additions have been made to the plant at the Central Queensland Salt Industries Limited plant near Port Alma and these works seem to be now firmly established. Whilst a few prospectors and fossickers have been engaged, mainly during week-ends, around the known old fields nothing of any note has been reported.

COMPARATIVE STATEMENT OF PRODUCTION

Coal

Colliery	1960		1959	
	Tonnage	Value	Tonnage	Value
		£ s. d.		£ s. d.
Cambria	14,931·5	48,199 11 3	14,740·15	44,789 18 10
Excel	16,081	50,479 17 4	14,232	42,076 14 1
Styx State Mine	44,794·9875	195,542 12 11	43,515·1	176,860 7 10
	75,807·4875	294,222 1 6	72,487·26	263,726 19 11

Limestone

Producer	1960		1959	
	Tonnage (Lime)	Value	Tonnage (Lime)	Value
		£		£
Ambrose Lime Works (Marmor)	11,871	37,840	6,100	33,550
E. M. Pilkington & Co. (6 months)	108	785	183	1,772
Limestone Leases Pty. (6 months)	630	1,254	Nil	Nil
	12,609	39,879	6,283	35,322

Chrome Ore

Producer	1960		1959	
	Tonnage	Value	Tonnage	Value
		£		£
Prospecting Services	529·5	4,244	Nil	Nil
Moessinger and Moore	Nil	Nil	120	840
	529·5	4,244	120	840

Clay Shale.

Producer	1960		1959	
	Tonnage	Value	Tonnage	Value
		£		£
Kalapa Brickworks	5,342·5	5,342	5,167	5,167

Silica

Producer	1960		1959	
	Tonnage	Value	Tonnage	Value
		£		£
Snow White Silica Syndicate	962·65	2,166	638·9	1,437

Salt

Producer	1960		1959	
	Tonnage	Value	Tonnage	Value
				£
Central Queensland Salt Industries Limited ..	9,500	27,608	11,054	44,216

N. F. APPLIN, Warden.

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ROMA DISTRICT

OIL SEARCH

Authority to Prospect No. 55P.—During 1960 exploration for petroleum has been very active, concentrated on seismic surveys and the logging of current wells. In the immediate Roma area the wells drilled are hereunder.

A.A.O. Timbury Hills No. 2, depth 3,792 ft.

A.A.O. Pickanjinnie No. 1, depth 5,213 ft.

A.A.O. Latemore No. 1, depth 4,775 ft.

A.A.O. Latemore East No. 1, depth 4,724 ft.

Geochemical surveying has been undertaken in order to further delineate suitable drilling locations. Geological work has been carried out in the Injune and Banana areas.

Authority to Prospect No. 56P.—During 1960 the oil test A.F.O. No. 1 (Cooroorah) was completed at total depth 2,289 ft. Re-evaluation of the geology of the area has been done and further surveys are planned.

Authority to Prospect No. 57P.—During the year 1960, Union Oil Development Corporation conducted surface and substance geological studies, completed an airborne magnetic survey involving 10,000 profile miles, contracted with United Geophysical Company S.A. for reflection seismograph surveys and accomplished 287 miles of subsurface coverage located a drillsite (Cabawin No. 1) near Tara, contracted with Oil Drilling and Exploration Limited for use of their National 80B drilling rig and personnel, and drilled a total of 9,952 ft. Mechanical difficulties were encountered and repair operations were in progress at year's end.

Authority to Prospect No. 81P.—During 1960 no machinery was used in this area and no personnel has been employed in field work on this Authority to Prospect. During the four and a half months since the Authority to Prospect was granted, operations relating to prospecting for petroleum within this area were directed towards study of surface geologic data, and subsurface data from wells in the environs of A.P. 81P.

F. W. SHEPHERD, Warden.

SOUTHPORT

The total value of production during the year was £195,160.

The mineral sands industry was again reasonably active, with three companies, Mineral Deposits Pty. Limited, Associated Minerals Consolidated Limited and Rutile Sands Limited, operating and employing a total of 173 persons. A small number of men was employed in mining for clay and perlite.

Rutile, Zircon, &c.

Mineral Deposits Pty. Limited.—During the year 1,370 tons of rutile, valued at £71,906, and 4,067 tons of zircon of the value of £55,485, were won.

Associated Minerals Consolidated Limited.—Work was restricted to operations on Dredging Lease No. 22 and Special Mineral Lease No. 937, the production therefrom being 1,172 tons of rutile and 986 tons of zircon of a total value of £49,126. During the year a new Ball Mill and sundry equipment, valued in all at £30,000, were installed.

Rutile Sands Limited.—Production for the year was 36 tons of rutile valued at £1,440 and 12 tons of zircon of an estimated value of £144. Only a skeleton staff of three men was maintained and they kept the plant in running repair and carried out limited production and obtained beach minerals as "wash-ups" occurred.

Clay

Southport Brick & Tiles Pty. Ltd.—Recovery comprised 13,930 tons of brickmaking clay, valued at £4,767.

Earthenware Pipes Ltd.—There were delivered to the company by contractor S. T. Wade of Labrador 1,194 cu. yd. of clay, valued at £245 and 411 cu. yd. of shale, valued at £68 12s.

G. D. Gunthorpe (Queensland) Pty. Ltd.—Materials won amounted to 685 tons, the value of which was £2,418.

Perlite

Australian Plaster Industries Pty. Ltd.—The production for the year was 796 tons of perlite, valued at £437 16s.

Bauxite

A.C.F. & Shirleys Fertilizer Ltd.—The production for the year was 2,093 tons, valued at £6,279.

J. A. FRANZMANN, Warden.

STANTHORPE FIELD

Hereunder are the production figures on the Stanthorpe Field for the year ended 31 December, 1960:—

ALLUVIAL TIN

Producer	Quantity	Value
	T. C. Q. L.	£
Unold, O.	1 3 3 2	787
Heslop, A. G.	0 13 1 6	430
Heslop, T. G.	0 18 1 1	608
Taylor, A. E.	0 2 1 10	75
Riley Newman Ltd. purchased from various producers	4 9 3 2	2,764
Totals	7 7 1 21	4,665

LIMESTONE

Producer	Quantity	Value
	Tons	£
Marberete Coy.	1,370	685
A. C. F. and Shirley's Fertilisers Ltd.	12,477	6,238
Totals	13,847	6,923

F. W. BLAKE, Warden.

THURSDAY ISLAND FIELDS

Banks (Moa) Island

There was no activity on this island in connection with wolfram deposits.

Cape York

Nine mining lease applications were current in this area and as far as is known testing and investigations are still being carried out. A total quantity of 1 ton 2 cwt. 3 qr. 2 lb. of alluvial tin was obtained for a value of £513 against 5 ton 13 cwt. 1 qr. 16 lb. for a value of £3,110 last year.

Horn Island

No further developments have occurred here. One Gold-mining Lease Application still in force.

Possession Island

There was no activity on this island. One Gold-mining Lease Application is still in force.

Weipa

The Commonwealth Aluminium Corporation Pty. Limited has furnished me with the following information:—

(*a*) Lease boundary survey was continued and all stations on western boundary between the Archer River and Port Musgrave are now complete.

(*b*) Drilling totalling 3,270 ft. in 252 holes was carried out west of the Mission for the purpose of evaluation of a proposed mining area.

(*c*) Hydrographic surveys and studies were continued.

(*d*) A geological reassessment was made of the whole area covered by S.B.M.L. No. 1. This was carried out over a period of six months.

(*e*) An investigation and survey was made into the possibility of surface water storage at Beening Creek.

(*f*) Erection commenced of a beneficiation plant and temporary shipping facilities for trial shipments of bauxite. This involved the installation of a power plant, washing and screening plant and stacking, reclaiming and loading by belt conveyor and was completed and ready for use on 16th December, 1960.

(*g*) Approximately 30,000 tons of crude ore was mined and stockpiled in preparation for beneficiation.

C. L. WALLER, Acting Warden.

TOOWOOMBA DISTRICT

It will be noted from the following table that the coal output was increased. Production of Brick Clay was slightly increased and, there has been a decrease in the production of Freestone. No diatomite was mined in the year 1960.

Table A

COMPARATIVE FIGURES—COAL OUTPUT—1959-60

Year	Tons	Value
		£
1959	60,198	169,916
1960	63,123	185,987

Table B

COMPARATIVE FIGURES—BRICK CLAY PRODUCTION—1959-60

Year	Tons	Value
		£
1959	23,152	5,809
1960	23,664	5,803

Table C

COMPARATIVE FIGURES—FREESTONE PRODUCTION—1959-60

Year	Tons	£
1959	1,223	12,305
1960	907	12,328

D. J. KEARNEY, Warden.

TOWNSVILLE DISTRICT

The principal mining activity in this district is that of North Australian Cement Limited in connection with its cement works at Stuart.

Limestone

North Australian Cement Limited produced 87,848 tons of limestone, compared with 91,257 tons in the previous year.

Agricultural lime totalling 2,549 tons was mined by Inkerman Lime Co. and Reid River Lime Co. This is 1,142 tons more than their combined production in 1959.

Ironstone

Production was 1,758 tons, being 435 tons above that of the previous year. The ironstone is used by North Australian Cement Limited in cement making.

Clay

The only brick clay produced in the district was about 650 tons stockpiled by Clay Industries on their lease at Kurukan, which has been in the developmental stage. The firm plans to be in full production in 1961 with two oil-fired brick kilns of 40,000 to 50,000 capacity each.

North Australian Cement Limited produced 15,146 tons of clay shale for use in cement making. The quantity in 1959 was 12,527 tons.

Quarries

Granite and blue metal totalling 75,487 cu. yd. were quarried. In the previous year the total was 82,379 cu. yd. The Townsville City Council operated at R230, employing four men for the production of 45,454 cu. yd. of granite, while Frost Constructions Pty. Ltd. with five men employed produced 30,033 cu. yd. of blue metal at their Bohle Quarry.

General

Mining gave direct employment on leases to 32 men and quarrying to 9 men. No alluvial mining was carried on, but perhaps 12 to 15 fossickers prospected spasmodically. Approximately ten applications were submitted for free assays. No claim was registered. No gold or tin is known to have been produced in this district during the year. An occasional Townsville address given in returns from smelters beyond the State has been found to relate to production from adjoining districts.

Appended is a table of mineral production for 1960:—

Mineral	Producer	Quantity	Value
		Tons	£
Limestone	North Australian Cement Limited	87,848	58,205
	Inkerman Lime Co. ..	1,086	1,837
	Reid River Lime Co. ..	1,463	4,983
		90,397	65,025
Ironstone ..	North Australian Cement Limited	1,758	4,395
Clay ..	North Australian Cement Limited	15,146	1,514
	Clay Industries	650	360
		15,796	1,874

E. H. BAKER, Warden.

WARWICK DISTRICT

Gold

A limited amount of development work was carried out but no production was reported.

Coal

This is the principal mining activity in this area. Production by The Tannymorel Coal Mining Co. Pty. Ltd. was 18,240 tons valued at £64,373. Drilling work continued during the year.

Limestone

Only producer this year was The Marbarete Co. Pty. Ltd. (M.Ls. 8 and 14) at 567 tons, valued at £2,268. Queensland Minerals Pty. Ltd. (M.Ls. 18 and 19) had no production, but normal maintenance and inspections were carried out.

Clay

A. C. Schnitzerling (M.L. 20) reported production of 1,000 tons valued at £60, for use in brick works at Warwick.

Rhodonite

Patricia (M.L. 21), D. A. Robinson and Ors.—Hand picking of existing dump material produced 600 lb. of Rhodonite, valued at £40, which was sold to a firm in South Australia for use in jewellery fashioned exclusively from natural Australian gem-stones.

No other mining operations in this area over the year.

H. A. GALLOWAY, Warden.

WOOLGAR AND MOUNT EMU FIELDS

Austral (Claim No. 222—T. Guest and R. R. Barns).—78½ tons of ore were crushed for a return of 18 fine oz. gold.

New Austral (Claim No. 230—N. F. Barns).—No reports have been received in respect of this claim.

Perseverance (G.M.L. No. 50—J. Howard and Ors).—No work was done on this lease.

Baby Grand (G.M.L. No. 51—W. A. Brown).—After tunnel collapsed, a shaft was sunk to a depth of 3 ft. in an endeavour to cut reef, which owner anticipates to be at a depth of 20 ft.

New Aurora (Claim No. 227—J. A. H. Barns).—A third shaft on the northern end of the claim has been sunk to a depth of 15 ft. on 4 ft. of reef. 12 tons of ore were obtained which has not yet been treated.

MOUNT EMU FIELD

No reports of any operations on this field were received.

A. N. JACOBS, Acting Warden.

REPORT OF THE STATE MINING ENGINEER

The Under Secretary for Development and Mines, Brisbane.

SIR,—I have the honour to submit my report for the year 1960. In accordance with practice instituted in previous years, the report is divided into sections, as follows:—

Section I—Review of Industry.
Section II—Development and Production.
Section III—Oil Prospecting.
Section IV—Employment.
Section V—Accidents and Safety
Section VI—General.
Section VII—Reports of Assistant State Mining Engineer, Inspectors of Mines, Northern Electrical Inspector of Mines, and Boring and Mechanical Superintendent.

(By arrangement, the reports of the Electrical Inspectors of Mines deal with both metalliferous and coal mines and the report of the Southern Electrical Inspector of Mines is included under Section V of the report of the Chief Inspector of Coal Mines. Similarly technical and geological data obtained from oil drilling is now dealt with in the section of the annual report of the Geological Survey relating to Drilling for Petroleum.

Statistical Tables relating to the above are attached.

I. W. MORLEY, State Mining Engineer.

SECTION I—REVIEW OF THE INDUSTRY

Due chiefly to the continued expansion of copper production by Mount Isa Mines Limited the value of the State's mineral production rose to £54,012,350, exceeding the previous year's record total by £6,823,739. The tonnage and value of uranium produced by Mary Kathleen Uranium Limited were slightly higher than in 1959 while at Mount Morgan Limited the increase in copper production more than offset a decreased gold production. Commonwealth Aluminium Corporation Pty. Limited began the mining of bauxite at Weipa in November and work on the first stage of the rehabilitation of the Collinsville–Mount Isa railway was begun in September. It will be regrettable if the fine achievement of the industry as a whole is marred by a small number of companies floated without sufficient attention to the true mineral potential concerned.

The price of copper declined slightly after August but began to rally again in December; on the whole, metal prices were fairly steady. The market for rutile and zircon continued to be weak.

The State's copper production totalled 52,042 tons of metal and 103,076 tons of concentrates with a combined value of £26,002,959. The bulk of the concentrates was shipped to Japan. Mount Isa Mines Ltd. produced 43,116 tons of copper metal and the whole of the concentrates containing 28,113 tons of metal. Mount Morgan Ltd. produced 8,393 tons of copper while small producers, mainly in the Mount Isa and Cloncurry fields, were responsible for 533 tons of metal.

Mount Isa Mines Ltd. commissioned one 30MW unit of the new Mica Creek Power Station and excavation for the new K57 shaft was begun (Plate 1); expansion in the new copper smelter was continued. At Mount Morgan good progress was maintained in uncovering the "Sugarloaf" extension of the Mount Morgan ore-body. Mount Isa Mines Ltd. and Mount Morgan Ltd. both continued diamond drilling to prove extensions of known ore-bodies. Mount Isa Mines Ltd. carried out geological mapping and geophysical surveys in the neighbourhood of Mount Isa and also undertook diamond drilling in the Chillagoe and Mount Cannindah areas. Mining Corporation (Aust.) N.L. and Rio Tinto Southern Pty. Ltd. continued their prospecting campaigns in the Mount Isa and Cloncurry districts.

Mary Kathleen Uranium Ltd. produced 662.82 tons of uranium oxide valued at £6,509,718. In addition to diamond drilling on the main ore-body, radiometric gridding and detailed geological mapping were continued on leases to the North. In the Mount Isa district, Queensland Mines Ltd., completed the drilling programme at Anderson's lode, the *Skal, Future, Bikini* and *Elaine Mary*.

The State's total production of lead was 56,029 tons valued at £5,100,747; of this Mount Isa Mines Ltd. produced 55,513 tons. Departmental drilling was resumed on the silver lead deposits at Liontown. Mount Isa Mines Ltd. was responsible for the whole of the zinc concentrates produced and containing 24,394 tons of metal valued at £2,707,415, almost double that of the previous year. The same company began to design a new mill to treat 150,000 tons of lead-zinc ore per four weekly period.

Silver production totalled 4,743,109 oz. valued at £1,954,284; of this Mount Isa Mines Ltd. produced some 98.9 per cent.

Due to a drop in gold production by both Mount Morgan Ltd. and Golden Plateau N.L. the State's total production fell 15,634 oz. to 75,852 oz. valued at £1,185,188. North Broken Hill Ltd. completed some 2,762 ft. of diamond drilling at Ravenswood. In the Mount Morgan district several areas received attention while at Cracow both Golden Plateau N.L. and the Department undertook diamond drilling campaigns.

The production of tin concentrates dropped 310¾ tons to 1,236 tons valued at £787,890. This drop was due to the foundering of the dredge of Tableland Tin Dredging N.L. on the 25th January; when digging was resumed on the 24th September water shortage prevented full scale operation for several weeks. Ravenshoe Tin Dredging Ltd. produced 689 tons and lode tin mining 269 tons.

The Broken Hill Proprietary Co. Ltd. examined a number of old tin mines and undertook geological mapping in the Sunnymount–Tate River area.

In the beach sand section of the industry the production of rutile concentrates declined further to 17,029 tons valued at £970,829; the production of zircon concentrates improved slightly to 15,145 tons valued at £183,064.

The Broken Hill Proprietary Co. Ltd. continued its exploration of the iron ore deposits at Constance Range and Iron Range; at the former 22,038 ft. of diamond drilling were completed while at the latter work was concentrated on the detailed examination of selected areas. Plate 2 shows an outcrop of iron ore at Constance Range.

Of particular interest in connection with the Cape York bauxite deposits was the establishment at Weipa by the Commonwealth Aluminium Corporation Pty. Ltd. of a beneficiation plant and temporary shipping facilities. Mining of bauxite (Plate 3) was begun in November and at the year's end some 30,000 tons of bauxite were stockpiled at the plant. Initially this bauxite will be exported overseas. Geological surveys and drilling to define and evaluate possible mining areas were continued as also were investigations into a local supply of fresh water and in connection with harbour development. The testing of a large scale harbour model in Holland was continued. Aluminium Laboratories Ltd. concentrated most of its exploratory work to the North of the Ducie River.

Oil prospecting is reviewed in Section III of this report. Most of the State is held under prospecting title and the tempo of prospecting both by drilling and geophysical means increased noticeably during 1960. Twelve wells were completed during the year while two were drilling at the end of the year; the footage involved was almost 50,000

SECTION II—DEVELOPMENT AND PRODUCTION

The prices of non-ferrous base metals during 1960 reflected the rate of industrial activity in the United States; while consumption of copper, lead and zinc in other countries was at record levels, in the United States consumption was below the level of the previous year and, on balance, world stocks of these metals increased. In the case of tin, the International Tin Council lifted export restrictions from producer members during the fourth quarter of 1960 and some over-production may result.

Some major world producers of copper restricted output in an attempt to bolster the price; Canada restricted deliveries of lead during the fourth quarter and Australia, Mexico, Peru and Yugoslavia agreed to take similar action on the understanding that other exporting countries did not take advantage of their action.

On the London Metal Exchange the price of copper reached a peak of £E 279 5s. on 25th April; the lowest price recorded was £E 217 17s. 6d. on 24th October; thereafter the price firmed somewhat due to a strike in Chile and cut-backs by some producers. During the first seven months of the year the price was remarkably steady and, after falling from August to October, appeared to become stabilised. The price in Australia is related to that on the London Metal Exchange and followed closely the trend of the latter; it averaged £A 347 16s. in February, £A 298 11s. 5d. in October and recovered to £A 305 7s. in December. In November the Tariff Board recommended to Parliament that assistance be offered to Australian producers of copper for local consumption on lines similar to those under the Bounty Act, i.e., a sliding scale tariff plus a bounty on production; subject to profit limitation.

On the London market the price of lead averaged £E 74 15s. 7d. in January and £E 77 8s. 3d. in May; thereafter it declined steadily to £E 64 19s. 6d. in December. In spite of increased deliveries of metal to consumers outside the United States the market was still affected by surplus stocks and no significant change in this position can be expected for some time. The Australian price continued at £A 100 per ton f.o.b. Port Pirie.

Zinc prices followed much the same pattern as those of lead. The average price on the London market in January was £E 94 11s. 5d. per ton, £E 92 1s. 11d. in May and £E 82 15s. 3d. in December. The Australian price, which is based on the London Metal Exchange quotation, averaged £A 118 4s. 11d. in January, £A 116 16s. 2d. in May and £A 107 1s. 1d. in December. At its second meeting the International Lead-Zinc Study Group in September estimated that there would be a surplus of 74,000 tons of zinc for the year, as against a deficit of 75,000 tons as forecast earlier.

The price of tin continued firm and remarkably steady. On the London market the highest price of the year was £E 823 5s. on 21st July, while the lowest was £E 780 15s. on the 30th May. The average monthly price in Australia was £A 1051 2s. 1d. in January, £A 1,063 5s. 2d. in August, and £A 1.036 8s. in December. Shipments from the U.S.S.R. and China have been less than anticipated but these together with the withdrawal of the quota system from countries participating in the International Tin Restriction Scheme, could result in over-supply.

The rutile and zircon markets continued in their depressed states; spot prices for the former being about £A 25 and the latter £A 12 13s. per ton. The price of tungsten concentrates remained relatively stable, the average monthly prices per unit of 65 per cent. WO_3 on the London market varying between 144s. and 162s.; the corresponding Australian prices 172s. and 195s.

MOUNT ISA MINES LTD.

Mount Isa Mines Ltd. produced 2,834,540 tons of ore of which total 2,028,764 tons were copper ores and 805,766 tons silver-lead-zinc ores. At the mill and smelters mine ores yielded 42,464 tons of copper, 52,616 tons of lead and 4,422,705 oz. of silver; in addition 103,076 tons of copper concentrates containing 28,113 tons of copper and zinc concentrates containing 24,394 tons of that metal were produced. Four thousand six hundred and seventy tons of dross containing 2,837 tons of lead, 238,333 oz. of silver and 652 tons of copper, were exported. The total value of this production was £32,784,107, almost seven million pounds greater than in 1959.

Underground development totalled 62,000 ft., of which 33,905 ft. comprised exporation and main development, 12,695 ft. stope development in lead ore and 15,400 ft. stope development in copper ore. Nine hundred and eight thousand five hundred and twenty-four cubic yards of stope fill were placed.

In the mill throughput increased 13.2 per cent. above the 1959 figure. In the crushing section alterations and extensions were made to conveyors and dust collection ducting was installed. Progress was made in the installation of additional flotation middlings regrind equipment and also in the aeration of all copper flotation feed. The design of a new lead-zinc mill to treat 150,000 tons per period was begun.

Expansion in the new copper smelter continued; the first stage of a new converter aisle was almost complete and two 60-ton cranes were erected. Good progress was made on the roaster building, reverberatory furnace and boilers and on the converter balloon flue. In the lead smelter various measures were adopted to improve dust removal and collection and all drossing kettles were converted from wood to oil firing.

At the new Mica Creek Power Station the first 30MW turbo-alternator set was commissioned in May and the installation of a second similar set begun.

MARY KATHLEEN URANIUM LTD.

Mary Kathleen Uranium Ltd. treated 427,345 tons of ore for a production of 662.8 tons of uranium oxide, valued at £6,509,718; 1,364,843 tons of material were mined, comprising 389,801 tons of ore, 65,622 tons of marginal ore and 909,420 tons of waste. In the primary crushing section of the mill radiometric sorters were installed to reject the larger sizes of waste. On the Eastern branch of the Leichhardt River a reservoir with a capacity of 3,000 million gallons was completed.

MOUNT MORGAN LIMITED

Mount Morgan Ltd. mined 957,775 tons of ore and removed 3,586,161 tons of waste. In the mills and smelters 946,300 tons of ore were treated for the production of 18,720 tons of pyrites and 8,473 tons of blister copper containing 8,393 tons of copper, 61,807 oz. of gold, 27,968 oz. of silver with a total value of £3,764,844. Stripping to expose the *Sugarloaf* extension of the Mount Morgan ore body was continued and in the search for an extension of that ore body below the *Linda* fault some 9,500 ft. of diamond drilling were carried out during the year.

To permit operation of No. 1 mill with a reduced crew over week-ends and holidays the ore stock pile was changed to a fine ore stock pile. This necessitated the installation of a new series of conveyors. The policy of substituting cyclones for classifiers was continued. Flotation results were improved by the addition to slime feed of abraded iron material extracted magetnically from tailings. At the smelter the reverberatory furnace was still in satisfactory condition after five years of continuous operation. The introduction of further refinements in lining practice and temperature control improved converter performance.

GOLDEN PLATEAU N.L.

Golden Plateau N.L. mined 38,700 tons of ore, of which 33,298 tons were treated for the recovery of 13,196 oz. of gold and 15,650 oz. of silver with a combined value of £215,582 which was £16,398 less than in the previous year. Some 5,594 ft. of underground development were completed. Diamond drilling totalled 5,298 ft. and located further ore shoots. In addition the Department had carried out 870 ft. of diamond drilling at the year's end.

TIN

The dredge of *Tableland Tin Dredging N.L.* foundered on the night of 24th/25th January and did not resume operations until September 24th; 1,237,800 cu. yd. of material were treated for 259 tons of tin concentrates valued at £163,579. *Ravenshoe Tin Dredging Ltd.* treated 2,611,000 cu. yd. for the recovery of 689 tons of tin concentrates valued at £460,000.

TITANIUM AND ZIRCONIUM INDUSTRIES PTY. LTD.

Titanium and Zirconium Industries Pty. Ltd. continued as the State's chief producer of beach sand minerals. The two dredges operating on the East coast of North Stradbroke Island treated 2,696,200 cu. yd. of sand for the recovery of 13,535 tons of rutile and 8,193 tons of zircon concentrates.

THE COMMONWEALTH ALUMINIUM CORPORATION PTY. LTD.

The Commonwealth Aluminium Corporation Pty. Ltd. began the erection of a bauxite benefication plant and temporary shipping facilities at Weipa in September. The plant comprises a 260 KVA power house, washing and screening plant together with stacking and loading belt conveyors. Mining of bauxite was begun in November and at the year's end some 30,000 tons was stock piled at the washing plant. Initially this bauxite is for export to Japan.

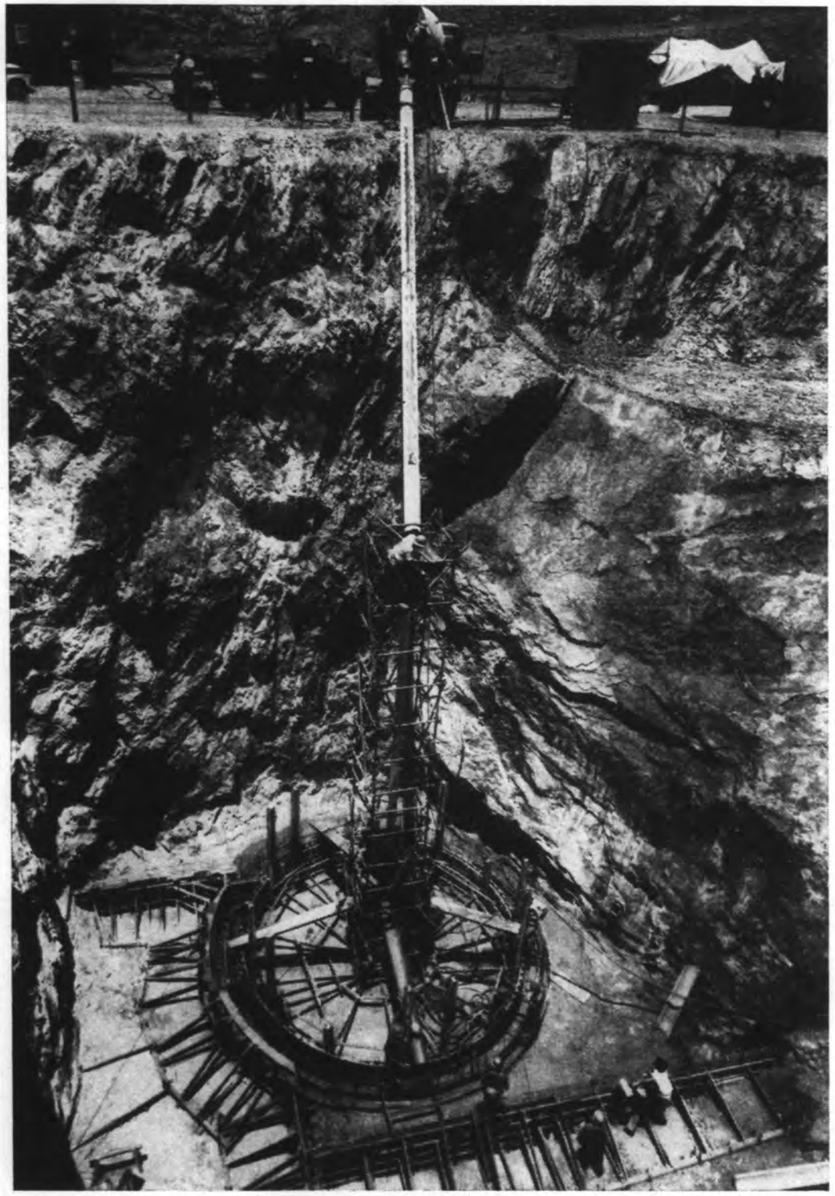


Plate 1—Mount Isa Mines Limited. Concreting in progress at the new K57 shaft.

(*Photo.: Mount Isa Mines Limited*)

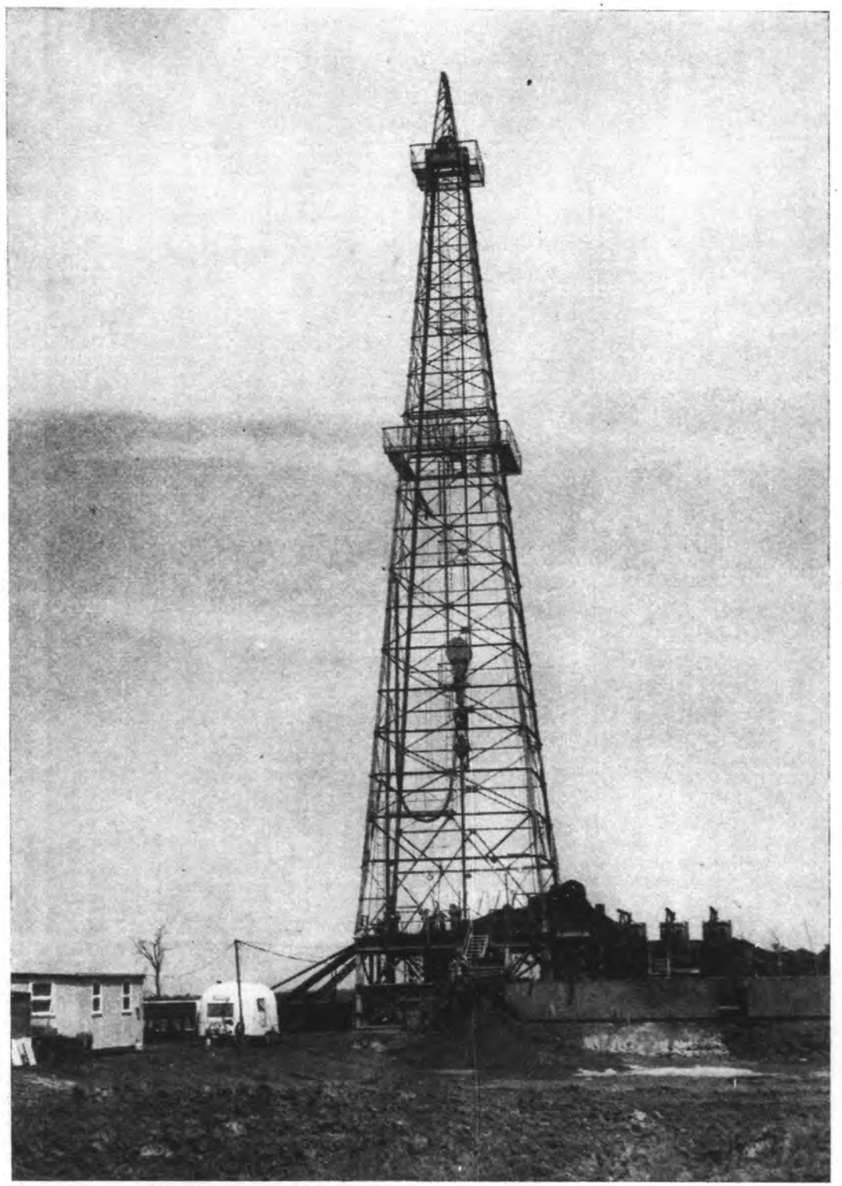


Plate 2—National 80B rig at Union–Kern–AOG Cabawin No. 1.

(*Photo.: Union Oil Development Corporation*)

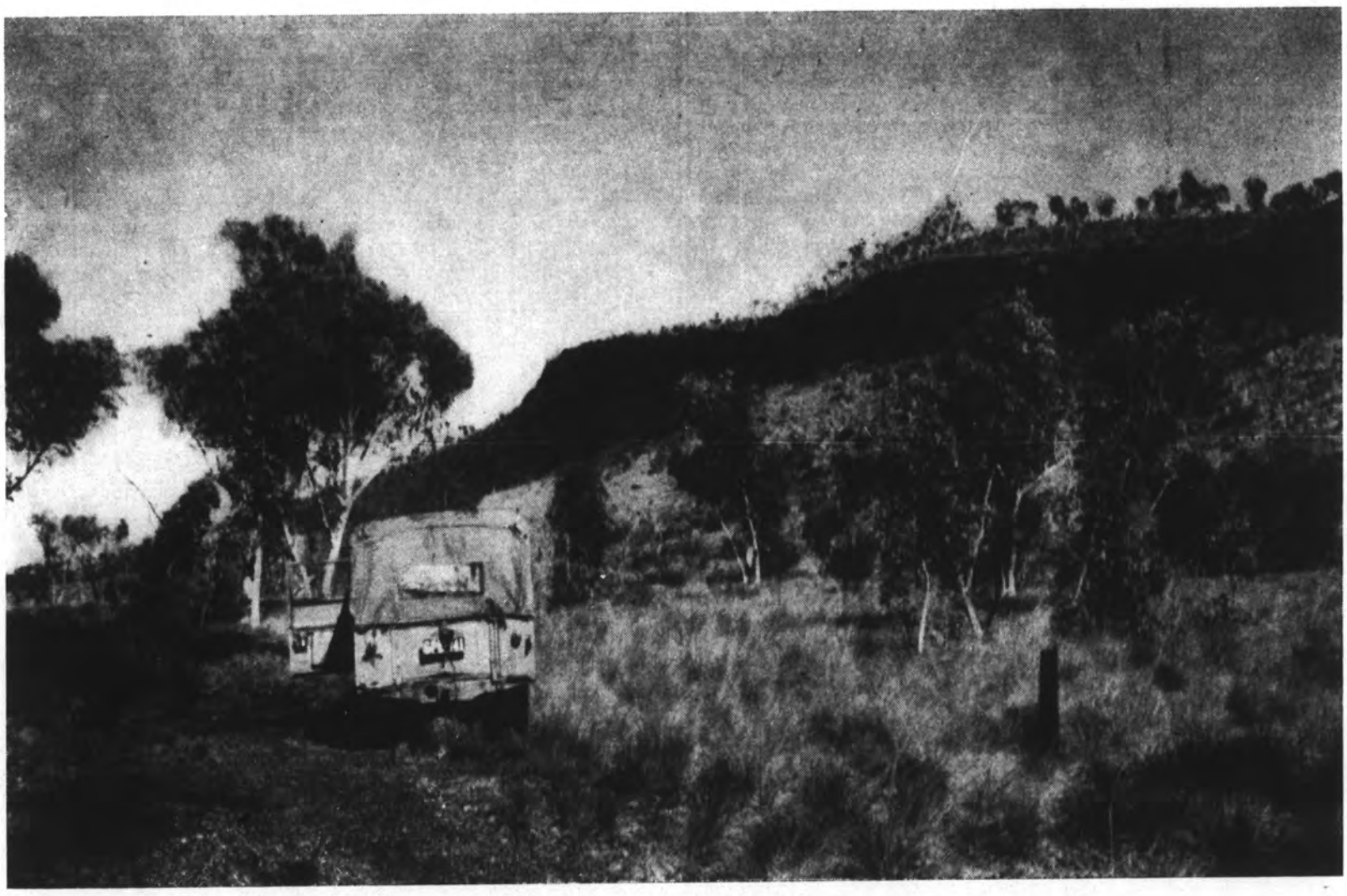


Plate 3—Constance Range. Prominent scarp formed by outcrop of iron ore.

(Photo.: The Broken Hill Proprietary Company Limited)

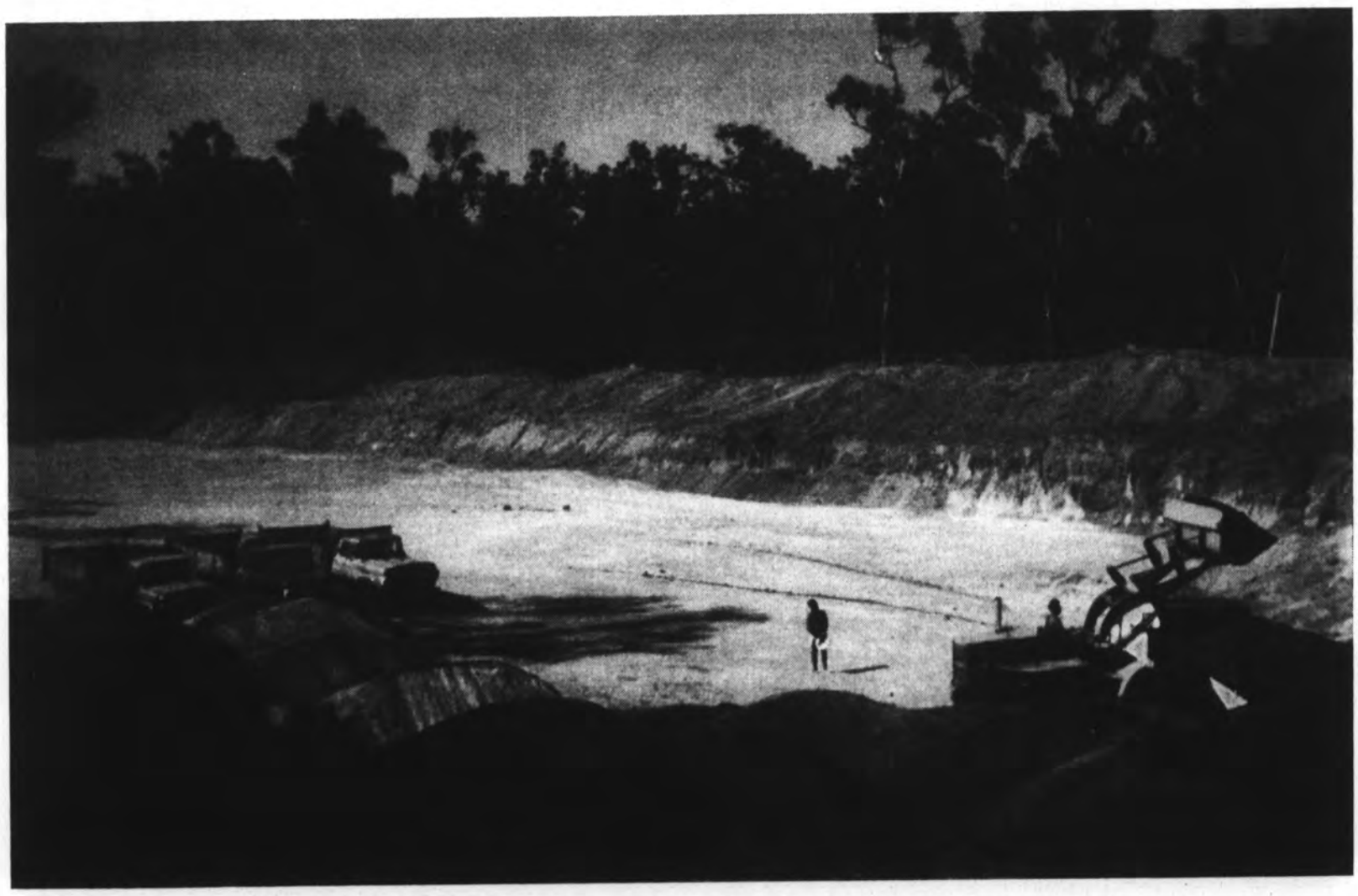


Plate 4—Weipa. The open-cut from which the first bauxite was mined.

(Photo.: C. A. Byrne, Esq.)

Among the smaller producers the *Mammoth* mine in the Mount Isa field produced 109 tons of copper valued at £34,428 from 1,366 tons of ore, while in the Cloncurry field the *Blockade* mine produced 92.5 tons of copper, valued at £29,342, from 714 tons of ore. In the Burketown field the *Silver King* mine produced 466 tons of lead and 9,270 oz. of silver of a total value of £45,997 from 929 tons of ore. In the Chillagoe field the *Dover Castle* mine won 1,366 tons of ore of which 691 were milled for the recovery of 58½ tons of tin concentrates valued at £31,040 and the *Gilmore* mines won 1,062 tons of ore of which 776 were milled for the recovery of 39¼ tons of tin concentrates, valued at £23,500. In the Anakie field interest in sapphire mining was increased by the hiring of a Departmental "Proline" drill as a means of facilitating the finding of the alluvial beds in which the gems occur. Interest in opal mining in the Cunnamulla district was revived for some months but no notable finds were reported.

Detailed information in connection with the development and production of Queensland mines is given in the Inspectors' reports at Section VII.

Details of Authorities to Prospect held during the year are contained in the following table, while particulars of footages drilled on metalliferous and coal mines and prospects in Queensland, excluding oil titles which are dealt with separately, form the final item of this section:—

TABLE OF AUTHORITIES TO PROSPECT GRANTED UNDER THE MINING ACTS AND CURRENT IN 1960

Authority Number.	Name of Holder.	District.	Area Held.	Term.	Remarks.
28M	Australian Mining and Smelting Co. Ltd.	West Coast, Gulf of Carpentaria	2,585 square miles	2 years from 1st May, 1959	Geological Investigation, drilling and pit sinking (Bauxite)
39M	Titanium Alloy Manufacturing Co. Pty. Ltd.	Tin Can Bay, Fraser Island and Inskip Point	23 square miles ..	From 15th August, 1952 to 15th February, 1958. Extended 1 year from 16th February, 1958. Extended 1 year from 16th February, 1959. Extended 1 year from 16th February, 1960	Investigation—Beach sands (Rutile, zircon, &c.)
53M	Aluminium Laboratories Ltd.	Cape York Peninsula	1,250 square miles	3 years from 1st September, 1959	Geological Investigation (Bauxite)
70M	Mining Corporation (Aust.) N.L.	South of Mount Isa	19·2 square miles	2 years from 1st November, 1956. Extended 1 year from 1st November, 1958. Extended 6 months from 1st November, 1959. Extended 6 months from 1st May, 1960. Extended 1 month from 1st November, 1960. Extended 1 month from 1st December, 1960	Geological Investigation (Copper, lead, silver, zinc)
86M	The Broken Hill Proprietary Company Ltd.	Iron Range ..	390 square miles ..	1 year from 1st April, 1957. Renewed 1 year from 1st April, 1958. Renewed 2 years from 1st April, 1959	Geological Investigations (All minerals)
116M	Commonwealth Aluminium Corporation Pty. Ltd.	Cape York Peninsula and Turtle Island	380 square miles ..	3 years from 1st October, 1957. Surrendered on 4th May, 1960	Geological Investigations (Bauxite and other minerals)
128M	Rio Tinto Australian Exploration Pty. Ltd.	Cloncurry—Mount Isa	95 square miles ..	2 years from 1st October, 1958	Geological Investigation (All minerals)
129M	Mount Isa Mines Ltd.	Kangaroo Hills ..	396 square miles ..	1 year from 1st December, 1958. Renewed 6 months from 1st December, 1959. Renewed 12 months from 1st June, 1960	Geological Investigation (All minerals)
134M	Mount Isa Mines Ltd.	Glassford Creek, Gladstone	9 square miles ..	1 year from 1st January, 1959. Surrendered on 16th February, 1960	Geological Investigation (All minerals)
136M	Queensland Mines Ltd.	Mount Isa ..	301½ square miles	1 year from 1st June, 1959. Surrendered 10th May, 1960	Geological Investigation, diamond drilling (Uranium)
138M	Central Queensland Salt Industries Ltd.	Casuarina Creek, Rockhampton	45 square miles ..	1 year from 1st May, 1959 ..	Investigation (Brine)
139M	J. S. Moffatt ..	Bribie Island ..	1,050 acres ..	1 year from 1st June, 1959. Surrendered 16th May, 1960	Investigation—Beach sands (Rutile, zircon, &c.)
140M	North Broken Hill Ltd.	Charters Towers and Ravenswood	200 square miles ..	1 year from 1st June, 1959, with right of renewal	Geological Investigation (All minerals)
141M	Rio Tinto Australian Exploration Pty. Ltd.	Paroo Creek, Mount Isa	56½ square miles ..	16 months from 1st June, 1959	Geological Investigation (All minerals other than uranium)
142M	Tableland Tin Dredging N.L.	Mount Garnet ..	10,145 acres ..	1 year from 1st July, 1959. Extended 1 year from 1st July, 1960	Investigation (Tin)

TABLE OF AUTHORITIES TO PROSPECT GRANTED UNDER THE MINING ACTS AND CURRENT IN 1960—*continued*

Authority Number.	Name of Holder.	District.	Area Held.	Term.	Remarks.
143M	Australian Mining and Smelting Co. Ltd.	Gulf of Carpentaria	145 square miles ..	1 year from 1st July, 1959 ..	Geological Investigation (Minerals other than designated minerals as defined by "*The Commonwealth Aluminium Corporation Pty. Ltd. Agreement Act of* 1957")
144M	B. Svirskis ..	Paradise Valley, Mount Isa	2 square miles ..	1 year from 1st August, 1959	Geological Investigation (All minerals)
145M	Mount Isa Mines Ltd.	Mount Cannindah	10½ square miles ..	1 year from 1st August, 1959. Surrendered on 30th May, 1960	Geological Investigation (All minerals)
146M	Mount Morgan Ltd.	Bajool	36 square miles ..	1 year from 1st August, 1959	Geological Investigation (All minerals)
147M	J. Gordon ..	Cliffdale Creek, Mount Isa	2 square miles ..	1 year from 1st August, 1959	Investigation (All minerals)
148M	Mount Isa Mines Ltd.	Chillagoe	9 square miles ..	3 months from 1st September, 1959. Extended 6 months from 1st December, 1959. Extended 12 months from 1st June, 1960	Geological Investigation (All minerals)
149M	Queensland Mines Ltd.	North-East of Mount Isa	500 square miles ..	1 year from 1st October, 1959. Surrendered on 11th May, 1960	Geological Investigation (All minerals)
150M	Rio Tinto Australian Exploration Pty. Ltd.	Tate and Lynd Rivers	1,188 square miles	1 year from 1st November, 1959. Surrendered on 16th May, 1960	Geological Investigation (Alluvial Tin)
151M	The Broken Hill Proprietary Co. Ltd.	Constance Range	995 square miles ..	5 years from 1st November, 1959, with right of renewal	Geological Investigation (Iron ore)
152M	Mount Isa Mines Ltd.	Mount Leyshon ..	4 square miles ..	1 year from 1st November, 1959. Surrendered on 11th August, 1960	Geological Investigation (All minerals)
153M	Mount Isa Mines Ltd.	Mount Isa ..	20 square miles ..	1 year from 1st January, 1960	Geological Investigation (All minerals)
154M	Mary Kathleen Uranium Ltd.	Mary Kathleen ..	225 square miles ..	1 year from 1st January, 1960. Surrendered 27th October, 1960	Geological Investigation (All minerals)
155M	Mount Isa Mines Ltd.	Mount Isa ..	12 square miles ..	1 year from 1st March, 1960. Surrendered 30th May, 1960	Investigation (All minerals)
156M	Rio Tinto Australian Exploration Pty. Ltd.	Rockhampton ..	45 square miles ..	2 years from 1st March, 1960. Surrendered 26th July, 1960	Investigation (Brine)
157M	Cape York Tin Pty. Ltd.	Cape York ..	25 square miles ..	1 year from 1st March, 1960	Geological Investigation (All minerals)
158M	The Broken Hill Proprietary Co. Ltd.	Mareeba	31 square miles ..	3 years from 1st March, 1960	Geological Investigation (Tin)
159M	Queensland Mines Ltd.	Chillagoe	238 square miles ..	6 months from 1st April, 1960. Surrendered 13th September, 1960	Investigation (All minerals)
160M	G. D. Holdings Pty. Ltd.	Augathella ..	39,879 acres ..	1 year from 1st May, 1960. Surrendered 30th June, 1960	Geological Investigation (Gypsum)
161M	Consolidated Zinc Pty. Ltd.	Mount Morgan ..	286 square miles ..	3 years from 1st July, 1960	Geological Investigation (Copper, lead, zinc, gold, silver, sulphur)
162M	Consolidated Zinc Pty. Ltd.	Rockhampton ..	90 square miles ..	3 years from 1st July, 1960	Geological Investigation (Copper, lead, zinc, gold, silver, sulphur)
163M	Mount Isa Mines Ltd.	Mount Cannindah	1,120 square miles	1 year from 1st June, 1960	Geological Investigation and drilling (All minerals)
164M	Alluvial Gold Ltd.	Emuford	4·2 square miles ..	2 years from 1st August, 1960	Investigation (All minerals)
165M	Alluvial Gold Ltd.	Palmer River ..	150 square miles ..	3 years from 1st September, 1960	Investigation (All minerals)
166M	The Broken Hill Proprietary Co. Ltd.	Chillagoe	81 square miles ..	2 years from 1st September, 1960	Geological Investigation (All minerals)
167M	J. S. Moffatt ..	Bribie Island ..	1,600 acres ..	1 year from 1st August, 1960	Investigation—Beach Sands (Rutile, zircon, &c.)
168M	Mount Isa Mines Ltd.	Mount Isa ..	12 square miles ..	1 year from 1st September, 1960	Geological Investigation (All minerals)
169M	Rio Tinto Southern Pty. Ltd.	Cloncurry–Mount Isa	262 square miles ..	2 years from 1st October, 1960	Geological Investigations (All minerals)
170M	Consolidated Zinc Pty. Ltd.	Cloncurry ..	2 square miles ..	1 year from 1st November, 1960, with right of renewal for further 2 years	Geological Investigation (All minerals)

DRILLING DATA, 1960

QUEENSLAND METALLIFEROUS AND COAL MINES

Name of Company	Rotary		Other	
	Development	Blast Hole	Development	Blast Hole
	Feet	Feet	Feet	Feet
Mount Isa Mines Ltd.—				
Mount Isa (Silver-lead, zinc, copper)	72,595	2,720	37,782	886,661
Chillagoe (Copper)	2,139	..	..	..
North Queensland (Bauxite)	..	..	1,574	..
Mount Cannindah (Copper)	3,649	..	..	..
Mount Kroombit (Copper)	900	..	..	..
Glassford Creek (Copper)	60	..	..	..
Kangaroo Hills (Tin)	252	..	2,620	..
Mary Kathleen Uranium Ltd.—Mary Kathleen (Uranium)	2,834	..	..	221,719
Queensland Mines Limited—(Mount Isa) (Uranium)	6,832	..	..	..
Broken Hill Proprietary Co. Ltd.—				
Constance Range (Iron)	22,038	..	..	..
Iron Range (Iron)	1,308	..	1,331	..
Mining Corporation (Aust.) N.L.—Mount Isa (Silver-lead, zinc, Copper)	3,593	..	..	..
Tableland Tin Dredging N.L.—Mount Garnet (Tin)	..	..	8,293	..
Ravenshoe Tin Dredging Ltd.—Mount Garnet (Tin)	..	..	629	..
Aluminium Laboratories Ltd.—Cape York (Bauxite)	..	..	1,585	..
Commonwealth Aluminium Corporation Pty. Ltd.—				
Weipa (Bauxite)	..	..	3,270	..
North Broken Hill Ltd.—Ravenswood (Gold)	2,762	..	..	..
Clutha Development Ltd.—Gilmore (Tin)	534	..	..	..
Mount Morgan Ltd.—Mount Morgan (Copper-gold)	12,565	..	..	475,760
Bajool (Copper-zinc)	62	..	..	..
Golden Plateau N.L.—Cracow (Gold)	5,300	..	200	..
F. B. Gartrell—Anakie (Sapphire)	1,186	..	..	..
Titanium and Zirconium Industries Pty. Ltd.—North Stradbroke Island (Rutile, zircon, &c.)	..	..	15,885	..
Mineral Deposits Pty. Ltd.—Gold Coast (Rutile, zircon, &c.)	..	..	1,659	..
Thiess Brothers (Qld.) Pty. Ltd.—Kianga (Coal)	11,271	..	..	..
Bowen Consolidated Coal Mine—Scottsville (Coal)	19,158	..	..	..
Howard Collieries Pty. Ltd.—Howard (Coal)	9,003	..	..	..
Queensland Collieries Ltd.—Maryborough (Coal)	400	..	..	..
Department of Mines—				
Ipswich (Coal)	20,184	..	..	..
Rosewood (Coal)	5,463	..	..	..
Warwick (Coal)	4,720	..	..	..
Burrum (Coal)	20,136	..	..	..
Bowen (Coal)	19,143	..	..	..
Brisbane (Clay)	11,664	..	..	..
Cracow (Gold)	870	..	..	..
Carrington (Silver-lead)	830	..	..	..
Charters Towers (Gold)	1,471	..	..	..
TOTAL	262,922	2,720	74,828	1,584,140

Footage drilled does not include seismic shot-hole drilling which is included in Section III.

SECTION III—OIL PROSPECTING

This section is divided into parts as follows:—

1. Introduction
2. Oil Prospecting Titles Held
3. Prospecting
4. Geophysical Surveys
5. Oil and Natural Gas Drilling
6. Employment and Accidents
7. Legislation and Instruction to Operators
8. General Survey of Industry.

PART 1—INTRODUCTION

As advised in previous years it is intended to make a record of oil prospecting a regular feature of this report. The information given herewith is therefore a continuation of that recorded in the 1959 report.

It will be noted that Part 3, previously known as "Surface Prospecting," is now given the general title of "Prospecting" since it deals with prospecting on each title in turn and in addition discusses the work of Governmental agencies. A new Part 4 "Geophysical Surveys" has been added in which a tabulation and analysis of various statistics relating to such surveys throughout the State is given. It is hoped to extend this type of information in subsequent years. Subsequent parts have been renumbered. It will also be noted that Part 5 "Oil and Natural Gas Drilling" is relatively brief. This is due to the fact technical and geological information obtained from such drilling is now by arrangement, to avoid duplication, dealt with each year in the Geological Survey Report on Drilling for Petroleum, appearing later in this volume and that report should be studied in conjunction with this report.

In connection with Part 6 "Employment and Accidents," with increased activity throughout the State it has been possible to separate employment on surface prospecting work from drilling employment with consequent improvement in statistics. Accident returns are however confined to drilling.

PART 2—OIL PROSPECTING TITLES HELD

In the 1959 Annual Report (pages 74, 75 and 76 and Figure 1) were shown oil prospecting titles held as at December 31st, 1959. Summarised this represented seven Prospecting Petroleum Permits totalling 1,288 square miles and twenty-two Authorities to Prospect totalling in all 823,640 square miles.

Figure 1 shows oil prospecting titles held as at 31st December, 1960. The following Table A sets out their status as at that date:—

Table A

Nos.	Area	Titleholders and Names and Addresses of Principal Officers	Locality	State of Operations
	Sq. Miles			
		PROSPECTING PETROLEUM PERMITS		
P.P.P. 697	200	Planet Exploration Company Pty. Ltd., J. G. Fuller, Managing Director, 26 O'Connell Street, Sydney	South-east of Springsure	Suspended
P.P.P. 704	200	Standard Gas Pty. Ltd., L. G. Neill, Managing Director, 307 Queen Street, Brisbane	Brisbane	Drilling
P.P.P. 705	188	Longreach Oil Limited, W. McD. Royle, Managing Director, Box 775, G.P.O., Sydney, W. D. Mott, Consulting Geologist, Astor Court, cnr. Wharf and Leichhardt Streets, Brisbane	Barcaldine and Ilfracombe	Suspended
P.P.P. 706	200	Planet Exploration Company Pty. Ltd., J. G. Fuller, Managing Director, 26 O'Connell Street, Sydney	South of Springsure ..	Suspended
P.P.P. 707	200	Planet Exploration Company Pty. Ltd., J. G. Fuller, Managing Director, 26 O'Connell Street, Sydney	South of Springsure ..	Suspended
P.P.P. 708	100	Condamine Oil Ltd., R. Swinton, Managing Director, Box 761K, G.P.O., Brisbane, J. Kooy, Driller in Charge, Auburn Road, Chinchilla	North of Chinchilla ..	Fishing, lost tools
P.P.P. 709	200	W. C. and H. J. Walz, Marian, via Mackay	West of Mackay ..	Suspended
Total ..	1,288	Square Miles.		
		AUTHORITIES TO PROSPECT		
*54P ..	43,000	The Papuan Apinaipi Petroleum Company Limited (B. W. Graham, Chairman and Managing Director) Box 4991, G.P.O., Sydney; D. M. Traves, Chief Geologist, Box 880L, G.P.O., Brisbane	Boulia	Geological and Geophysical Investigations
*55P ..	13,100 Amalgamated	Associated Australian Oilfields No Liability: E. N. Avery, Chairman and Managing Director, 360 Collins Street, Melbourne; D. M. Traves, Chief Geologist, Box 880L, G.P.O., Brisbane	Roma–Theodore	Geological and Geophysical Investigations and Drilling
*56P ..	33,440	Associated Freney Oil Fields No Liability: E. N. Avery, Chairman and Managing Director, 360 Collins Street, Melbourne; D. M. Traves, Chief Geologist, Box 880L, G.P.O., Brisbane	Mount Morgan–Clermont–Mackay	
57P ..	43,000	Australian Oil and Gas Corporation Limited with whom are Associated in this area Union Oil Development Corporation and Kern County Land Company. A.O.G.: T. W. H. Dee, Managing Director, Box 5048, G.P.O., Sydney; Professor E. A. Rudd, Geological Consultant, University of Adelaide, Adelaide, South Australia. Operator, Union: D. Tower, President, Union Oil Centre, Los Angeles, California, U.S.A.; D. Graves, Resident Manager, Box 5048, G.P.O., Sydney; D. Pyle, Field Superintendent, 203 Margaret Street, Toowoomba	St. George–Miles ..	Geological and Geophysical Investigations and Drilling
58P ..	137,000	Santos Limited (50 per cent.) and Delhi Australian Petroleum Ltd. (50 per cent.). Santos: J. G. Bonython, Chairman, Mutual Life Chambers, 44 Grenfell Street, Adelaide, South Australia; Geo-Surveys of Australia Pty. Ltd. (R. C. Sprigg, Managing Director), Geological Consultants, Box 1479L, G.P.O., Adelaide, South Australia). Delhi: W. Clifford Smith, Vice President, Fidelity Union Tower, Dallas, Texas, U.S.A.; C. T. Easley, Resident Manager, Box 1837P, G.P.O., Adelaide, South Australia. Operator, Delhi	Gulf of Carpentaria ..	Suspended, preparing for Drilling
60P ..	15,800	L. H. Smart Oil Exploration Co. Limited: L. H. Smart Chairman, Box 2670, G.P.O., Sydney; R. C. Sprigg, Geological Consultant, Box 1479L, G.P.O., Adelaide, South Australia	Eromanga	Scout Drilling
61P ..	45,900	Plymouth Oil Company; G. H. Fisher, Vice President, Sinton, Texas, U.S.A.; C. H. Wilson, Solicitor, Box 320E, G.P.O., Brisbane	Cape York Peninsula ..	Suspended
64P ..	37,700	Carpentaria Oils Pty. Ltd., with whom are associated in this area, Australian Swain Pty. Limited and Cree Oil of Canada (1958) Pty. Limited. Operator, Cree: D. Y. Cooke, Vice President, 708 Seventh Avenue West, Calgary, Alberta, Canada; C. H. Wilson, Solicitor, Box 320E, G.P.O., Brisbane	Julia Creek, Ilfracombe ..	Suspended
*65P ..	15,500	Associated Australian Oilfields No Liability (50 per cent.) and Associated Freney Oil Fields No Liability (50 per cent.): E. N. Avery, Chairman and Managing Director, 360 Collins Street, Melbourne; D. M. Traves, Chief Geologist, Box 880L, G.P.O., Brisbane	Normanton	Suspended
66P ..	33,800 Checkerboarded and Interrelated	Santos Limited: J. Bonython, Chairman, Mutual Life Chambers, 44 Grenfell Street, Adelaide, South Australia. Geo-Surveys of Australia Pty. Ltd. (R. C. Sprigg, Managing Director), Geological Consultants, Box 1479L, G.P.O., Adelaide, South Australia	Haddon Corner, Queensland–South Australia Border	Geological and Geophysical Investigations
67P ..	33,800	Delhi Australian Petroleum Ltd. (W. Clifford Smith, Vice President, Fidelity Union Tower, Dallas, Texas, U.S.A.; C. T. Easley, Resident Manager, Box 1837P, G.P.O., Adelaide, South Australia) with whom are associated in part of these areas, Frome-Broken Hill Co. Pty. Ltd. (M. A. Osborne, General Manager, Box 384D, G.P.O., Melbourne). Operator, Delhi		

FIGURE 1.

QUEENSLAND

Showing

APPROXIMATE AREAS COVERED BY

AUTHORITIES TO PROSPECT AND

PROSPECTING PETROLEUM PERMITS AS AT 31ST DEC. 1960

SCALE OF MILES

100 50 0 100 200 300

L.P.H. 10-1-61

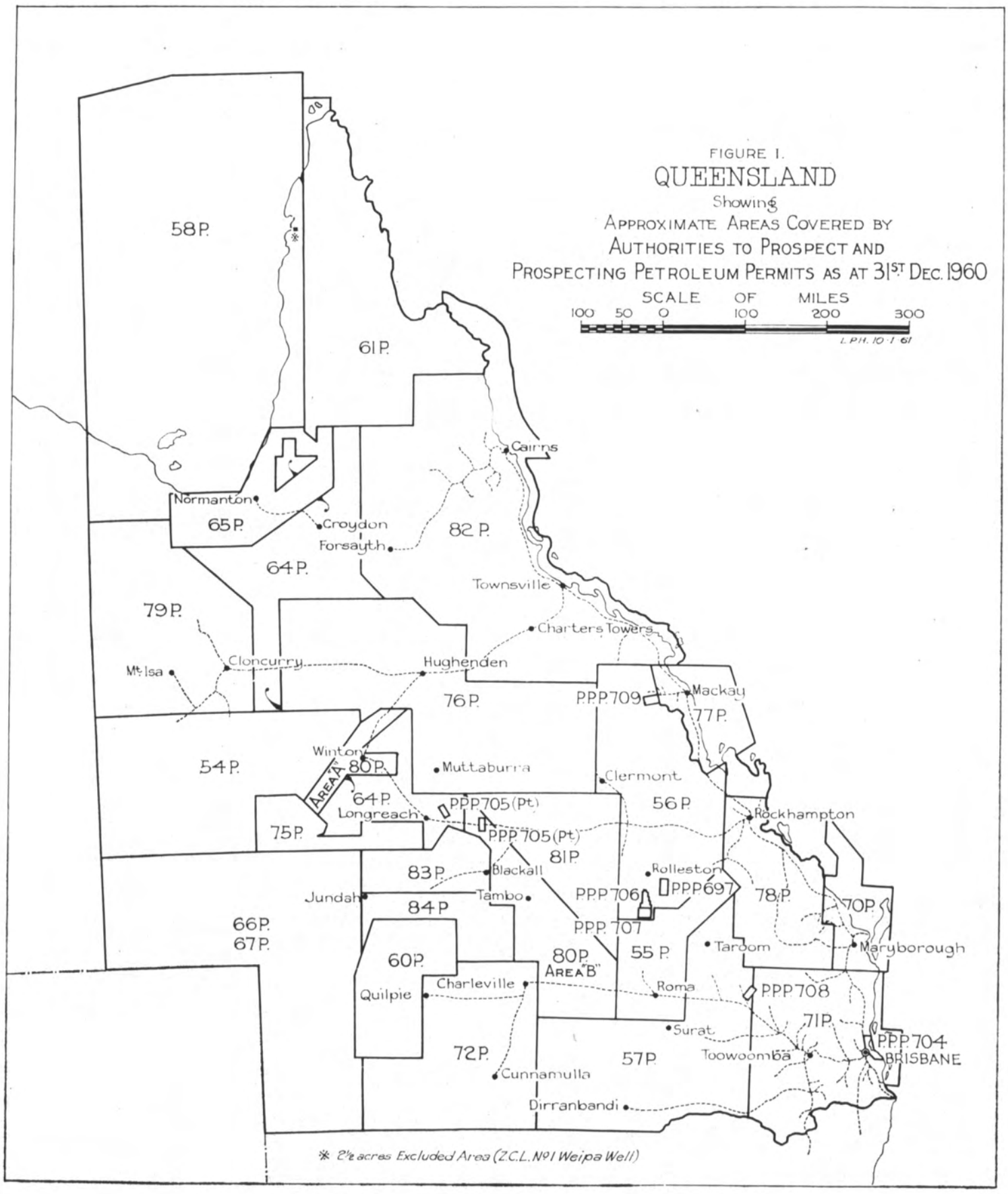


FIGURE 2

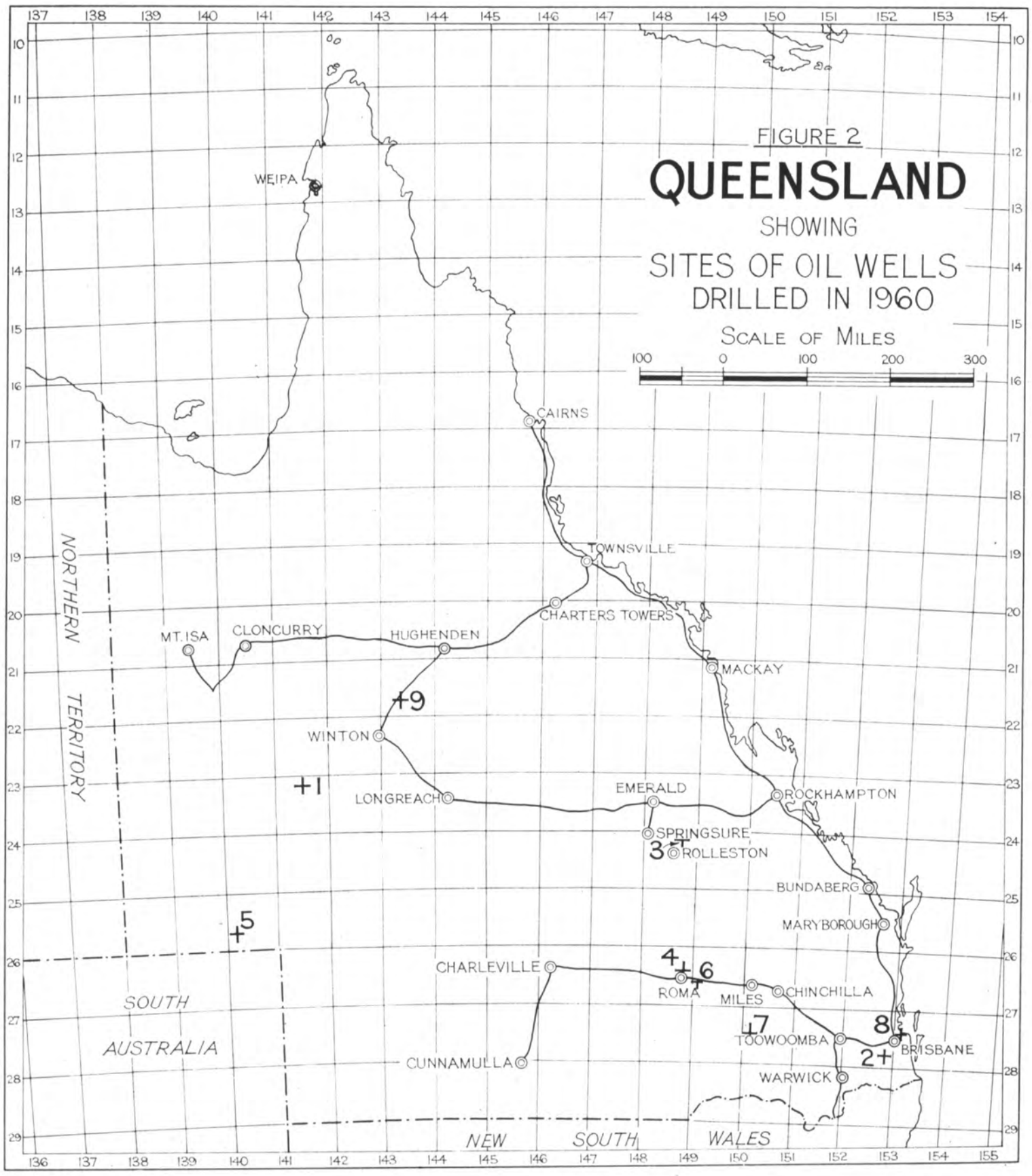
QUEENSLAND

SHOWING

SITES OF OIL WELLS DRILLED IN 1960

SCALE OF MILES

100 0 100 200 300



INDEX

No	Well	Latitude	Longitude	R.L. of Rotary Table	Height of Rotary Table
1	Conorada Ooroonoo No1	23° 10′ 50″	141° 33′ 09″	405′	5′
2	Queensland American The Overflow No 1	27° 48′ 30″	152° 51′ 04″	194′	11′
3	A.F.O No 1 (Cooroorah)	23° 07′ 30″	148° 42′ 40″	605′	9′
4	A.A.O Timbury Hills No 2	26° 33′ 38″	148° 49′ 38″	1110′	10′
5	D.F.S No 1 (Betoota)	25° 42′ 30″	140° 49′ 46″	Abt. 359′ Ground Elevn	14′
6	A.A.O Pickanjinnie No 1 A.A.O Latemore No 1 A.A.O Latemore East No 1	26° 35′ 42″ 26° 35′ 13″ 26° 35′ 36″	149° 07′ 18″ 149° 04′ 35″ 149° 05′ 40″	1069′ 1075′ 1045′	10′ 10′ 10′
7	Union-Kern-A.O.G Cabawin No 1	27° 28′ 16″	150° 11′ 19″	966·9	15·5
8	Standard Gas Cribb Island No 1	27° 22′ 26″	153° 07′ 03″	6′	1′ Ht. of Collar
9	Magellan Corfield No 1	21° 42′ 40″	143° 22′ 30″	847′	5′

Table A—*continued*

Nos.	Area	Titleholders and Names and Addresses of Principal Officers	Locality	State of Operations
	Sq. Miles			
		AUTHORITIES TO PROSPECT—*continued*		
70P ..	10,000	Pacific American Oil Company: Gene Goff, President, 305 Pan American Building, Tulsa 3, Oklahoma, U.S.A., C. W. Siller, Vice President, Box 1555V, G.P.O., Brisbane	Maryborough–Bundaberg	Suspended
71P ..	29,500	Queensland American Oil Company (50 per cent.) and Sunray Mid-Continent Oil Company (25 per cent.) and Phillips Petroleum Company (25 per cent.). Operator, Phillips: P. J. Parker, Vice President, International, Phillips Building, Bartlesville, Oklahoma, U.S.A.; J. J. Tanner, Manager, Australian Operations, Box 863L, G.P.O., Brisbane	Gympie–Brisbane ..	Suspended
72P ..	35,000	Sunray Mid-Continent Oil Company (50 per cent.) and Phillips Petroleum Company (50 per cent.). Operator, Phillips: P. J. Parker, Vice President, International, Phillips Building, Bartlesville, Oklahoma, U.S.A.; J. J. Tanner, Manager, Australian Operations, Box 863L, G.P.O., Brisbane	Charleville	Geological and Geophysical Investigations
75P ..	8,300	Conorada Petroleum Corporation: B. V. Uhl, President, 630 Fifth Avenue, New York, U.S.A.; I. McPhee, Resident Geologist, 74 Seventh Avenue, St. Lucia, Brisbane	West of Longreach ..	Geological Investigations
76P ..	57,900	Artesian Basin Oil Company Pty. Ltd.; Gene Goff, Chairman, 305 Pan American Building, Tulsa 3, Oklahoma, U.S.A.; C. W. Siller, Managing Director, Box 1555V, G.P.O., Brisbane	Hughenden	Geological Investigations
77P ..	12,000	Reef Oil Company Pty. Ltd.: Gene Goff, Chairman, 305 Pan American Building, Tulsa 3, Oklahoma, U.S.A.; C. W. Siller, Managing Director, Box 1555V, G.P.O., Brisbane	Mackay	Suspended
78P ..	19,400	Nortex Australian Oils Ltd.: J. R. Wendover, President, 1900 Life of America Building, Dallas, Texas, U.S.A.; C. H. Wilson, Solicitor, Box 320E, G.P.O., Brisbane	Rockhampton–Mundubbera	Geological Investigations
79P ..	40,000	Australamerica Corporation: H. J. Steel, President, 527 Madison Avenue, New York 22, New York, U.S.A.; C. H. Wilson, Solicitor, Box 320E, G.P.O., Brisbane	Cloncurry-Mount Isa ..	Suspended
80P ..	Area A 5,000	Magellan Petroleum Corporation (75 per cent.) and Central Queensland Petroleum Coy. Pty. Ltd. (25 per cent.). Magellan: B. W. Heath, President, 103 East 37 Street, New York, U.S.A.; H. I. Harris, Chief Geologist, Australia, Box 455F, G.P.O., Brisbane. Cent. Qld.: R. F. G. Wilson, Agent, Box 1555V, G.P.O., Brisbane. Operator, Magellan	Winton	Geological Investigations
	Area B 18,000	Magellan Petroleum Corporation: B. W. Heath, President, 103 East 37 Street, New York, U.S.A.; H. I. Harris, Chief Geologist Australia, Box 455F, G.P.O., Brisbane	Tambo	
81P ..	19,500	Oil Development N.L.: K. W. Craig, Chairman, 100 Collins Street, Melbourne. Geo-Surveys of Australia Pty. Ltd. (R. C. Sprigg, Managing Director), Geological Consultants, Box 1479L, G.P.O., Adelaide; L. W. Doggett, Agent, Box 281D, G.P.O., Brisbane	Alpha	Suspended
82P ..	82,000	Triton of Australia Ltd.: T. H. Dunn, President, Vaughn Building, Dallas, Texas, U.S.A.; C. H. Wilson, Solicitor, Box 320E, G.P.O., Brisbane	Cairns	Suspended
83P ..	9,300	Cordillera–Australian Petroleum Company Pty. Ltd.: R. P. Greson, President, 827 Mercantile Securities Building, Dallas, Texas, U.S.A.; C. H. Wilson, Solicitor, Box 320E, G.P.O., Brisbane	Isisford	Suspended
84P ..	9,600	Sunray Mid-Continent Oil Company (50 per cent.) and Phillips Petroleum Company (50 per cent.) Operator, Phillips: P. J. Parker, Vice President, International, Phillips Building, Bartlesville, Oklahoma, U.S.A.; J. J. Tanner, Manager, Australian Operations, Box 863L, G.P.O., Brisbane	Yaraka	Geological and Geophysical Investigations
Total ..	807,540	Square miles.		

* In these areas 54P, 55P, 56P, and 65P, Associated Australian Oilfields No Liability, Associated Freney Oil Fields No Liability, and The Papuan Apinaipi Petroleum Co. Ltd., are jointly associated.

In respect of 54P, Phillips–Sunray (For details of Company names and Principal Officers, see 72P and 84P) have an option over 50 per cent. of this area on a checkerboard basis and in pursuance of this option Phillips are the present operators.

In respect of 55P, 56P, and 65P, the operators are a subsidiary Company—Mines Administration Pty. Ltd. (In future this Company will operate under the name "Petex"), E. N. Avery, Managing Director, D. M. Traves, Chief Geologist, Box 880L, G.P.O., Brisbane.

Summarised Table A represents seven Prospecting Petroleum Permits totalling 1,288 square miles and twenty-four Authorities to Prospect totalling 807,540 square miles.

The following titles were relinquished during the year (Table B):—

Table B

No.	Holder	Locality	Remarks
		Prospecting Petroleum Permits	
		Nil	
		Authorities to Prospect	
53P ..	Humber Barrier Reef Oils Pty. Ltd. ..	Barrier Reef	Surrendered
62P ..	Magellan Petroleum Corporation (75 per cent.) and Central Queensland Petroleum Co. Pty. Ltd. (25 per cent.)	Winton	Surrendered and merged in 80P
63P ..	Magellan Petroleum Corporation ..	Tambo	Surrendered and part merged in 80P
73P ..	Stekoll Australian Petroleum Ltd. ..	Cairns–Townsville–Georgetown ..	Surrendered
74P ..	Australian American Oil Company Pty. Ltd.	Isisford	Surrendered and merged in 83P (part) and 84P (balance)

PART 3—SURFACE PROSPECTING

The following details of work done in surface geology, geophysical surveying and prospecting during 1960 have been obtained from the titleholders and by personal inquiry and observation. In addition work done by Government agencies is described.

Prospecting Petroleum Permits

P.P.P. 697.—No field work was carried out on this permit during the year, but geological data available was reviewed.

P.P.P. 704.—A well was commenced at Cribb Island at the beginning of March (Standard Gas Cribb Island No. 1) and at the end of the year drilling was continuing with a percussion plant at a depth of 1,420 ft. In addition a scout bore was sunk at Aspley to a depth of 970 ft.

P.P.P. 705.—No field work was carried out on this permit during the year, but geological and geophysical data available was reviewed.

P.P.P. 706.—No field work was carried out on this permit during the year, but geological data available was reviewed.

P.P.P. 707.—No field work was carried out on this permit during the year, but geological data available was reviewed.

P.P.P. 708.—After suspending fishing and recovery operations to recover the tools lost in the well C.O.L. No. 1 (Speculation) for six months these were resumed in April and the company continued recovery operations (without success) until the end of the year. There was no advance in the depth of the well.

P.P.P. 709.—No field work was carried out on this permit during the year.

Authorities to Prospect

53P.—This title was surrendered at the end of August. No field work had been done on the authority during 1960 up to the time of surrender.

54P.—As indicated in Table A an option over 50 per cent. of the area (on a checkerboard basis) of this Authority was granted in the middle of the year and the option holders are the present operators. The geological data obtained on this area was carefully reviewed and a seismic crew was employed on reconnaissance seismic survey of part of the area covering 2,000 square miles throughout the second half of the year.

55P and 56P.—As indicated in Table A these Authorities were amalgamated during the year and accordingly activities in respect of them are recorded under the one heading. Work on these areas was undoubtedly the most active of any part of Queensland during 1960. One well A.F.O. No. 1 (Cooroorah) was completed and four other wells (A.A.O. Timbury Hills No. 2, A.A.O. Pickanjinnie No. 1, A.A.O. Latemore No. 1 and A.A.O. Latemore East No. 1) were also drilled for a total footage of 19,813 ft. Geological work consisted of mapping in both the Injune and Banana areas, and well site geology at the five wells. Subsequently detailed reports were received on this and other work. Some experimental geochemical work was also done in selected parts of the authorities and a general geological control maintained over the activities on the authorities. 8.9 crew months were spent in both regional and detailed seismic work to the north, south and east of Roma and in the Banana district. It was a result of this seismic work that the last four wells were drilled, of which two (Timbury Hills No. 2 and Pickanjinnie) were established as potential gas wells. The area covered by the seismic surveys totalled 1,490 square miles.

57P.—It was noted last year that operations in this area are now conducted by an overseas company and during the past year there has been a very active geological, geophysical and finally drilling programme on this authority. The initial well drilled (Union-Kern-A.O.G. Cabawin No. 1—Plate 4) had reached 9,952 ft. at the end of the year. The geological work consisted firstly of literature studies of the Bowen and Surat Basin, followed by reconnaissance and detailed surveys of the same basins, geological work in connection with the seismic surveys undertaken and well site work at Cabawin No. 1. Geophysical prospecting on the area comprised two months of aerial magnetometer surveys covering an area of 3,000 square miles in the Cabawin district and 8.3 crew months of seismic surveys in Cabawin, Glenmorgan and Miles district, traversing in all 287 miles.

58P.—Owing to unforseen difficulties arising in connection with the proposed drilling of a test well on Mornington Island no field work in connection with Authority was undertaken during the year. Further geological studies of data previously obtained were made and equipment obtained with a view to use in the proposed well which is to be commenced in about May 1961, and the well site and road to the same were cleared.

60P.—Only scout drilling and a review of the geological data obtained therefrom was carried out on this title during the year. One scout bore was completed and another commenced for a total footage of 3,508 ft. in 1960.

61P.—No work was done on this authority during the period. Proposals have been made to drill a stratigraphic well in the Laura Basin area during the dry season of 1961.

62P.—This title was surrendered at the end of March 1960 and merged in 80P. Prior to that date no field work was done on this authority during 1960.

63P.—This title was surrendered at the end of March 1960 and part of it merged in 80P. Prior to such surrender a gravity survey had been done covering an area of 950 square miles on this authority.

64P.—With the exception of a ½ crew month of seismic prospecting in the middle of the year, traversing 60 miles to the west of Longreach practically no work was done on this authority during the year.

65P.—No work was undertaken on this authority during the year.

66P. and 67P.—These two authorities which are checkerboarded and interrelated are dealt with together. They have been the subject of intensive work during the year comprising geological mapping of areas peripheral to the Great Artesian Basin, seismic surveys and the completion of the well D.F.S. Betoota No. 1 at a depth of 9,824 ft. as a dry hole. The geological examination of outcrops of pre-Mesozoic rocks was made in South Australia, New South Wales and the Northern Territory with a view to obtaining a better knowledge of the pre-Mesozoic rocks beneath the Great Artesian Basin. As subsequently recorded the South Australian Department of Mines ran a seismic traverse from Boulia, Qld., to Clifton Hills, S.A. In addition detailed seismic work was done for the title-holders in the Innamincka–Durham Downs area, this comprised 2.1 crew months traversing 77 miles.

70P.—The only work done on this area during the year was a review of the geological and geophysical data available.

71P.—No surface work was done on this Authority during the period, but the well Queensland American *The Overflow* No. 1 was drilled to a depth of 2,993 ft. and plugged as a dry well. The site of this well was on the South Moreton Anticline in the Beaudesert district.

72P.—This authority was the subject of a very active programme during the year. Geological investigations consisted of photo-geological reconnaissance, air and ground reconnaissance, review of available literature and a compilation of water bore data. Geophysical work was both by aero magnetic means and seismic methods. In the case of the former these comprised three party months of aerial magnetometer survey covering an area of 35,000 square miles, whilst in regard to

the latter an area of 4,500 square miles was covered in seventeen crew months. This detailed programme was the precursor to the selection of a deep drilling target in 1961.

73P.—This title was surrendered in May 1960. Prior to its surrender no work was done on it.

74P.—This title was surrendered at the end of June and merged in Authorities to Prospect 83P (part) and 84P (balance). Prior to that date the results of the reconnaissance air photo interpretations carried out the previous year were reviewed.

75P.—A photogeological evaluation of this authority was prepared by an American firm of consultants and a review was made of all the geological data available. Consequent upon this work a stratigraphic well (Conorada Ooroonoo No. 1) was drilled to 3,852 ft. and plugged as a dry well.

76P.—The data obtained from this reconnaissance seismic survey in the Muttaburra district of this area in late 1959 was interpreted and reviewed. Subsequently a geological survey was carried out for four months in the Lake Galilee district.

77P.—The petroleum possibilities of the Styx River district of this area were examined and reported on by the Company's consultants.

78P.—The titleholder completed an office research on material available on this area and a consultant made a field reconnaissance trip over the area and reported on the same.

79P.—No work was carried out on this area during the year.

80.P.—This title commenced in April and subsequently the company has been re-interpreting the gravity and magnetometer data previously obtained and has initiated a regional study of the geology of the outcrops surrounding the Great Artesian Basin. To assist in this work the company extended a water bore as a stratigraphical well (Magellan Corfield No. 1) drilling 1,877 ft. to a total depth of 4,507 ft. This petroleum potential of the well was negative and the well was completed as a water bore.

81P.—No work was carried out on this authority during the year.

82P.—No work was carried out on this area in 1960.

83P.—No work was done on this title during the year.

84P.—A review was made of the literature available and water bore data was compiled. An aerial magnetometer survey of the title was completed.

Regional Geological Surveys

The Bureau of Mineral Resources in conjunction with the Geological Survey of Queensland undertook a fairly extensive programme of regional surveys to assist the search for oil in Queensland in 1960.

In the Bowen Basin area these comprised the mapping of the Mount Coolon four mile sheet with one party for 17 geologist months, and the mapping of the Clermont four mile sheet by another party for 20 geologist months.

In the Great Artesian Basin area in far western Queensland four and a-half four mile sheets were mapped by a further party during 14½ geologist months.

Data obtained by this survey is basic to the proper understanding of these basins and their petroleum prospects.

Regional Geophysical Surveys

The Bureau of Mineral Resources conducted a variety of geophysical surveys in Queensland in 1960. These comprised water bore logging, gravity surveys and seismic survey. The water bore logging programme was experimental to determine the value of such work and conducted mainly in the southern part of the State over 26 bores.

The Gravity surveys of the Bureau comprised a reconnaissance survey of the Mount Whelan area in far Western Queensland by helicopter, traversing 600 miles, regional surveys in southern and eastern Queensland traversing 4,725 miles and a semi-detailed survey in central Southern Queensland traversing 350 miles. These traverses are of great value in determining sub-surface structure.

The seismic programme of the Bureau of Mineral Resources comprised regional surveys in the Roma–Surat–Dalby area for four party months, and further regional surveys in the Emerald–Duaringa area and west of Winton for periods of 3½ and ½ party months respectively. The work in Southern Queensland and the Bowen Basin is proving particularly valuable and makes possible a new and very valuable interpretation of the Pre-Mesozoic strata in these areas.

The South Australian Department of Mines ran a regional reconnaissance seismic correlation line from Breadalbane (near Boulia) to Birdsville, then east to Betoota, all in Queensland, subsequently they carried this line further from Birdsville to Clifton Hills in South Australia. In all this traverse covered 255 miles in Queensland. The purpose of this work was to carry reflections obtained in areas of identified Lower Paleozoic rocks, as in water bores near Boulia into the deep parts of the Great Artesian Basin where Paleozoic rocks are not yet satisfactorily identified.

PART 4—GEOPHYSICAL SURVEYS

The following tables detail the water bore logging, gravity, aerial magnetometer and seismic work done in Queensland in 1960. The results of these surveys are discussed in more detail in the Geological Survey report on Oil Prospecting by Mr. R. J. Allen, Geologist, to which reference has already been made.

The water bore logging (Table C) was a project jointly conceived and sponsored by the Qupex Group, the Irrigation and Water Supply Commission, the Bureau of Mineral Resources and the Department and was an excellent example of co-operative effort. The results obtained from it could be very valuable in correlating the upper Mesozoic section of the Great Artesian Basin and extending the knowledge of aquifers.

Table C

WATER BORE LOGGING

Locality: From Roma west to Eromanga, with a southerly sweep nearly to the Border. Also town bores at Winton, Corfield, and Mitchell.

Arranged by: Qupex, Department of Development and Mines, Irrigation and Water Supply Commission and Bureau of Mineral Resources, Geology and Geophysics.

Operator: B.M.R. Geophysical (Logging) Party.

Crew Months: 4—1 Geophysicist, and 1 Technician or 1 Assistant Geophysicist.

Gamma Ray: 24 bores logged—48,000 ft. of logging.

Temperature: 6 bores logged—12,600 ft. of logging.

S.P.-Resistivity: 2 bores logged—5,850 ft. of logging.

Caliper: 1 bore logged—1,300 ft. of logging.

Gravity surveys (Table D) by companies were limited in 1960, but the Bureau of Mineral Resources had a very extensive programme.

Table D

GRAVITY SURVEYS

Title	Operator	Contractor	Party Months	Area covered in Square Miles	Number of Line Miles Traversed	Number of Stations
63P ..	Magellan Petroleum Corporation	Century Geophysical Corporation	3	950	750	1,449

BY GOVERNMENT AGENCIES

Surveys Conducted by the Bureau of Mineral Resources, Geology and Geophysics

Area of Operation	Type of Survey	Party Months	Area covered in Square Miles	Number of Line Miles Traversed	Number of Stations
Mount Whelan (Western Queensland)	Reconnaissance by Helicopter	1¼	3,500	600	80
Thargomindah–Quilpie–Charleville–Roma–St. George–Toowoomba–Brisbane	Regional (Party 1) ..	1¾	..	1,225	225
Brisbane–Townsville–Cairns Hughenden–Emerald–Roma–Dirranbandi	Regional (Party 2)..	4	..	3,500	800
Thargomindah–Cunnamulla–Quilpie–Charleville	Semi-detailed (Party 2)	2¼	..	380	305

Table E

AERIAL MAGNETOMETER SURVEYS

Title	Operator	Contractor	Field Party Months	Area Covered in Square Miles	Number of Line Miles Flown
57P ..	Union Oil Development Corporation	Adastra Hunting Geophysics Pty. Ltd.	2	3,000	3,463
72P ..	Phillips Petroleum Company	Aero Service Corporation	3	35,000	13,277
84P (and part of 60P) ..	Phillips Petroleum Company	Aero Service Corporation	1	13,500 (includes 3,900 square miles in 60P)	4,634

Table F

SEISMIC SURVEYS

Title	Operator	Contractor	Crew Months	Type of Survey	Method of Survey	Area Surveyed	Length of Traverses	Number of Profiles	Number of Observation Points	Holes Drilled	Feet Drilled	Explosive Used	Detonators Used
						Sq. Miles	Miles				Ft.	Lb.	
54P ..	Phillips Petroleum Company	Austral Geo-Prospectors Pty. Ltd.	6·0	Regional reconnaissance	Mainly Spot correlation (reflection) with limited continuous profiling (reflections)	2,000	480	..	743	1,131	120,051	10,139	2,061
55P and 56P	Mines Administration Pty. Ltd.	Austral Geo-Prospectors Pty. Ltd.	8·9	Mainly detailed with some regional lines	Continuous profiling (reflection) ..	1,490	298	..	1,322	1,306	125,492	43,317	2,341
57P ..	Union Oil Development Corporation	United Geophysical Inc.	8·3	Reconnaissance	Continuous profiling (reflection) ..	..	287	1,182	1,123	1,181	184,424	54,680	2,163
64P ..	Cree Oil of Canada (1958) Pty. Ltd.	Austral Geo-Prospectors Pty. Ltd.	0·5	Reconnaissance	Spot correlation (reflection)	..	60	..	57	58	9,960	1,000	126
66P and 67P	Delhi Australian Petroleum Ltd.	South Australian Department of Mines	2·1	Reconnaissance and detailed	(*a*) Detailed continuous reflection profiling	..	19·3	89	..	91	9,923	2,777	101
					(*b*) Reconnaissance reflection correlation	..	57·5	33	..	34	3,781	1,726	43
					(*c*) Reconnaissance reversed in line refraction	..	..	4	129	83	9,840	8,170	216
72P ..	Phillips Petroleum Company	Petty Geophysical Engineering Company	17·0	Mainly reconnaissance with some detailed	Continuous profiling (reflection) ..	4,500	840	..	2,039	3,951	418,169	63,063	7,618
					BY GOVERNMENT AGENCIES								
South Australian Department of Mines Regional Traverse (Boulia, Queensland, to Clifton Hills, South Australia) Queensland Section			3·55	Regional	(*a*) Wide internal reflection correlation	..	255 (Altogether in Qld.)	223	143 (Altogether in Qld.)	171	11,600	2,241	236
					(*b*) Single line refraction with accompanying continuous reflection profiling	..	..	334	..	159	13,457	5,720	383
Bureau of Mineral Resources, Geology and Geophysics— (i.) Cabawin–Jondaryan and Roma–Surat areas			4·0	Regional	Continuous reflection profiling at selected intervals and reverse line refraction profiles	..	150 (reflection) traverse)	413 (reflection)	413 (reflection)	458	56,382	14,000	822
							103 (continuously shot)	4 (refraction)	45 (refraction)	..	..	..	..
(ii.) Bowen Basin (Emerald–Duaringa area)			3·5	Regional	Continuous reflection profiling at selected intervals and reverse line refraction profiles	..	130 (reflection traverse)	232 (reflection)	232 (reflection)	459	35,536	17,500	1,092
							58 (continuously shot)	11 (refraction)	38 (refraction)	..	..	..	..
(iii.) Winton area (north-west from Winton for 21 miles along McKinlay Road)			0·5	Regional	Continuous profile reflection	..	$8\frac{1}{2}$	34	34	39	4,944	1,304	74
Total			54·35						Total ..	9,121	1,003,599	225,637	17,276

Aerial Magnetometer Surveys (Table E) were used by two companies to obtain confirmatory bedrock evidence to be used in conjunction with seismic surveys undertaken by them. The very compact unit and small crew operated by one contractor was of special interest as showing the ready adaptability of this method for relatively small jobs.

With a total of 54.35 crew months of operation in Queensland in 1960 seismic prospecting became the major exploration tool in use. The compilation (Table F) shows the magnitude of the work undertaken. It will be noted that not all operators and contractors use the same nomenclature and classifications; consequently there is a little confusion in making a summation of the data. The drilling of Timbury Hills No. 2, Pickanjinnie No. 1 and Cabawin No. 1 have more than justified this seismic expenditure and it is to be expected that the tool will be used still more in 1961.

PART 5—OIL AND NATURAL GAS DRILLING

This work, including scout structure drilling, was in progress on two Prospecting Petroleum Permits (P.P.P.'s 704 and 708) and seven Authorities to Prospect (Nos. 55P, 56P, 57P, 60P, 66P, 71P and 75P) during the year.

The sites of wild cat wells, excluding scout structure bores, drilled during 1960 is shown on the accompanying plan (Fig. No. 2). Sites of wells drilled prior to 1959 are shown in the previous annual reports.

The following Table G shows the footages of wells drilled in 1960 in chronological order. All these wells are classed as wild cat wells or scout bores in accordance with the accepted practice of the oil industry. All footages mentioned in this table represent depths measured from the rotary table or casing head (in percussion wells):—

Table G

Name of Well	Location (and Title)	Operator (and Contractor)	Footage Drilled	Completed Depth	Results and Remarks as at End of Year
				Ft.	
		ROTARY DRILLING			
A.F.O. No. 1 (Cooroorah)	Cooroorah, via Capella (56P)	Associated Freney Oilfields N.L., with whom are associated Associated Australian Oilfields N.L. and the Papuan Apinaipi Petroleum Co. Ltd. (Mines Administration Pty. Ltd.)	701	3,523	Plugged as a dry well
D.F.S. No. 1 (Betoota)	Betoota, South-Western Queensland (66P)	Delhi Australian Petroleum Ltd., with whom are associated Frome–Broken Hill Co. Pty. Ltd. and Santos Ltd. (Delta Drilling Co.)	8,123	9,824	Plugged as a dry well
A.A.O. Timbury Hills No. 2	Timbury Hills, North-East of Roma (55P)	Associated Australian Oilfields N.L., with whom are associated Associated Freney Oilfields N.L. and the Papuan Apinaipi Petroleum Co. Ltd. (Mines Administration Pty. Ltd.)	4,400	4,400	Tested as a gas well and awaiting completion
Queensland American The Overflow No. 1	Between Beaudesert and Boonah, South-Eastern Queensland (71P)	Queensland American Oil Company with whom are associated Phillips Petroleum Company and Sunray Midcontinent Oil Company (Mines Administration Pty. Ltd.)	2,993	2,993	Plugged as a dry well
Magellan Corfield No. 1	Corfield (Hughenden–Winton Line) Central Queensland (80P)	Magellan Petroleum Corporation with whom are associated Central land Petroleum Coy. Pty. Ltd. (W. L. Sides and Son Pty. Ltd.)	1,877	4,507	Deepened as a stratigraphic test well below 2,630, plugged as a dry well and converted to a water well
A.A.O. Pickanjinnie No. 1	Pickanjinnie, 20 miles East of Roma (55P)	Associated Australian Oilfields N.L., with whom are associated Associated Freney Oilfields N.L. and the Papuan Apinaipi Petroleum Co. Ltd. (Mines Administration Pty. Ltd.)	5,213	5,213	Tested as a gas well and awaiting completion
Conorada Ooroonoo No. 1	Mackunda Creek, 160 miles west of Longreach (75P)	Conorada Petroleum Corporation (Mines Administration Pty. Ltd.)	3,852	3,852	Plugged as a dry well
A.A.O. Latemore No. 1	17 miles East of Roma (55P)	Associated Australian Oilfields N.L., with whom are associated Associated Freney Oilfields N.L., and the Papuan Apinaipi Petroleum Co. Ltd. (Mines Administration Pty. Ltd.)	4,775	4,775	Gas show, plugged
A.A.O. Latemore East No. 1	18 miles East of Roma (55P)	Associated Oilfields N.L., with whom are associated Associated Freney Oilfields N.L. and the Papuan Apinaipi Petroleum Co. Ltd. (Mines Administration Pty. Ltd.)	4,724	4,724	Gas show, plugged
Union–Kern–A.O.G. Cabawin No. 1	26 miles South-West of Tara (57P)	Union Oil Development Corporation with whom are associated Kern County Land Company and Australian Oil and Gas Corporation Ltd. (Oil Drilling and Exploration Ltd.)	9,952	..	Drilling
		PERCUSSION DRILLING			
C.O.L. No. 1 (Speculation)	Chinchilla (P.P.P. 708)	Condamine Oil Ltd.	..	..	Fishing for lost tool at 2,333 feet—current depth
Standard Gas Cribb Island No. 1	Cribb Island, Brisbane (P.P.P. 704)	Standard Gas Pty. Ltd. (Godfrey Bros. Pty. Ltd.)	1,420	..	Drilling
		SCOUT BORES			
		(*Percussion*)			
Smart Oil Harkaway Scout No. 1	Harkaway, via Eromanga, South-Western Queensland (60P)	L. H. Smart Oil Exploration Ltd. (J. R. Robinson)	1,850	1,850	Abandoned
Smart Oil Orient Scout No. 1	Orient, via Thargomindah, South-Western Queensland (60P)	L. H. Smart Oil Exploration Ltd. (J. R. Robinson)	1,658	..	Suspended, limit of rig
Standard Gas Aspley Scout No. 1	Aspley, Brisbane (P.P.P. 704)	Standard Gas Pty. Ltd., (S. H. Scells)	970	..	Suspended, limit of rig

Summarised the above details are shown in the following table:—

Table H

WILD CAT DRILLING

Footage drilled during year (1,420 feet percussion, balance rotary)	47,030 ft.
Number of wells drilling at 31st December, 1960	Two
Number of wells drilled and completed in year and results	Nine (Five dry, Two gas shows plugged, and Two tested as gas wells and awaiting completion)

SCOUT DRILLING

Footage drilled during year (all percussion) ..	2,478 ft.
Number of bores drilling at 31st December, 1960	Nil
Number of bores drilled during the year ..	Three

Specific details of the various wells and scout bores drilled during the year appear in the Geological Survey Report on Drilling for Petroleum, previously referred to. Records of previous wells and bores appear in earlier reports.

PART 6—EMPLOYMENT AND ACCIDENTS

Employment increased steadily throughout the year, reflecting the increased tempo of activity. The increase for the year was 139 per cent. On present indications employment in 1961 will be even greater.

With increased employment it has been found possible to give statistics in more detail, by dividing drilling and the employment by Government agencies into categories separate from other employment by titleholders. These results are shown in the following Table I, being the average employment throughout the State during 1960, and which totals 289:—

Table I

EMPLOYMENT

Administrative Geologists Geophysicists, &c.		Other		Managers, Petroleum Engineers, Toolpushers, Drillers, &c.		Derrick and Floormen		Miscellaneous Others	
Titleholders Employees	Contractors Employees	Titleholders Employees	Contractors Employees	Titleholders Employees	Contractors Employees	Titleholders Employees	Contractors Employees	Titleholders Employees	Contractors Employees
EMPLOYED BY OPERATORS									
27	44	22	102	13	10	15	15	8	8
								Total ..	264
EMPLOYED BY GOVERNMENT AGENCIES									
Technical Personnel 11	..	Other 14	..	..	..	..	..	..	Total 25
38	44	36	102	13	10	15	15	8	8
									Total 289

Regular accident statistics have been compiled only in respect of drilling operations. They are detailed in the following Table J:—

Table J

DETAILED CLASSIFICATION OF ACCIDENTS
(All Lost Time)

Nature of Injuries	Occupation					Injured Member									Agency of Injury					
	Toolpushers	Drillers, &c.	Floormen and Derrickmen	Miscellaneous	Total	Fingers	Hands	Arms	Toes	Feet	Legs	Head	Body	Total	Moving Machinery	Using Tools	Handling Drillpipe, &c.	Falling Objects	Miscellaneous	Total
Contusions and Abrasions ..	..	..	3	1	4	..	..	..	..	..	1	..	2	3	..	1	1	..	2	4
Cuts and Lacerations ..	1	..	3	..	4	1	1	1	..	1	1	1	..	6	..	2	1	..	2	5
Fractures	..	..	2	1	3	2	..	..	..	..	..	..	..	2	..	..	2	..	..	2
Burns	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	1	..	8	2	11	3	1	1	..	1	2	1	2	11	..	3	4	..	4	11

No fatal or very serious accidents were recorded.

PART 7—LEGISLATION AND INSTRUCTIONS ISSUED TO OPERATORS

There were no changes in the legislation governing the industry, *"The Petroleum Acts,* 1923 *to* 1958," during the year. A minor change was made to the instructions issued to operators stating the correct sample requirements of the Commonwealth subsidised wells. The instructions with this correction were re-issued to all operators.

PART 8—GENERAL SURVEY OF INDUSTRY

The overseas interest in Queensland's oil potential which was the characteristic of 1959 has been more than maintained in 1960, by very large expenditures by American "Independents" in Queensland.

The estimated expenditure by all companies in oil exploration in Queensland in 1959 was £450,000. In 1960 it was £1,900,000, and in 1961 based on proposed programmes it should be between four and five million.

As at the end of the year, with the exception of the greater part of the Barrier Reef the whole of the State was held under title. The seven P.P.P.'s were held by five interests (one interest holding three titles). In respect of the authorities, due to joint interests, these twenty-four are actually held by fifteen separate groups of interests. Eleven of these authorities comprising somewhat less than half the total area of the State were held by solely overseas interests, eight comprising not quite a third of the State were held jointly by overseas and Australian interests whilst the remaining five authorities and all the P.P.P.'s comprising a little less than a quarter of the State's area are held solely by Australian interests.

The dry wells at Betoota, Cooroorah, The Overflow, Corfield, Ooroonoo, Latemore and Latemore East, supplied considerable data which has permitted the re-interpretation of much of the knowledge on our sedimentary basins, particularly the Great Artesian Basin. The promise of potential gas fields from the Timbury Hills No. 2, Pickanjinnie No. 1

and Cabawin wells has given tremendous hope for the future. The footage of wells drilled during the year, though not a record, approached with a total of 47,030 ft. the record of 1955. However, the 1960 wells were infinitely better located, and showed some success as against the negligible results of 1955. The great increase in seismic prospecting gave promise of many well sites in 1961.

The prospective use in 1961 of the gas from A.A.O. No. 4 (Hospital Hill) and A.A.O. Timbury Hills No. 2 to operate gas engines at the Roma Town Council power house is a development of importance that could be a lead to future utilisation of gas for power.

Undoubtedly the highlights of the year were the testing of the 6.25 m.m.c.f. per day well at Pickanjinnie No. 1 and the discovery early in December of high pressure petroliferous gas at 9935 feet in Cabawin No. 1.

The testing of Cabawin No. 1 in 1961 is now awaited with intense interest.

If the rates of expenditure continue, with increased geological and geophysical data obtained and better siting of wells, we should in 1961 be nearer to our goal of commercial oil.

SECTION IV—EMPLOYMENT

The average number of men employed during the year in metalliferous mining operations was 7,062, an increase of 34 compared with the previous year. Mount Isa Mines Ltd. and Mount Morgan Ltd. both recorded increased employment but this was largely offset by decreases on small mines in the Charters Towers and Southern Divisions.

Of the total, 2,242 were engaged in mines and 4,820 in connection with the treatment of ore in mills, smelters, cyanide plants and other works on the surface. The average number of persons employed in quarries gazetted under the Mines Regulation Acts and clay pits was 408, a decrease of 6 compared with the previous year. The number of persons employed in connection with sewerage construction under the Mines Regulation Acts increased by 511 to 1,649; the bulk of this increase occurred in the Southern Division.

NUMBER OF MEN EMPLOYED IN CONNECTION WITH MINES, MILLS, TREATMENT WORKS, QUARRIES, AND SEWERS UNDER CONSTRUCTION, UNDER THE MINES REGULATION ACTS.

Classification	Southern Division	Central Division	Charters Towers Division	Northern Division	North-West Division	Total State
Mines	106	478	41	279	1,268	2,242
Mills	103	170	16	85	348	722
Smelting and Metallurgical Works	Nil	92	Nil	Nil	474	566
Workshops	58	413	Nil	70	827	1,368
Miscellaneous on Surface	97	233	Nil	192	1,642	2,164
Total—1960	364	1,386	127	626	4,559	7,062
1959	394	1,327	182	588	4,537	7,028
Quarries (including Clay Pits)	224	94	57	33	Nil	408
Sewers (under construction)	1,269	185	74	97	24	1,649

SECTION V—ACCIDENTS AND SAFETY

Statistical tables and data contained in this section include:—

Table 1—Classification of fatal and serious accidents reported under section 28 of the Mines Regulation Acts (over 14 days' disablement).

Table 2—Comparative table of accidents in metalliferous mines, mills, smelters, and other surface works for the past ten years, and total accidents recorded since 1879, classified as to cause (over 14 days' disablement).

Table 3—Classification of accidents (over 14 days' disablement) in sewers under construction.

Metalliferous Mines.—During the year 1960 a total of 754 lost-time accidents occurred in the metalliferous mining industry in the State. Three fatal accidents are included in this number. Of the total accidents 189 (including fatal accidents) involved more than 14 days' disablement.

Fatal Accidents.—Three fatal accidents occurred in connection with metalliferous mining operations during the year.

The first occurred at the *Mount Morgan Ltd.* mine on the 2nd February, 1960, when William Raymond Berry, a pipe fitter, fell from the No. 3 to No. 4 bench and sustained fatal injuries. It appears that Berry was installing air and water lines close to the edge of No. 3 bench when his wrench slipped and Berry overbalanced and fell to No. 4 bench.

The second fatal accident occurred on the 14th October, 1960, at the copper smelter of Mount Isa Mines Ltd. Ronald Glen Davies, an employee of a construction company, was assisting in the erection of a 60-ton overhead travelling crane and it seems that while he was using a pinch bar to help position an end tie the latter moved unexpectedly causing Davies to overbalance and fall to the ground, sustaining fatal injuries.

The third fatal accident occurred underground at the No. 13 level of the *Mount Isa* mine of Mount Isa Mines Ltd. on the 24th October, 1960. Marton Rozek, who was acting as brakeman on an electric locomotive was killed when explosives lying on the track were run over and exploded by the locomotive. The explosives had fallen unnoticed from a supply car which had passed that point a short time previously.

Statutory inquiries into the cause and nature of the first and third abovementioned fatalities were completed during the year. In addition two inquiries were held in the Northern Division; one in respect of a fatal accident which occurred in that Division on the 30th November, 1959, and the other into the foundering, without personal injury, of the dredge of Tableland Tin Dredging N.L. on the night of 24th/25th January, 1960.

Details of the inquiries appear at Section VII in the reports of the Inspectors of the Central and North Western and Northern Divisions.

Death rate.—The death rate per 1,000 men employed in metalliferous mining for the year 1960 and the previous year is as follows:—

——	1960	1959
Metalliferous mines	0·35	1·40
Mills, smelters, and other surface works	0·77	..
All mines, mills and works	0·42	0·43

The total number of lost-time accidents (involving at least one day's disablement) was 754 of which 240 occurred underground, and 514 at mills, smelters and other surface works. 52.1 per cent. of the underground accidents occurred to machinemen and facemen, 11.7 per cent. to miscellaneous workers, 11.3 per cent. to boggers and truckers and 8.3 per cent. to shaftmen and timbermen. Of the surface accidents,

19.7 per cent. occurred in mills, 19.1 per cent. in workshops, 17.5 per cent. in smelters and 33.6 per cent. to miscellaneous workers.

Sewers Under Construction.—A total of 82 accidents involving more than 14 days' disablement were reported; there were no fatal accidents.

One statutory inquiry was held at Rockhampton into a fatal accident which occurred there on 23rd December, 1959. Details are contained in the report of the Inspector of Mines, Central Division, at Section VII.

Quarries.—Only one accident involving more than 14 days' disablement was reported. There were no fatal accidents.

Table 1

QUEENSLAND 1960

METALLIFEROUS MINES

DEATHS AND INJURIES—MINES, MILLS, &C.

Fatal and serious injuries reported under section 28. (Over 14 days' disablement)

——	Killed	Seriously Injured	Number of Persons Employed	Percentage Casualties
1. Below Ground—				
Accidental explosion and blasting accidents (below ground) (detailed on back or ip attached)	1	..	..	..
Explosions of gas ..	..	1	..	..
Falls of ground ..	..	10	..	..
Falling down shafts ..	..	1	..	..
Materials falling down shafts	..	..	..	..
Other shaft accidents ..	..	..	..	..
Ladder accidents (below ground)	..	1	..	..
Accidents in winzes and passes	..	..	..	..
Machinery accidents (below ground) ..	..	14	..	..
Falls from staging, &c. (below ground) ..	..	..	..	..
Truck and wagon accidents (below ground)	..	8	..	..
Miscellaneous (below ground)	1	15	..	..
Total	2	50	1,891	2·75
2. Above Ground—				
Machinery accidents (machinery connected with mine only) ..	..	16	..	..
Miscellaneous (at brace, pit-bank, &c., in connection with operations about the mine)	..	58	..	..
Total	..	74	3,880	1·91
3. Accidents in batteries, ore dressing, smelting, and other metallurgical works	1	62	..	..
Total .. .	1	62	1,291	4·80
Grand Total ..	3	186	7,062	2·68

Table 2

METALLIFEROUS MINES AND ORE REDUCTION WORKS, ETC., QUEENSLAND

TABLE SHOWING NUMBER OF PEOPLE KILLED AND INJURED—1879 TO 1960

Causes of Accidents	Classified as to Cause of Accident																							
	1879 to 1950		1951		1952		1953		1954		1955		1956		1957		1958		1959		1960		Total	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Ladder Accidents	17	93	..	..	..	..	..	1	..	1	..	3	..	3	..	1	..	1	..	1	..	1	17	105
Falling down Shafts	127	109	..	2	..	..	..	4	..	..	..	..	..	..	..	..	1	..	..	1	..	1	128	117
Materials Falling, &c.	52	219	..	..	..	..	..	..	..	..	1	1	..	..	1	4	..	..	..	..	..	..	54	224
Gases in Shafts and Winzes ..	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	9	..
Other Shaft Accidents	50	320	..	..	..	..	..	..	..	3	..	2	..	2	..	..	..	..	1	..	..	..	51	327
Accidents in Passes and Winzes ..	21	159	..	..	1	2	2	6	1	7	..	1	..	3	..	..	1	..	..	..	..	..	26	178
Falls of Earth and Rock ..	268	1,198	..	10	1	7	1	6	..	19	..	13	2	7	..	12	..	11	1	12	..	10	273	1,305
Accidental explosions and blasting Accidents	124	453	..	1	..	3	..	1	2	2	..	..	..	3	1	..	..	5	1	2	1	..	129	470
Machinery Accidents	27	354	..	8	..	8	..	11	..	20	..	9	..	8	..	2	..	8	..	12	..	14	27	454
Explosions of Gas..	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	2	6
Falls from Brace Staging, &c. ..	12	145	..	..	..	..	..	2	..	..	..	..	1	..	..	1	..	1	..	..	..	..	13	149
Wagon Accidents	10	332	1	5	..	4	..	11	..	14	1	9	3	3	..	11	..	10	..	1	..	8	15	408
Inundation of Water	8	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	2
Miscellaneous	52	2,333	..	30	..	51	1	42	..	32	..	53	..	29	..	48	..	38	..	47	1	15	54	2,718
Surface Works	56	2,075	..	118	1	124	1	155	3	156	1	128	3	158	1	136	3	129	..	140	1	136	70	3,455
Total { Killed	834	..	1	..	3	..	5	..	6	..	3	..	9	..	3	..	6	..	3	..	3	..	876	..
Total { Injured	..	7,796	..	174	..	199	..	239	..	254	..	219	..	216	..	215	..	204	..	216	..	186	..	9,918

Table 3

QUEENSLAND, 1960

SEWERS UNDER CONSTRUCTION

ACCIDENTS CAUSING MORE THAN 14 DAYS' DISABLEMENT

Underground and in Trenches	Killed	Injured	Surface	Killed	Injured
Falls of earth and rock	..	11	Machinery accidents	..	1
Slipping and falling	..	6	Slipping and falling	..	3
Dermatitis and septic	..	4	Handling materials	..	9
Handling timber	..	8	Handling timber	..	4
Explosives and blasting	..	..	Dermatitis and septic	..	1
Miscellaneous	..	21	Miscellaneous	..	14
Total	..	50	Total	..	32

Grand total—Killed, Nil; Injured, 82.

SECTION VI—GENERAL

Particular attention is drawn to the report of the activities of the drilling branch of the Department as detailed in the reports of the Assistant State Mining Engineer and the Boring and Mechanical Superintendent in Section VII.

The annual reports of Inspectors, including the Northern Electrical Inspector, are attached in Section VII. These reports give details of the observance of the Mines Regulation Acts and mining progress in their respective divisions.

STAFF

Staff location at the close of the year was as follows:—Inspectors of Mines—J. O. Jones and W. L. Stapleton, Brisbane; O. Andersen, Rockhampton; J. G. Banks, Charters Towers; G. S. Naumoff and G. K. McLellan, Herberton; A. J. Saunders and G. S. T. Robertson, Mount Isa. Electrical Inspectors of Mines—J. Newborough, Brisbane; G. P. Chadwick, Rockhampton.

HEALTH

Following application by the Australian Workers' Union of Employees and other Industrial Unions for variations of the Mount Isa Mines Ltd. award, the Industrial Court in December, 1959, appointed Dr. E. M. Rathus, Director of Industrial Medicine, to "Investigate and report to the said court on all aspects of the effects on the health and employment of employees of Mount Isa Mines Limited of mining for lead and the smelting of lead or any association with lead by those employees in the course of their employment".

Dr. Rathus's report was published in the *Queensland Government Gazette,* No. 104, dated the 1st August, 1960. The fact that Mount Isa Mines Ltd. was already giving attention to several matters upon which Dr. Rathus made recommendations in no way detracts from the value of the report to the company. To other mining concerns and those organisations concerned with the health of the mining community, the report is earnestly commended.

During the year Mount Isa Mines Ltd. completed the installation of dust collection equipment at the mill, while in the lead smelter a 12,000 c.f.m. "Rotoclone" and ducting were installed at the screening and crushing section of the sinter plant and two 16,000 c.f.m. "Rotoclones" at the D-L discharges. All roofing over conveyor galleries and part of the sinter plant roof were removed to improve ventilation. In the blast furnace section an additional fume removal fan was installed and the hoods on No. 3 furnace modified. Roads in the mill and lead smelter were bitumised or concreted, the cabins of overhead cranes and crib-rooms were air-conditioned and additional washing facilities were provided. Regular lead-in-air sampling was instituted.

The Lead Board met at Mount Isa on four occasions and examined twenty-four men of whom eight were certified as suffering from lead poisoning.

At Mary Kathleen Uranium Ltd. a check radiation survey at the mine and treatment plant was undertaken; also, a series of biological tests of selected personnel was instituted in co-operation with the Department of Health and Home Affairs.

LEGISLATION

There were no amendments to the Mines Regulation Acts during 1960.

PROSECUTIONS

Three prosecutions, all in respect of breaches of Rule 55 (*b*)—boring in the vicinity of a butt containing explosive—were successfully instituted during the year.

WINDING ROPES

In accordance with the provisions of the Acts, the regular testing of winding ropes was given careful attention by Inspectors of Mines, and the following table gives particulars of the work done during the year with the testing machines at the various centres:—

TABLE OF WINDING ROPE TESTS

Testing Centre	Number of Tests	Number Condemned
Rockhampton	21	3
Charters Towers	28	Nil
Total	49	3

MINE MANAGERS', MINE SURVEYORS', MINE ELECTRICIANS' AND DEPUTIES' CERTIFICATES AND WINDING LICENSES.

During the year the Board of Examiners granted three first-class certificates of competency as mine managers (metalliferous mines), and, in connection with coal mines, six first-class certificates of competency and eleven second-class certificates of competency as mine managers were granted. The number of certificates of competency and service granted by the Board of Examiners for mine managers up to 31st December, 1960, is shown in the following table:—

	First Class				Second Class			
	Competency		Service		Competency		Service	
	Metalliferous	Coal	Metalliferous	Coal	Metalliferous	Coal	Metalliferous	Coal
In lieu of Certificates held under "*The Mining Act of* 1898"	17	4	104	13	2	3	..	..
Certificates of service granted to 1st July, 1912	..	..	164	57	..	..	264	63
Certificates of Competency granted from 1st May, 1911, to 31st December, 1959	137	121	..	..	64	265	..	..
Certificates of Competency granted during year ended 31st December, 1960	3	6	..	..	..	11	..	..
Total number granted	157	131	268	70	66	279	264	63

The annual examination for certificates of competency as mine managers (first and second-class), mine surveyors, and mine electricians was held, as usual, in December. The Board arranged for a number of examinations during the year for persons desiring to qualify as deputies in collieries. Examinations, including practical demonstrations of gas testing, were held at various centres in the State and 17 certificates as deputy were granted.

One mine surveyors' certificate of competency was granted during the year. The total number of mine surveyors' certificates granted by the Board to 31st December, 1960, was 47.

One mine electricians' certificate of competency was granted during the year. The total number of mine electricians' certificates granted by the Board to 31st December, 1960, was 69, of which 56 were certificates of competency and 13 certificates of service.

The Board appointed to examine candidates desirous of obtaining winding licenses arranged for examinations to be held during the year as required. The total number of winding licenses granted during the year was, for steam or air winding, 8 for winding engines worked by electrical power, 25, and oil-driven winding engines, 23, thirteen certificates were endorsed for the winding of men.

STATE MINING OPERATIONS

The State Treatment Works at Irvinebank milled 7,184 tons of ore for a yield of 92 tons of tin concentrates valued at £48,442. The tonnage of ore milled was slightly more than in 1959 but the amount of concentrates produced and their value were some 10 per cent. less due to the fact that much of the ore treated was from old dumps; only 26.5 per cent. of the total represented newly mined ore. A secondary crusher was installed during the year.

The Venus Battery at Charters Towers treated 768 tons of ore and 290 tons of tailings. One hundred and forty-one tons of gold ore were milled for a recovery of 105.6 oz. of gold. Ore from the New Queen mine (silver-lead) produced 210.7 oz. of gold, 11,999 oz. of silver and 49.5 tons of lead. Three concentrating tables were fitted with new linoleum and repairs to the settling pits were completed.

The Government Assay Office at Cloncurry received a record number, 1,471 of samples and completed 4,589 assays, in which copper and gold determinations predominated.

Departmental drilling operations in connection with coal exploration were carried out on the Ipswich, Rosewood, Warwick, Burrum and Bowen coal fields and totalled 69,646 feet. In addition to coal exploration some 14,835 feet were drilled mainly in connection with clay deposits in the Brisbane area.

SOUTHERN DIVISION

Report of Mr. W. L. Stapleton

The following report on the administration of the Mines Regulation Acts and on the progress of mining in the Southern Division for the year ended 31st December, 1960, is submitted.

GENERAL

The principal mining activity in the Southern Inspection Division continued to be in respect of beach sand deposits. The price of rutile did not improve during the year and, at times, the spot price fell below £25 per ton; the price of zircon averaged £12 per ton over the year.

On account of the continuation of forward contracts the major producers were able to maintain their outputs at almost the same level as during 1959.

Manganese mining, which had developed in the Gympie area during the previous two years, met a severe set-back at the end of April when the Broken Hill Proprietary Co. Ltd. suspended its purchases of that ore on account of the transfer of the site of its ferro-manganese production from Newcastle.

About the middle of the year interest in lead mining was aroused in the Gympie area also; unfortunately this interest was short-lived. In the Cunnamulla district in 1960 there was a revival of opal mining but no notable "finds" were made. In the Warwick and Gympie districts several attempts were made to re-open old gold mines, but results were not encouraging. Towards the end of the year the exploration of a gold reef in the Biggenden district was begun. In the Stanthorpe district there was the usual small-scale activity in respect of alluvial tin ore.

Staff.—Two Inspectors were attached to the Division, namely, Messrs. J. O. Jones and W. L. Stapleton.

MINES REGULATION ACTS

Inspections of mines were made at regular intervals, and it is pleasing to report that the various managers and owners endeavoured to comply with the provisions of the Mines Regulation Acts.

Health and Sanitation.—No cases of silicosis or other industrial diseases were reported.

Fencing and Protection.—The provisions of the Acts in regard to these matters were well observed in operating mines.

Ventilation.—Conditions in this connection were satisfactory, as the underground mines in the Division are small and natural ventilation maintains reasonable conditions of comfort.

Ladders and Travelling Ways.—Minor breaches of the provisions of the Acts in this connection were observed. These breaches were readily rectified by the management.

Explosives.—The provisions of the Acts in this regard were satisfactorily complied with. No complaint in connection with defective explosives was received.

Accidents.—Lost time accidents reported in the division totalled 58 of which number 5 involved more than 14 days disablement.

Inquiries.—The nature of the accidents reported did not warrant the holding of inquiries under section 31 of the Mines Regulation Acts.

SEWERS

Inspections were made at regular intervals of sewerage under construction. Minor breaches of the Acts were noted, but these were immediately rectified on being brought to the notice of the registered foreman.

Health and Sanitation.—The health of the men engaged in the industry appears to have been good. No cases of employees suffering from industrial diseases were reported.

Accidents.—Lost-time accidents reported totalled 158, of which number 72 involved more than 14 days disablement.

Details of Sewer Excavation.—Major sewer excavations were carried out in Brisbane, Inala, Redcliffe, Toowoomba, Ipswich, Roma and St. George. The footage of excavation completed totalled 786,435 lineal feet comprising 770,235 ft. of trenching, 14,395 ft. of driving and 1,805 ft. of sinking.

QUARRIES

Regular inspections were made of quarries gazetted under the Acts, and the provisions generally have been well observed. The dust nuisance, from screening plants in particular, has been reduced but not yet eliminated.

Health and Sanitation.—The health of the men engaged in the industry appears to have been good. No cases of employees suffering from industrial diseases were reported.

Accidents.—A total of three accidents was reported; none involved more than 14 days disablement.

EMPLOYMENT

The average number of men employed throughout the Division totalled 1,857, of which number 364 were employed in mines, 1,269 in connection with sewerage construction, 160 in quarries and 64 in connection with clay production.

Special Reports.—Considerable time was spent in compiling special reports and statistics for the State Mining Engineer.

MACHINERY INSTALLATIONS

Associated Minerals Consolidated Ltd. installed a new grinding mill with separation and collection equipment in their Southport treatment works. Dust collection apparatus was fitted to the mineral dryer exhaust.

At *The University of Queensland's Experimental Mine* at Indooroopilly a double-drum winder powered by a 25 h.p. electric motor was commissioned while in the new pilot mill a jaw crusher, gyratory crusher and a wide range of semi-portable concentration and separation equipment was installed.

DEVELOPMENT AND PRODUCTION

Rutile, Zircon, &c.

*The production of heavy mineral concentrates totalled 32,190 tons comprising 17,029 tons of rutile concentrates, 15,145 tons of zircon concentrates and 116 tons of monazite concentrates.

Titanium and Zirconium Industries Pty. Limited on North Stradbroke Island treated 2,696,200 cu. yd. of sand with their dredges "Titania" and "Zirconia" for a return of 13,535 tons of rutile concentrates, 8,193 tons of zircon concentrates and 52 tons of monazite concentrates. Exploratory drilling on North Stradbroke Island totalled 15,885 ft.

Mineral Deposits Pty. Limited, Southport, treated 350,500 cu. yd. of sand for a return of 1,370 tons of rutile concentrates and 4,067 tons of zircon concentrates.* Developmental and test work on a new type of primary concentrator for use in connection with low-grade deposits were continued during the year. Exploratory drilling on the Gold Coast totalled 1,659 ft.

Associated Minerals Consolidated Limited, Southport, treated 7,735 cu. yd. of sand mined as beach scraping and recovered 1,172 tons of rutile concentrates and 986 tons of zircon concentrates.

Titanium Corporation of Australia Pty. Limited, Tewantin, treated 11,465 tons of sands, mainly beach scrapings for a return of 916 tons of rutile concentrates, 1,887 tons of zircon concentrates and 67 tons of monazite concentrates.

* In addition, 3,964 tons of rutile and 1,182 tons of zircon concentrates were produced from Commonwealth lands within the Queensland border.

Rutile Sands Limited, Currumbin, again operated on a very restricted basis owing to the low price offered for rutile. One thousand one hundred and ten cu. yd. of concentrates obtained from beach scraping and the dry mining of mineral lease No. 526 at Tallebudgera were stockpiled. From limited operation of the Currumbin treatment plant in June, November and December 36 tons of rutile concentrates and 12 tons of zircon concentrates were produced.

Gold.—Exploratory work was carried out in the Warwick, Gympie and Biggenden districts.

Tin.—Production of tin concentrates in the Stanthorpe districts totalled 7 tons, valued at £4,665.

Opal.—In the Quilpie district work was continued at the *Hayricks Black Opal* mine while, during the latter half of the year, more than usual activity was shown in the Cunnamulla district; however, no notable finds were reported.

Manganese.—In the Gympie district Sanders Bros. produced 3,200 tons of manganese valued at £51,200; the decision of the Broken Hill Pty. Co. Limited not to accept manganese at Newcastle has virtually stopped manganese mining in the State until such time as an alternative market can be found.

Limestone.—A total of 17,041 cu. yd. of limestone, valued at £22,380 was produced from the quarries of A.C.F. and Shirleys Fertilizers Ltd. at Gore, Tamaree Limeworks at Curra, near Gympie and of the Marberete Co. Pty. Ltd. at Elbow Valley and Limestone.

Quarried Stone.—Production from quarries gazetted under The Mines Regulation Acts (Consolidated) as applied to quarries totalled 488,009 cu. yd. valued at £393,561. Freestone mined in the Gatton district for building and ornamental purposes is included in these figures.

CENTRAL DIVISION

Report of Mr. O. Andersen

The following report is submitted for the year ending December, 1960, on the administration of the Mines Regulation Acts and on mining activity and prospecting.

General.—The major producers of gold were Mt. Morgan Ltd. and Golden Plateau N.L. Mt. Morgan Ltd. was the only substantial producer of copper. The newer mines, Molybdenite Mining (Australia) Ltd. of Mt. Perry and the Defiance Mines Pty. Ltd. at Cordalba were mainly engaged on preparation work and prospecting.

In August a conference of the Australian Institute of Mining and Metallurgy was held at Mt. Morgan. Delegates to the conference represented all states and many interesting papers were read on mining practice, particularly applicable to open cut operations.

Health and Sanitation.—Health and sanitation conditions were generally good.

Accidents.—One fatal accident occurred at the *Mt. Morgan* Mine on the 7th February. Edward William Raymond Berry, employed as a pipe fitter, sustained fatal injuries when he fell from No. 3 to No. 4 bench. Details are given under Inquiries.

The accidents occurring during the year were as follows:—Fatal, 1; over 14 days disablement, 74; all accidents, 185.

Inquiries.—An Inquiry was held at the Mt. Morgan Court House before Mr. N. F. T. Applin, Warden, into the circumstances of the fatality occurring on the 7th February. Evidence disclosed that Edward William Raymond Berry, employed as a pipe fitter, was installing air and water lines at No. 3 bench of the Mt. Morgan mine Open-cut. At a point close to the face he was tightening a valve connection with a pair of stilsons. It is apparent that the wrench slipped while he was exerting pressure on it, possibly downwards, and the sudden release of the wrench caused him to fall over the face.

The experienced miners found that the cause of the accident was due to the deceased falling over the face from three to four bench, due apparently to the slipping of the stilson wrench which he was using to tighten a valve at the edge of the face.

The following recommendation was made:—

> "It is recommended that men working on tightening of valves or pipelines within five feet of the face should wear safety belts."

The experienced miners were George Ferguson, John Francis, John McHugh and Cornelius Fogarty.

Prosecutions.—Nil.

Ladder and Travelling Ways were kept to the required standard.

Ventilation has been satisfactory.

Ropes.—Twenty-one ropes were tested. Three ropes were condemned. The deterioration of two of these ropes was due to the drying out of the core in storage prior to use. Care was not taken to keep the rope continually oiled during storage. It is considered that if the hemp core of wire ropes is allowed to dry out there appears to be no effective practical method of reintroducing oil to the dried out core. But the dry core will absorb moisture and cause internal corrosion of the wires. There is strong evidence of this having happened with the two ropes referred to.

Explosives.—There were no reports of defective explosives, fuse or detonators. There has been no premature explosion due to hot ground for two years which indicates the precautions now taken for blasting in hot ground have proved most effective.

The use of ammonium nitrate-sugar/molasses slurries at Mount Morgan has totally replaced ammonium nitrate fuel oil mixtures. It has proved effective and economical.

The use of ammonium nitrate in these mixtures has also been used at the Harbour Board Quarry, Mackay.

QUARRIES AND CLAY MINES

The Mines Regulation Acts were generally well observed. Two further quarries were gazetted under the Mines Regulation Acts as Applied to Quarries.

Health and Sanitation.—Were generally satisfactory and attention was continually given to possible dust hazards.

Explosives.—No defective explosives were reported and no accidents occurred with the use of explosives.

At the Harbour Board Quarry, Mackay experiments were made with ammonium nitrate–fuel oil and ammonium nitrate–sugar/molasses slurries.

Accidents and Inquiries.—No serious accidents were reported. Two accidents of a minor nature were reported. No inquiries were held.

SEWERS

Sewerage schemes were in operation at Mackay, Rockhampton, Maryborough, Bundaberg and Winton and were completed in Longreach and Barcaldine.

Accidents.—One serious accident involving a loss of time of over fourteen days was reported.

Inquiry.—An Inquiry was held into the circumstances of the accident that occurred in the Rockhampton Sewer on the 23rd December, 1959. The Inquiry was held before the Warden, Mr. N. F. T. Applin and four experienced miners at the Rockhampton Court House on 21st March and 1st April, 1960.

On the 23rd December two men, Trevor Rattenbury and the deceased, Brian Backhouse, were engaged in removing timber from a trench 22 ft. deep and 65 ft. long at Lion Creek Road. The sewerage piping had been laid. When the last set of timber was removed a side of the trench caved in completely burying Backhouse and partially burying Rattenbury. Brian Backhouse was killed. The two men had been standing at the bottom of the trench while the timber was being removed. The finding and recommendations of the experienced miners and of the Warden were as follows:—

What was the Nature of the Accident?

Death of Brian Backhouse in a sewerage trench at Wandal, Rockhampton, on the 23rd December, 1959, from asphxyia, due to suffocation, due to respiratory failure from pressure of earth on chest when buried.

What was the Cause of the Accident?

Fall of earth in sewerage trench in an untimbered section.

Recommendations as Appear to be Necessary for the Prevention of Similar Accidents.

Experienced and competent men should be employed on the job to ensure safe working and to see that the requirements of the Acts are complied with.

WARDEN'S FINDINGS:

Whilst I am not prepared to find that the foreman was negligent I consider that under section 15 of the Act, he is the person responsible for the control and management of the work, and should ensure that the workings are safe, and that employees are properly protected. Having this responsibility, he should make certain that his gangers are experienced men and enforce his directions as to safety in all respects, particularly with regard to placing and removing timber.

I consider that Ganger Lewis was either inexperienced or careless in allowing the deceased and Rattenbury to remove the timber in the way they did. Admittedly, it was thought that the ground was safe, but whilst it is easy to be wise after an accident, it is also too late. It does seem to me that Foreman Blanchfield left too much to Ganger Lewis.

I cannot stress too strongly that the foreman appointed is the person responsible and he should brook no interference with his responsibilities. If some person senior to him in the service of the employer considers he has greater knowledge, then that person should have himself appointed foreman with the responsibilities under the Act.

I desire also to stress the necessity of qualified men to supervise this dangerous work of removing timber, and of generally seeing that the provisions of the Act are complied with.

Some mention was made of a further subsequent fall of earth in which a man was seriously injured, and in view of the fact that an inquiry may be held into that accident also, I do not wish to make any comment on the circumstances, except to draw the employer's attention to the fact that this accident was not reported in accordance with the requirements of section 28 (1) and (2) of the Act.

MACHINERY INSTALLED

At Casuarina, the Central Queensland Salt Industries Ltd. have installed a new refinery consisting of crushers, centrifuges, dryers, distributing conveyors, bagging plant and salt press, &c. In addition a Harvest Conveyor has been installed.

EMPLOYMENT

1,665 men were employed as follows:—

Mines.—A total of 1,386 men were employed in mining comprising 373 underground, 754 at the surface and 259 in mills and metallurgical works.

Sewers.—185 men were employed.

Quarries.—51 men were employed.

Clay Mines.—43 men were employed.

FIELD WORK

The usual inspections and investigations were carried out, subsidy applications were dealt with and special reports were submitted on many matters. A number of specimens were received for identification and determination of mineral content. Advice was given on mining and treatment problems.

In addition, special investigations and reports were made outside the division on matters pertaining to Ukalunda, Collinsville State Mine and Mt. Isa Mines Ltd.

The prevalence of CO_2 gas at Collinsville and Mt. Isa Mines and hot ground at Mt. Isa Mines was especially reported on. An instrument was made for the detection of outbursts of CO_2 and instruments for the detection of CO_2 were under design and experiment as time permitted.

PROSPECTING

Extensive prospecting of the Mount Cannindah field was continued by Mt. Isa Exploration Ltd., now known as Capricornia Explorations Ltd. The results were sufficiently encouraging to warrant further investigation and drilling is continuing.

Holes were drilled to a total depth of 3,649 ft. The Authority to Prospect was enlarged to 1,120 sq. miles and includes Mt. Kroombit and Glassford Creek areas and three holes were drilled at Mt. Kroombit and one commenced at Glassford Creek.

At Mt. Morgan, Consolidated Zinc Corporation acquired two prospecting areas in the Mt. Morgan and Mt. Chalmers areas. Geologists have been examining the area. Mt. Morgan Ltd. have discontinued drilling of the Ajax Mine, Bajool. Mt. Morgan Ltd. have also inspected the Pinevale Copper Mine at Mackay.

At Mt. Perry, Molybdenite Australia Ltd. have continued prospecting for copper ore in the Mt. Perry district while the *Wonbah* mine was being re-equipped for production.

At the *Defiance* mine, Cordalba, prospecting of the *New Ideal* mine is being carried out and new headgear and mine equipment was installed.

At Cracow a Mines Department drill is drilling prospecting holes on the Golden Plateau N.L. leases.

GOLD PRODUCTION

Mt. Morgan Ltd.—The ore mined exceeded that of the previous year by 150,000 tons and totalled 957,775 tons. Waste removal was a little less at 3,586,161 tons.

946,300 tons of ore were treated for a recovery of 8,473.2 tons of blister copper containing 61,806.70 oz. gold, 8,392.91 tons of copper and 27,967.9 oz. silver, representing an increase of 697.7 tons of copper and 5,343 oz. silver. Gold dropped by 2,990 oz.

18,720 tons of pyrite valued at £56,160 was produced and 9,556 tons valued at £28,667 were sold.

At the *Golden Plateau N.L.* a total of 38,700 tons of ore was mined of which 33,298 tons was treated at the plant yielding 13,196.41 oz. of gold valued at £209,368 14s. 7d. and 15,650 oz. of silver valued at £6,213 17s. 2d.

Gold was also produced in small quantities in other fields. The Clermont district produced 36.41 oz., Gladstone 10 oz. 14 dwt., Mackay district 111.28 oz. and at Rockhampton 2.34 oz. gold.

CHROMITE

Prospecting Services operated the Tungamull Mine and supplied to Mt. Isa Mines Ltd. 430 tons of chromite valued at £4,244 and 99.5 tons to southern buyers valued at £696 10s.

Some short jackhammer holes were drilled to test for ore suitable to southern markets.

SALT

At Casuarina Island, Central Queensland, Salt Industries Ltd. harvested 9,500 tons of salt valued at £27,708 6s. 8d. for the harvest season, October, 1959, to February, 1960. A new season started in October, 1960, and will end in February, 1961.

During the year the construction of the Refinery was completed and put into operation. The Refinery has a capacity of 6 tons per hour and produces several grades of salt.

MOLYBDENITE

At Mt. Perry work on reconditioning the shaft at the Wonbah Mine continued. A new 55 ft. high headframe has been erected. The shaft collar was cemented and old timber replaced to a depth of 35 ft. and below that depth, sets of timber were replaced where necessary. A hoisting engine and generating plant were installed.

No molybdenite has been produced.

CHARTERS TOWERS DIVISION

Report of Mr. J. G. Banks

The following report is submitted on the administration of the Mines Regulation Acts and mining activity in the Charters Towers Division.

GENERAL

Several companies have carried out prospecting and testing in their respective authority to prospect areas, i.e. Ravenswood and Kangaroo Hills area. Results in both areas were inconclusive and further testing in at least one area will be carried out.

While metal prices have maintained a fairly steady price there has been overall a slight decline in production due mainly to the decrease in the number of men in the field with little fresh interest being shown.

MINES REGULATION ACTS

These were well observed and there was not one prosecution for breaches of the Act.

Health and Sanitation.—The industry has maintained a high standard of health and no case of Miners' Phthisis or plumbism was reported.

Accidents.—Very few lost time accidents have been reported and these have been of a minor nature only.

Machinery Accidents.—Nil.

Inquiries.—Nil.

Fencing and Protection.—Conditions satisfactory.

Ventilation.—This was satisfactory in working places.

Ladders and Travelling Ways.—Working conditions satisfactory.

Ropes.—Thirty-two ropes were tested and all found satisfactory.

Explosives.—No complaints were received from the users of explosives. Instructions issued to maintain safety standards were promptly carried out.

Mines Regulation Acts (Consolidated as applied to Quarries)

Health and Sanitation.—Good. It is pleasing to note the increase in the number of persons wearing protective clothing. One serious accident occurred when a box of detonators exploded during fuse preparation and capping operations. The victim was cut about the face and hands but no permanent injury resulted.

Inquiries.—Nil.

Mines Regulations Acts as Applied to Sewers

Sewer Excavation.—Work was carried out in Townsville, Bowen and Richmond.

Health and Sanitation.—Good.

Accidents.—No serious accidents were reported.

Explosives.—No complaints were received.

Inquiries.—Nil.

MACHINERY INSTALLATIONS

At the Black Jack Mine a treatment plant is being installed.

DEPARTMENTAL MACHINERY

There has not been a big demand for department machinery. While some plant has been on hire all the year other pumps and winches have been hired for short periods. The two compressors were railed to other divisions. Engines requiring attention have been overhauled.

EMPLOYMENT

As mentioned in the first paragraph there has been a decline in the number of men on production though the companies with prospecting authorities have maintained the activity on the field. Men employed in mining in this division is estimated at 127, a decline of 47 (N.B.—Intermittent workers, casual prospectors not included).

Sewer construction	74
Quarries	48
Clay Pits	9

PROSECUTIONS

No prosecutions for breaches under the Act were necessary.

SPECIAL REPORTS

Several applications for subsidy and road grants were dealt with; also a special report on the Ukalunda Gold Mine.

FIELD WORK

Mine inspections were carried out in the Charters Towers, Ravenswood, Kangaroo Hills, Ukalunda and Woolgar fields.

Sewer excavation inspections were made in the Townsville, Bowen, Richmond areas and quarries were inspected in the Townsville, Bohle, Calcium, Bowen, Clare and Richmond areas.

VENUS BATTERY

The Venus Battery, operated under lease by P. and J. Millican provided crushing and cyanidation facilities. During the year 768 tons of ore was crushed and 290 tons of tailings treated. Details of the recovery of gold and silver by amalgation and cyanidation also particulars of the 119.86 tons of lead-silver, gold concentrates are shown on the Warden's Tables. The *New Queen* mine continued to be the principal supplier. The balance of the crushing came from a number of small parcels. No ore was received from the *Black Jack* gold mine. A serious delay in the delivery of cyanide and to some extent a shortage of water at the end of the year caused a big drop in the tons treated by cyanidation. General maintenance work was carried on during the year. New linoleum has been fitted to the three concentrating tables. Repairs were completed to the old tailing storage pits which are now in use.

DEVELOPMENT AND PRODUCTION

Development has been largely in the hands of prospectors, departmental drilling at the *Black Jack* mine, North Broken Hill, drilling at Ravenswood and Carpentaria Exploration Coy. testing of the alluvial tin deposits in the Kangaroo Hills Field. While prospectors have been handicapped by the dry weather during the year, one interesting find was made in the Running River area. Mr. Lyall Wilcox has opened up a tin deposit which promises to be a good producer. The Mines Department completed its surface testing of the *Black Jack* gold mine; the results did not call for any further holes. The drilling plant was transferred to Liontown and recommenced drilling in this area in the knowledge of the work carried out by the Bureau of Mineral Resources in their Geophysical Survey.

CHARTERS TOWERS MINERAL FIELD

Gold

While the recorded production totalling 364.81 fine oz. showed a drop of 216.795 fine oz. the final returns from shipped concentrates, if available, would probably have changed the overall picture.

A shortage of cyanide is reflected in the reduced tonnage of tailings treated from 437 to 290 tons. This also reduced the amount of gold and silver won.

Silver Lead

New Queen.—During the year No. 1 West Shaft was sunk a further 17 ft., total depth 134 ft. Driving east from this shaft at 117 ft.—No. 2 Level was extended a further 24 ft., total 120 ft. Stoping above this level produced most of the ore won besides a small block above No. 1 Level West. There is very little evidence of sulphides in the lower workings, widths remain about the same, that is, lenses up to 3 ft. The gold content appears to be lower at the west end of the lease than at the east end. Silver and lead values vary but average about the same.

Prospecting.—A number of small shows have been operated during the year but to date nothing of note has been reported.

Tin

G. Irlam and party have been active in the Stockyard-Tinvale area and erected a small three-head battery and later a heavy two-head mill in which they crushed stone and dumps from a number of mines including the *Morning Sun* and the *White Line.*

Ambrose Tin.—This the party took up as the *Second Last* and commenced a new shaft which reached a depth of 45 ft. at the end of the year. It is intended to deepen the shaft and later connect to the old workings in the Ambrose.

Copper

Limited work was carried out at the *Rio Tinto* and *Midas.*

RAVENSWOOD FIELD

Gold

The North Broken Hill Pty. Ltd. carried out geological work and tested an area known as *Barrabas* by diamond drilling. No mining of importance carried out. A small crushing of approximately 4.75 tons from the Kirk River returned 1.07 fine oz. 4.15 fine oz. of alluvial gold was also recorded.

WOOLGAR FIELD

Gold

Work was continued at the *Austral* and *Aurora* gold mines.

KANGAROO HILLS FIELD

Tin

Total crushings showed an increase of 207.3 tons of ore crushed to 534.45 tons. While tin recovery from batteries increased by 4.6 tons to 34.29 tons. Alluvial tin produced totalled 5.64 tons, a decrease of 1.05 tons. The overall value of returns to hand was £15,969.

The main producers were the *Sardine Peak* tin mine (P. Jones and Sons) and the *Sardine* tin mine (J. and W. Reddie). In addition, the following mines were worked during the year:—*Shrimp, Patricia, Doreen, Dream, Northumberland, Firefly, Goanna, Hector, Trial Cat Extended, Venus, Sunrise, Dianna, Pope, Barbara, Shearer* and *El Dorado.*

UKALUNDA FIELD

Gold

At the *Ukalunda* gold mine some 100 ft. of driving was completed but the quantity of "wash" treated and the amount of gold recovered is not known.

At Mount Lauraine a small treatment plant was erected and material from earlier development was treated.

Copper

A treatment plant, including a leaching vat were installed but, owing to poor recovery, operations were suspended.

NORTH-WEST DIVISION

Report of Mr. A. J. Saunders

The following report is submitted on the administration of the Mines Regulation Acts, and mining activity generally in the North-West Division during 1960.

GENERAL

Mount Isa Mines Ltd. continued their expansion programme and production tonnage surpassed that of the previous year, while the total value of production at slightly over £33 millions was more than £7 millions greater than the previous year.

Mary Kathleen Uranium Ltd. operations again were very successful financially, with their uranium production at approximately £6½ millions, representing a slight increase over the previous year.

A most important development during the year was the Government decision to proceed with the rehabilitation of the Collinsville-Mount Isa railway. The first stage of this project commenced during September, and during December it was announced that five additional contracts were to be called.

Broken Hill Pty. Ltd. continued their testing of the iron deposits at Constance Range.

Queensland Mines Ltd. ceased drilling on their uranium leases in this Division during the year.

Small copper mining operations were continued within the scope of a total quota of 650 tons copper per annum.

The Annual Conference of The Australasian Institute of Mining and Metallurgy which commenced at Mount Isa and Mary Kathleen during August was attended by a record number of delegates and was an outstanding success.

STAFF

Mr. G. H. Hutchinson commenced duty as an Inspector on the 4th April, since which time this Division has been maintained on a three Inspector basis. The Assistant State Mining Engineer, Mr. A. W. Norrie was in charge of this Division during the absence on leave of A. J. Saunders between the 26th April and the 14th June. During the year Messrs. G. S. Robertson and G. K. McLellan were transferred on exchange duties, Mr. McLellan leaving for the Northern Division on the 27th June, and Mr. Robertson commenced at Mount Isa on the 1st July.

THE MINES REGULATION ACTS

The Acts generally, were well observed, the exception as in previous years being in respect of those Rules relating to drilling near butts. There were three prosecutions for breaches of Rule 55 during the year, while five other instances investigated, two were awaiting Court hearing in the New Year.

Variations of Rules

(*a*) In one instance the Hon. the Minister in pursuance of Rule 26A of Part II of The Schedule to *"The Mines Regulation Acts,* 1910 *to* 1958," approved the installation of a small diesel engine underground at a small mine in the Ballara area.

(*b*) Paragraphs one and two of Sub-rule (*a*) of Rule 55 of Part II of such Schedule were suspended and variations approved in their stead in respect of the use of Lucana tamping rods at the Mount Isa mine of Mount Isa Mines Ltd., and also at the open-cut of Mary Kathleen Uranium Ltd.

(*c*) The third paragraph of Rule 18 of Part II of such Schedule was varied in respect of the ladderway to be installed in the Lawlor fan shaft of Mount Isa Mines Ltd.

HEALTH AND SANITATION

Conditions generally were satisfactory. The Lead Board met on four occasions, during which times a total of twenty-five cases were considered including some which were reconsidered.

The mobile X-ray unit operated in the Division during June.

Radiation Measurements.—A check survey was made at the mine and treatment plant of Mary Kathleen Uranium Ltd. during August and September, in addition to which the Company co-operated with this Department and the Department of Health and Home Affairs in instituting a series of biological tests of selected personnel.

At Mount Isa Mines Ltd. the provision of air conditioning of 60-ton crane cabins, installation of evaporative cooling at the copper smelter crib room, as well as modifications of the Cottrell system, all represented very desirable advances. In the milling section roads were bitumised or concreted, the flotation floor ventilation was improved, crib rooms were airconditioned and the ventilation system of the assay room was improved as also was the main rotoclone dust collecting system. Additional wash basins also were provided. Considerable modifications and additions were made to equipment at the lead smelter during the year. All concrete roads were fitted with permanent sprays, other roads were bitumised, the area to the North of the casting floor was concreted, surplus structures including conveyor gallery roofs were removed in order to eliminate dust collecting surfaces. The Company's Industrial Hygiene section performed regular "lead in air" tests, a 12,000 c.f.m. Rotoclone unit was installed at the screen-rolls portion of the sinter crushing and screening section, while two 16,000 c.f.m. Rotoclones were installed at the D-L discharge ends, and new sprays fitted at belt transfer points in the trackhopper section.

FENCING AND PROTECTION

Conditions generally were satisfactory. Attention again was directed towards the requirements concerning the wearing of safety belts and ropes by persons working in precipitous places.

VENTILATION

Conditions generally were satisfactory. The small operating mines in this Division are of shallow depth and natural ventilation generally is sufficient. At Mount Isa Mines Ltd. the quantity of air upcasted was increased 100,000 c.f.m. to 500,000 c.f.m. by the provision of two 50,000 c.f.m. fans at the surface. Then in December the quantity upcasted through AW84 shaft was increased to slightly over 1,000,000 c.f.m. by the provision of two 169 in. diameter fans at the surface. The change over from grizzlies to scrams also resulted in much better ventilation in the areas concerned.

Following comparative tests a combined water-compressed air type spray was standardised and its use extended considerably in scrams, crusher stations and ore pockets.

Dust counting on a routine basis by the Company was extended throughout the mine, while stripping of E21 airway proceeded for the purpose of improving the ventilation in the southern portion of the mine.

LADDERS AND TRAVELLING WAYS

Conditions generally were satisfactory, although in one instance it was necessary to require the realignment of a ladderway in a long rise. Cage rising was carried into practice in E21 airway during the year and proved very satisfactory.

An Alimak rise climber also was used in this rise and was very successful.

WINDING ROPES

Twenty-eight ropes for test were sent by Mount Isa Mines Ltd. to the Inspector of Mines at Charters Towers for testing, as a result of which none was condemned, but three were withdrawn from service for other reasons. In this latter connection discarded winding ropes of suitable size have found a ready use on underground scraper installations. Some research was done by Mount Isa Mines Ltd. on the electromagnetic testing of winding ropes.

EXPLOSIVES

Permits were issued for an explosives magazine and a detonator magazine in connection with contract construction of the East Leichhardt reservoir for Mary Kathleen Uranium Ltd., as well as one for an explosives distributing magazine to serve the open-cut mine of the Company, which also continued to make extensive use of AN mixtures in blasting operations.

A permit also was issued for an explosives magazine on No. 13 level of the Mount Isa mine of Mount Isa Mines Ltd. Arising from the occurrence of elevated ground temperatures in the 500 copper lode in this mine, a good deal of investigation has been made, and is continuing, concerning the use of explosives under such conditions. The action of water on the associated silica dolomites has presented an associated problem by the generation of CO_2 gas and investigations have been directed towards preventing, as far as practicable, the introduction of water to the area.

ACCIDENTS

Lost time accidents totalled 496, of which 174 occurred underground. Of the total accidents reported, there were 106 which resulted in over 14 days' lost time, including 2 fatal accidents. Of the accidents involving more than 14 days' lost time, 33 occurred underground.

The first fatal accident occurred at approximately 4 p.m. on the 14th October, 1960, when an employee of Messrs. Evans, Deakin Ltd., named Ronald Glen Davies was engaged in the positioning of an end tie for a new 60-ton overhead electrical travelling crane at Mount Isa Mines Ltd. copper smelter converter aisle extension, and it appears that while using a heavy pinch bar to move the tie, movement of the latter caused him to lose balance and fall 64 ft. to the ground. As a result of his injuries he died some five hours later in the Mount Isa Public Hospital.

The second fatal accident occurred at approximately 5.05 a.m. on the 24th October, 1960, when an acting brakeman named Marton Rozek received injuries as a result of an explosion of fracteur on No. 13 level main haulage of the Mount Isa mine of Mount Isa Mines Ltd. Shortly before the accident two underground employees had occasion to travel along a section of this main haulage for the purpose of delivering two canvas bags containing fracteur and one canvas bag containing fuses to a development job in the southern working. The three bags were being transported on the flat top of a supply car attached to an electric mule, when one of the bags containing approximately 40 lb. of fracteur fell unnoticed off the supply car and onto the main haulage. The ore train of 12 full Granby wagons drawn by an electric locomotive known as the "Underlander" then approached on its run towards the tipple, and although the driver saw fracteur lying on the line immediately ahead it was not possible for him to halt the train before the locomotive passed over the fracteur, some of which detonated when run over by the off rear wheel of the latter. The deceased who at that time was riding on the top rear of the locomotive, sustained serious injuries as a result of the explosion and expired shortly afterwards.

INQUIRIES

An inquiry under the provisions of section 31 of *"The Mines Regulation Acts,* 1910 *to* 1958," was held at Mount Isa on the 12th and 13th December, 1960, into the circumstances as described above, and which resulted in the death of Marton Rozek.

The finding of the four experienced miners was as follows:—

What was the Cause of the Accident?

An explosion of fracteur that had fallen from a flat-top service car drawn by a mule and had been run over by a locomotive.

Recommendations as Appearing Necessary for the Prevention of Similar Accidents

Fracteur bags should not contain more than 40 lb. of fracteur and bags should be securely fastened at the top with a minimum of two buckled straps. Securely attached to one corner of each bag should be a non-ferrous metal ring to be inserted over the metal pinion in the centre of the service car. We are in agreement with the proposal by Mount Isa Mines Ltd. that all service cars be modified so that metal pinions can be inserted upright in the centre of the cars when fracteur is being carried. It should be the responsibility of the person issuing the fracteur from the magazine to ensure that bags of fracteur are securely fastened by the buckled straps provided on the bags before fracteur is taken from the magazine.

The Warden concurred with the finding of the experienced miners and also was of the opinion that the employees conveying the fracteur by means of the mule and man-car did not exercise sufficient care to ensure that fracteur did not fall from the man-car, and that it was clearly their responsibility to ensure that the fracteur was safely delivered intact to its destination. He considered that steps now being taken by Mount Isa Mines Ltd. to have fracteur cases secured to steel pins in the centre of man-cars is a satisfactory remedy to avoid, as far as practicable, the repetition of a similar occurrence.

OCCURRENCES

There were 34 notifications under the provisions of section 28 (4) of *"The Mines Regulation Acts,* 1910 *to* 1958," and they were as follows:—

Fires—	
Surface	4
Underground	6
Winding	15
CO_2 gas	8
Accidental ignition of explosive	1
Total	34

In general these occurrences were of minor nature, and no injury to person resulted in any instance.

QUARRIES

No quarries gazetted under the Mines Regulation Acts were operated in this division during the year.

SEWERS

These were inspected regularly.

Health and Sanitation.—Conditions were satisfactory.

Accidents.—Nil.

Enquiries and Prosecutions.—Nil.

EMPLOYMENT

The average employment figure for the division was 4,583, this being 34 greater than the previous year and was as follows:—

Mines	1,268
Mills	348
Smelting and metallurgical	474
Workshops	827
Miscellaneous on surface	1,642
Sewers	24

DEPARTMENTAL MACHINERY

There were six departmental compressor-jackhammer plants available for hire to small mine operators, and demand for them was fairly consistent. Demand for each of the four departmental Quickwinch plants also was fairly consistent, two of these having been received ex-Redbank during the year.

FIELD WORK

Since the appointment of the third inspector it has been possible to have more frequent inspections made, particularly of the small mines in outlying areas. Two Land Rovers were used for the latter work, while a new Holden station sedan was received during July. Technical advice was given in a number of instances.

APPLICATIONS FOR DEPARTMENTAL ASSISTANCE

All were investigated during the year, the majority being in respect of mining access roads. Financial assistance also was made available in the form of a subsidy loan for mining development in one instance, while in another finance was made available for purchase of machinery.

MOUNT ISA GOLD AND MINERAL FIELD PRODUCTION (long tons)

Mount Isa Mines Ltd.

Mining.—The total ore production of 2,834,540 tons represented an increase of 11.3 per cent. over that of the previous year, and comprised:—

	Long Tons	
Lead-zinc sulphides ..	793,242	
Lead carbonates ..	12,534	
		805,776
Copper sulphides ..	1,980,079	
Copper oxides	48,685	
		2,028,764
Total		2,834,540

Development—

	Feet
Exploration and Main development ..	33,905
Stope development—lead	12,695
Stope development—copper	15,400
Total	62,000

Milling.—The mill treated a total of 2,766,327 tons of sulphide ores which represented an increase of 13.2 per cent. over the previous year and comprised:—

	Long Tons
Lead-zinc sulphides assaying 6.6 oz. silver, 8.2% lead, 5.6% zinc ..	790,648
Copper sulphides assaying 3.8% copper	1,975,679

The Company stabilised the rate of lead-zinc ore treatment and devoted the remaining plant capacity to copper ore treatment. Although the lead-zinc ore treated was 3,730 tons less than the previous year, the lead and zinc head values were slightly higher as also were recoveries, resulting in higher tonnage recovery of each concentrate. An interesting development during December was the shipment of approximately 5,000 tons of zinc concentrate from Townsville for Risdon, Tasmania, this representing the first bulk shipment of Mount Isa produced zinc concentrate for treatment in an Australian State. A total of 69,937 dry tons of zinc concentrate was railed to Townsville during the year, and zinc production at 24,394 tons was valued at £2,707,414.

Design of a new mill to treat 150,000 tons of lead-zinc ore per period was in progress, and this mill is to be sited to the north-west of the existing mill.

There were considerable modifications and extensions in the crushing, grinding, flotation, and tailing disposal sections, while the copper ore treated represented an increase of 19.8 per cent. over that of the previous year.

Ore Purchases—Copper.—A total of 5,598.8 dry tons of ore containing 547.8 tons of copper with an estimated gross value of £170,072 was purchased by Mount Isa Mines Ltd. smelters from 37 small mines, including one parcel of 18.6 tons of ore containing 3.4 tons of copper having a gross value of £1,122 from a small mine in the Northern Territory.

Dry Lead.—A total of 890.3 tons of ore containing 477.1 tons of lead and 8,911.9 oz. silver was supplied from the *Silver King* mine at Lawn Hill in the Burketown Mineral Field. The estimated gross value of the lead content was £40,585 and the silver £3,677.

Limestone—

	Long Tons	Value £	s.	d.
Mount Isa Field ..	7,486	19,099	14	8
Cloncurry Field ..	9,435.8	21,584	11	9
Total ..	16,921.8	40,684	6	5

The total value of all minerals produced by Mount Isa Mines Ltd. during the year was £33,002,402, this figure includes the value of purchased copper and lead ores, as well as the total value of dross and copper concentrates exported.

Machinery Installations—Mica Creek Power Station.—Power from this station was first supplied to the mine area at 132 kV during May, 1960, following which commissioning tests and certain modifications continued until October. It is adjacent to the railway line and some four miles to the south of Mount Isa, being the first outdoor type station to be built in the Southern Hemisphere, and the largest yet built in Australia by private enterprise. The first stage consists of one 280,000 lb. steam per hour pulverised coal fired boiler, and one 30,000 kW turbo-alternator set, with ancillary equipment, the only fully enclosed structures being the air-conditioned control room, switchroom, amenities block and workshop. Power is generated at 11,000 volts and stepped up to 132,000 volts for transmission. Stage two is scheduled to be completed during 1961, and will consist of a similar boiler and turbo-alternator set, while provision has been allowed for the expansion of the station to five boilers and two sets, with a total installed capacity of 120,000 kW.

Copper Corporation of Australia Pty. Ltd.

Approximately 740 tons of ore were mined, the estimated grade being 9.35 per cent. and this was dry screened in the plant which meantime had been modified. The upgraded ore was delivered to Mount Isa Mines Ltd. smelters, the grade since October averaging 14.99 per cent. and the discarded fines assayed 3.74 per cent. During the year a total of 604.4 tons of ore was delivered to the smelters, the average grade being 11.3 per cent.

Mammoth Mine

Work was concentrated on the *Mammoth* opencut, and a system of inclined workings sumped below floor level to the south for a distance of 50 ft. beyond the brow. Limited production came from a small opencut on the other side of the hill 200 ft. south-west of the main workings. Towards the end of the year a start was made to deepen an old shaft 200 ft. NNW of the *Mammoth* opencut.

Mount Hope Mine

Most of the work was done since a change of ownership in the latter half of the year. The No. 1 shaft, near Binna Burra boundary, was sunk from a depth of 120 ft. to 140 ft. At the 120-ft. level a drift was advanced westwards on lode from 70 to 100 ft., the approximate boundary, and a leading stope 10 ft. wide taken out over this length.

Exploration east of the shaft on the 120-ft. level consisted of an irregular drift 115 ft. long. A short section between 85 and 100 ft. was stoped up to 15 ft. above the floor of the drift.

BURKETOWN MINERAL FIELD

Silver King Mine

Underground mining and upgrading of crude ore continued spasmodically throughout the year, with plant breakdowns and wet weather greatly restricting production and the hauling of concentrates to Mount Isa.

Mining was confined to the Cant's shaft area where between the 150-ft. and the 45-ft. levels a large body of high grade sulphide ore at least 25 ft. wide has been opened up.

CLONCURRY GOLD AND MINERAL FIELD

Mary Kathleen Uranium Ltd.

Exploratory.—Radiometric gridding and detailed geological mapping was continued on leases north of the ore-body.

The company, after taking an option on the *Rosebud* copper mine in the same area, reconditioned the shaft collar and cleaned the shaft to a depth of 84 ft. for the purpose of underground exploration.

This company also made some investigations at *Trekelano* copper mine in the Duchess area. Any underground investigation, as in the case of the *Rosebud* mine, would entail reconditioning of the shaft.

Diamond drilling.—The total for the year was 2,834 ft. of developmental drilling of 3 holes, one only of which was collared during 1960.

Machinery Installation.—A most interesting installation was in the primary section of the mill during the latter half of the year when radiometric sorting was incorporated

as a means of excluding the larger sizes of waste which otherwise pass through the mills. The effect since commissioning the radiometric sorting units has been an increased demand for open-cut crude ore. The primary crusher capacity is in excess of 300 tons per hour to permit an overall rejection rate of 30 per cent. by the four sorters, each of which has a rated capacity of 40 tons per hour. The type of sorters installed was the K. & H. which was developed in Eastern Ontario late in 1958, and the installation at Mary Kathleen was the first in Australia.

Water Supply.—In order to augment the existing water supply of Mary Kathleen Uranium Ltd., Messrs. Thiess Bros. under contract to the abovementioned company during May, 1960, commenced the construction of a reservoir on the eastern branch of the Leichhardt River, the site being some 14 miles from Mary Kathleen. Following are some particulars of the new reservoir which was completed and filled by the end of the year:—

Capacity	3,000	million gal.
Catchment area	184	sq. miles
Impounded area	584	ac.
Height of wall	75	ft.
Length of wall at crest	510	ft. approx.
Construction: Rock fill, with impervious earth core.		

Copper Concentrates Ltd.

During the last quarter of the year this company commenced the construction of a plant at the "Great Australia" freehold on the southern outskirts of Cloncurry, the intention to treat copper ores on a custom basis. Concrete foundations were poured and a pipeline connection made with the new water tank of Cloncurry Shire Council several hundred yards distant, in addition to which a manager's cottage was erected near the plant. Essentially the plant will be a jaw-crusher, followed by a gyratory crusher, conveyor to 80-ton capacity bin, ball mill and flotation cells. Eight men were employed on construction which was not completed at the end of the year.

Blockade Mine

(Mining-Producing-Development Syndicate)

In terms of value of production this was the second most important small copper producer in this Division during the year, a total of 714.0 tons of ore containing 92.5 tons of copper with an estimated gross value of £29,342 having been obtained from stoping over the 150-ft. level to the south of the main shaft.

Crusader Mine

Messrs. J. and J. R. Stainkey had erected a small copper smelter adjacent to M.L. 5386 *Crusader South* but prospecting in the Watson shaft on this lease failed to produce suitable sulphide ore, following which the smelter was dismantled and removed for storage elsewhere.

OTHER MINERALS

Silver.—Messrs. Tunny Bros., of Kuridala, reported having sold 14.971 nett tons of ore containing 1130.1 oz. silver and .006 oz. gold per ton, the total value being £5,557 6s. 10d. During the year, however, there was no production from their mine, the *Silver Phantom,* from which the abovementioned ore had been obtained. Operations were limited to costeaning by two men.

Beryl.—Shallow pitting and surface exploration was carried on intermittently by several prospectors in the Mica Creek area to the south of Mount Isa, and production for the year was estimated at less than one ton of ore. It is estimated that upwards of 5 tons of beryl ore is being held locally by these prospectors, while no sales were reported.

Gold.—A prospector reported having won 12 oz. of gold while prospecting over an eight months period along the Fullarton River to the east of Cloncurry, and that most of it appeared to have shed from small leaders.

Opal.—The old opal field in the Kynuna district was inspected during November, and the diggings were found to be abandoned. Local interest in opal mining was at a very low ebb and indications for a successful revival of opal mining on this field were not regarded as encouraging.

NORTHERN DIVISION

Report of Mr. G. Naumoff

The following report of mining activity and administration of the Mines Regulation Acts is submitted for the year ended 31st December, 1960.

GENERAL

Major development in mining during the year was relinquishing of some bauxite Authorities to Prospect and taking up of selected areas by Commonwealth Aluminium Corporation Pty. Ltd. as Special Bauxite Leases. Stage is reached when large shipments of ore are being prepared for production tests at aluminium plants.

STAFF

Inspector Robertson has been transferred from this Division. Inspector McLellan was appointed to the Division.

MINES REGULATION ACTS

There were minor infringements of the Mines Regulation Acts, but matters were rectified at Inspector's instructions.

There were no prosecutions for breaches of Mines Regulation Acts.

Health and Sanitation.—Satisfactory.

Accidents.—There were no fatal accidents during the year.

Comparative figures of reported accidents are tabled below:—

——	1958	1959	1960
Total number of men employed	670	678	626
Fatal Accidents	1	1	Nil
Serious Accidents (lost time over 14 days)	9	4	4
All Accidents	18	18	14

Machinery Accidents.—On the night of 24/25th of January, Tableland Tin Dredging N.L. Dredge No. 2 foundered in the dredging pond at Smith's Creek. The accident did not involve any personal injury or loss of life.

Full details are given under the heading of "Inquiries."

Inquiries.—Two inquiries were held during the year.

1. On the first of March, 1960, an inquiry was held before the Warden, Mr. Dillon, and four experienced miners into the circumstances of an accident whereby Thomas Edward Betheral was killed at the Dingo Mine, Silver Valley, on the 30th November, 1959.

The findings of the four experienced miners were:—

Nature.—Deceased was struck by a piece of rock falling from the face.

Cause.—The ground had become loosened by the previous blasting operations. During the working out of the ground by hammer and bar the rock became further loosened and owing to the nature of the country being "big" with soapy or greasy heads, the rock was loosened by air getting in causing it to fall. We regard it as purely accidental.

Recommendation.—Owing to the nature of the country the face should be carefully examined before working there again and all loosened rock worked out.

Warden concurred with the finding and recommendation.

2. On the 27th and 28th of April an inquiry was held before Warden, Mr. Dillon, and four experienced miners into the cause of an accident which occurred on 25th January, 1960, whereby dredge No. 2, property of Tableland Tin Dredging N.L. foundered.

The findings of the four experienced miners were:—

Nature of Accident.—On the 25th January, 1960, Tableland Tin Dredging No Liability dredge No. 2, foundered during dredging operations and became partly submerged, port bow downwards.

Cause of Accident.—We find a number of factors to be involved. The dredge was engaged in "tight" dredging and had a build up of sand on the starboard side, causing some degree of listing to port. In the course of being freed from the tight position, jolting occurred causing a faulty turn buckle attached to a guy rope holding the stacker at the starboard side, to break. This threw the weight of the stacker somewhat to the port side. As the ladder was off the bottom the weight of the stacker caused the bows to dip on the port side, which in turn caused the second and last guy rope holding the stacker on the starboard side, to break, throwing the full weight of the stacker to port bow to submerge. The weight of the dredge itself lurching towards the port bow completed the foundering.

The Warden summarised his findings as to causes of foundering:—

(1) Gross tailing up by sand at the stern of the dredge, principally on the starboard side.

(2) Breaking of the lateral guy ropes holding the stacker on the starboard side.

Neither experienced miners, nor the Warden, offered a recommendation.

Fencing and Protection.—Satisfactory.

Ventilation.—Mines in the Division are small and relatively shallow. In most mines natural ventilation maintains reasonable standards.

Dover Castle mine installed mechanical ventilation on Inspector's instruction.

Auxiliary ventilation of developmental ends was used at *Gilmore* mine.

Forced ventilation was used in pontoons of Tableland Tin Dredging N.L. dredge No. 2 during repairs after foundering.

Ladders and Travelling Ways.—Conditions satisfactory.

Ropes.—Winding appliances in the Division are principally small hoists, hoisting material only. Ropes and fittings are examined visually. Three rope test pieces were sent for testing to Charters Towers.

No ropes were condemned.

Explosives.—There was no report of defective explosives or explosive accidents.

Mines Regulation Acts (Consolidated) as Applied to Quarries

Two gazetted quarries were in continuous production during the year. Others were on intermittent production, obtaining material as required.

Health and Sanitation.—Satisfactory.

Accidents.—No accidents were reported during the year.

Explosives.—Conditions were satisfactory.

Inquiries.—No inquiries were held during the year.

Mines Regulation Acts (Consolidated) as Applied to Sewers

Sewers under construction were regularly inspected in Cairns and Gordonvale.

Health and Sanitation.—Satisfactory.

Accidents.—Reported accidents show a disproportionate increase on previous year's figures.

Comparative figures of reported accidents are tabled below:—

—	1958	1959	1960
Average number of men employed ..	..	70	97
Fatal accidents	..	Nil	Nil
Serious accidents (lost time over 14 days)	..	1	21
All accidents	..	2	54

Explosives.—No explosives were used in sewer construction.

Inquiries.—No inquiries were held during the year.

MACHINERY

State Treatment Works installed a secondary crusher, elevator and conveyors.

Commonwealth Aluminium Corporation Pty. Ltd. installed a small beneficiation plant on S.B.M.L. No. 1 at Weipa.

EMPLOYMENT

Mines.—Comparative figures of employment are:—

—	1958	1959	1960
Number of men employed ..	650	588	626

Quarries.—Comparative figures of employment are:—

—	1958	1959	1960
Number of men employed ..	20	20	25

Sewers.—Comparative figures of employment are:—

—	1958	1959	1960
Number of men employed ..	..	70	97

PROSECUTIONS

There were no prosecutions during the year.

SPECIAL REPORTS

A number of applications for assistance have been investigated and reported on.

Applications for assistance varied from road and mine development to machinery loans and loans to purchase equipment.

There were a number of technical matters investigated and reported on and not connected with applications for assistance.

FIELD WORK

Field work during the year consisted of usual inspections and investigations.

Authorities to Prospect and Special Bauxite Mining Leases of Cape York were visited during the year.

Towards the end of the year regular inspections were made of Barron Falls Hydro Electric Project, underground excavations of which are gazetted as a mine.

DEVELOPMENT AND PRODUCTION

Gold

There are few mines operating continually. Most work is done either on part time basis or by old prospectors living on leases. Many of these are getting too old and are drifting to townships.

Reported production was 84.03 oz. valued at £346.

Tin

Tin production figures are down—bulk of tin in the Division is produced by dredges and the fact that Tableland Tin Dredging N.L. dredge was out of production for 37 weeks accounts for this.

Comparative production figures are:—1959, 1,492 tons; 1960, 1,189.6 tons.

Tableland Tin Dredging N.L.—The dredge of the company foundered on the night of 24 to 25th January and did not go into production again until 24th September. Supply dam ran dry early in November and dredging was suspended for a fortnight until local storms partially filled the dam at Return Creek.

Pollution mitigation measures during the year consisted of construction of return circuit from Poison Gully slime retention bunds. This involved installation of two pumping stations. Construction of Return circuit enables the company to dispense with settling areas in gullys above the dredge and thus reduce amount of slimes in Smith's Creek catchment.

Ravenshoe Tin Dredging Ltd.—Dredging continued upstream in shallower ground and company reports dredging 2,611,000 cu. yd. for a recovery of 689 tons of tin valued at £460,000.

Mining plant and machinery operated satisfactorily.

Gilmore Mine, Woepen.—Developing and exploratory work continued in the mine during the year.

Main shaft was sunk 173 ft. to a depth of 577 ft.

Driving and cross-cutting totalled 1,790½ ft. and rising totalled 360 ft.

Total of 1,062 tons of ore resulted from this developmental work, of which 776 tons were crushed at local batteries for a yield of 47 tons of concentrates valued at £23,504. The development work aimed at exploring the extension of the Midas Shear Lode at depth.

Diamond drilling (534 ft. in all) sought to locate ore pipes in the Southern Ore pipe complex.

Dover Castle Mine, Bamford Hill.—Mine operated during the year producing 58¼ tons of concentrates valued at £31,040.

No report was received from the mine and details of year's work are not known.

The following batteries are known to have crushed tin ore during the year:—

State Treatment Works, Irvinebank.
Great Northern Battery, Herberton.
Emuford Battery, Emuford.
Brownville Battery, Brownville.
Sunnymount Battery, Sunnymount.

Comparative figures of employment are:—

——	1958	1959	1960
Number of men employed ..	422	469	465

Authorities to Prospect.—Broken Hill Proprietary Company Limited was very active on its Authorities to Prospect in Sunnymount-Tate River areas. The company has a well equipped camp at Sunnymount which is used as a base. Company brought dozer, mining machinery and after constructing access roads reopened and retimbered a number of mines for examination and sampling.

Winzing and driving was done in *Kerosene Tin* mine.

Geological mapping and surveying programme was carried out in the area.

One bulk sample of 20 tons was crushed at a local battery for a return of 10 bags of concentrates.

Number of other Authorities to Prospect were in force in tin areas, but work on these was confined principally to reconnaissance and general prospecting in order to determine areas suitable for detailed examination.

Wolfram-Scheelite

There was little activity in Tungsten mining and only a few old miners living on or near leases in semi-retirement continued desultory mining.

Silver-Lead-Zinc

Production of silver was confined to by-products of copper and gold mining. There was no mining for lead or zinc.

Fluorspar

There was no reported production of fluorspar.

Reconnaissance Pty. Ltd. took up an Authority to Prospect 150M. on behalf of Rio Tinto Southern Pty. Ltd. and investigated several fluorspar mines with disappointing results.

Copper

Again the principal producer of copper in the Division was the *90-Mile* copper mine.

The mine constructed a beneficiating plant during the year and is known to have shipped considerable quantity of beneficiated ore to Japan.

There were other shipments to Japan through various agents from a number of mines, but returns are not to hand.

A local company commenced reconditioning of Atlanta Copper mine at Stannary Hills.

Mining machinery is being installed at the mine and beneficiating plant on a site some distance from the mine near a water supply.

Bauxite

Commonwealth Aluminium Corporation Pty. Ltd. secured a number of Special Bauxite Mining Leases and commenced preparatory work on same.

Aluminium Laboratories Ltd. continued exploratory work on Authority to Prospect 53M.

Most of the work was concentrated in the remaining unexplored section of the Authority north of the Ducie River. The work consisted mainly of careful geological reconnaissance and putting down drill holes wherever deemed necessary.

Mount Isa Mines Ltd. commenced a programme of prospect drilling for possible bauxite deposits along the North Coast and Tablelands late in the year. A truck mounted drill was used for this purpose and a total of 1,574 ft. was drilled.

Iron Ore

Broken Hill Pty. Co. Ltd. continued investigation on Authority to Prospect 86 M.

General reconnaissance of the area was completed previously and work was concentrated on detailed examination of selected areas.

Work consisted of close geophysical survey, costeaning and close grid drilling of these areas.

Number of iron ore samples from small deposits in the Division were sent for test by various persons.

BARRON FALLS HYDRO ELECTRICITY PROJECT

The excavations for the above project were gazetted as a mine by Order in Council in 1959.

A small exploratory tunnel through proposed Power House site was completed early in the year.

Excavation of major tunnels commenced in October.

By the end of the year the following footages were completed:—

	Ft.
Mucking tunnel	168
Access tunnel (Valve Chamber) ..	27
Access tunnel (Power House) ..	38
Pilot shaft (Surge Tank)	55

Labour force increased progressively as new faces were commenced and at the end of December 30 men were employed underground.

REPORT OF ASSISTANT STATE MINING ENGINEER

Mr. A. W. Norrie

As in previous years, the Assistant State Mining Engineer supervised the work of the Drilling Branch.

DRILLING

For the first time in several years, footage drilled was less and unit cost higher than in the previous year (Table 1). This resulted from more difficult drilling conditions in several districts. Core recoveries continued to be satisfactory. Two drills were purchased and put into operation.

Drilling for coal continued in Ipswich, Rosewood, Burrum, and Bowen districts. It commenced in Warwick district. As before the work was done in co-operation with the Geological Survey and the Coal Board.

Drilling for minerals other than coal continued. One drill operated at Black Jack, near Charters Towers, and then at Liontown. Another drill commenced a programme of exploration in Cracow district. Agreements were made with the holders of areas drilled, providing for the cost of drilling to be repaid if workable deposits were found.

A tractor-mounted power-auger was purchased and used to speed up the programme to locate workable deposits of clay in the Greater Brisbane area.

Details of drilling done in each area are set out in Table 2. Further information is given in the report of the Boring and Mechanical Superintendent, Mr. J. M. Strauss.

Programme.—The coal drilling programme was reviewed at a conference in September and it was recommended that, when the programme in Warwick district ends, the drill and crew move to Baralaba.

Costs.—Costs were calculated for each drill at six monthly intervals in order to check on the efficiency of the drill and to ascertain whether the job could be done more cheaply by some other method. These costs include wages, supplies, maintenance of plant, vehicles and drillers' quarters, administrative charges, depreciation and interest on capital employed.

Average cost was £2.11 per ft. (compared with £1.74 per ft. in the previous year). This is the first increase in average costs for five years. Factors affecting this increase in costs were: difficult drilling conditions in several areas, the need to carry out major overhauls on drills, basic wage increases, marginal increases, and price increases for supplies.

The Proline crew, working in Brisbane district, reduced its cost to £0.41 per ft.

Core recoveries.—Core recoveries were generally satisfactory. Five redrills were necessary.

Surveys.—Mr. E. Cowley, Assistant Topographical Surveyor, continued the necessary traversing and levelling surveys of the areas prospected by drilling in Ipswich, Rosewood, Warwick, Oakey and Burrum districts.

REDBANK DEPOT

The workshops had a busy year with major overhauls of two drills and modifications to equipment, while at the same time carrying out maintenance and repair of equipment used by the Department. In addition, some special equipment was designed and made.

The stores continued to operate efficiently and the stocktake and periodical checks were made. Changes were made to improve the methods of working.

PERSONNEL

At the end of the year 91 persons were employed in the Drilling Branch (86 at the end of the previous year). This total includes supervisors and surveying, workshop, stores, core library and office personnel but does not include geological and drafting staff. Of the total, 27 (22) were employed at Redbank depot, 2 (1) were drilling for clay in Brisbane district, 17 (20) were drilling for coal in Ipswich district, 8 (7) in Rosewood district, 6 in Warwick district, 8 (8) in Burrum district, and 15 (15) in Bowen district, while 4 were drilling for metalliferous deposits in Cracow district and 5 in Carrington district.

ACCOMMODATION

Most drilling crews were housed in temporary dwellings made from prefabricated huts and provided, wherever possible, with running water, electric power, laundries and hot showers.

Groups of these dwellings were erected on suitable sites at Redbank, Rosewood, Killarney, Cracow, Howard, Collinsville and Liontown.

During the year, the drillers quarters at Charters Towers were moved to Liontown. The quarters at Killarney were completed and additions were made at Cracow and Redbank.

EQUIPMENT

During the year, a Mindrill A2000 drill and a Proline power auger were purchased and put into operation. Major overhauls were carried out on the Failing 2500 and Sullivan 200A drills. Five vehicles were purchased (three four wheel drive vehicles, one station sedan, one truck) and three were sold.

METHODS

There is need for a better method for drilling deep holes, and wireline coring is being investigated.

Table 1

DRILLING CARRIED OUT BY DEPARTMENT OF DEVELOPMENT AND MINES IN RECENT YEARS

Year	Bores Completed	Drilled	Cost	£/ft.
		ft. in.	£	
1955	78	34,595 3	96,303	2·78
1956	134	47,020 0	122,125	2·61
1957	200	61,944 7	141,333	2·29
1958	383	80,334 9	151,791	1·89
1959	373	94,230 4	163,790	1·74
1960	687	84,482 0	178,476	2·11

Table 2

SUMMARY OF DRILLING CARRIED OUT BY DEPARTMENT OF DEVELOPMENT AND MINES DURING 1960

District	Bores Completed	Drilled	Shifts	Ft./Shift	Cost	£/Shift	£/Ft.
		ft. in.					
Ipswich	23	10,184 3	1,688	12·0	58,215	34·5	2·88
Rosewood	24	5,462 11	357	15·4	13,200	37·0	2·42
Warwick	11	4,719 9	464	10·2	16,131	34·8	3·41
Burrum	37	20,136 5	700	28·8	22,302	31·8	1·11
Bowen	40	19,143 1	1,315	14·5	40,870	31·1	2·14
Coal Drilling	135	69,646 5	4,524	15·4	150,718	33·2	2·17
Brisbane (Proline)	544	11,664 0	171	67·4	4,790	28·1	0·41
Cracow	2	870 6	219	4·0	9,744	44·5	11·2
Carrington	2	829 7	167	4·9	7,871	47·1	9·50
Charters Towers	4	1,471 6	244	6·2	5,353	22·0	3·65
Other drilling	552	14,835 7	801	18·5	27,758	34·7	1·87
All Drilling	687	84,482 0	5,325	15·7	178,476	33·3	2·11

BORING AND MECHANICAL SUPERINTENDENT'S REPORT

Report of Mr. J. M. Strauss

The following report covers departmental drilling plants operating during the year ended 31st December, 1960.

DRILLING OPERATIONS

Ipswich Drilling.—Three drills operated here, two for the full period working three shifts daily, and one for a period of eight months working three shifts, excepting for a short period when only two shifts were worked.

The Mindrill F20 drilled fourteen bores ranging in depth from 150 ft. to 500 ft. The Failing 2,500, Joy 125 and Sullivan 200A drilled eleven bores between them ranging from 1,000 ft. to 2,700 ft. Records show, that after bores reached a depth of 1,500 ft. the rate of penetration drops 40 per cent. between 1,500 ft. and 2,700 ft. This is chiefly due to time lost in pulling tools.

Burrum Drilling.—One drill was on this field for the full period working three shifts. Drilling was done on 38 bores for a total footage of 20,136 ft. 5 in.

The footage drilled is much less than in the previous year because of the small amount of non-coring done this year.

Rosewood Drilling.—One drill operated here working two shifts from the beginning of the year to April 25th, and from September to the end of the year three shifts were worked.

Drilling was done on 25 bores for a total footage of 5,462 ft. 11 in. One bore was incomplete at the end of the year.

Collinsville Drilling.—Two drills operated here for the full period working three shifts when crews were available. Drilling was done on 41 bores for a total footage of 19,143 ft. 1 in.

Warwick Drilling.—The drillers' quarters were completed and drilling commenced on January 19th. Drilling was done on 12 bores for a total footage of 4,719 ft. 9 in.

Charters Towers Drilling.—Drilling was completed on the *Black Jack* mine on 8th July. The crews and drillers' quarters were then transferred to Liontown.

Liontown Drilling.—Drilling commenced here with the Sullivan 22HD No. 1 on the 1st August. At the end of the year, drilling had been done on three bores for a footage of 829 ft. 7 in.

The drilling here has been difficult, but slightly faster progress has been made with the heavier machine with a Hydraulic feed.

Cracow Drilling.—Drilling commenced here on the 9th March. At the end of the year, drilling had been carried out on three bores for a footage of 870 ft. 6 in.

Progress has been very slow because of bad ground and it has been difficult to obtain core recoveries.

Testing for Clays in Brisbane Area.—Drilling commenced with the Proline drill on April 13th. At the end of the year drilling had been carried out on 544 bores for a footage of 11,664 ft. Some modifications were carried out on the drill and bits during the year.

GENERAL

The footage drilled is not as great as in the previous year. This is due to the low footage obtained by the Sullivan 37 and Mindrill A2000 at Killarney and Cracow because of the difficult drilling encountered at these places.

Core recoveries on the coal fields were satisfactory and are as follows:—

	Per Cent.
Ipswich	91.6
Rosewood	94
Killarney	96
Burrum	91

No figures are available for the Bowen field but it is understood that they have again been satisfactory.

During the year a visit was made by the Boring and Mechanical Superintendent to Belmont, near Newcastle, where wire line coring was in progress. This demonstration was very interesting and the method is considered to have many advantages over conventional coring methods when drilling some types of formation.

The administrative offices for the drilling branch were completed in the new store and workshop building, and were occupied during the year, so vacating Building No. 9 for use by the Geological Survey.

REDBANK WORKSHOP

The workshop experienced a very busy year maintaining the 12 drills in good order, as well as 34 small pumping and lighting plants, 18 stationary diesel engines attached to drilling plants and 29 motor vehicles. The general overhaul of the Sullivan 200A drill was completed early in the year. A complete overhaul was carried out on the Failing 2,500 drill, the Proline Auger Drill, the Sullivan 22HD No. 1 drill and No. 2 Gardner Denver Mud Pump. The Suliivan 22HD No. 1 drill was converted from the trailer mounted to the skid-base mounted type during the above overhaul. To eliminate a weakness in design, a major modification was made to the Proline drill during overhaul. Other work completed by the workshops included the manufacture of equipment for Cloncurry Assay Office, making up three Quick winch plants and modifications to two pumping plants.

One workshop foreman, six tradesmen, one fitter's assistant, and one helper were employed in the workshop.

During the year, a tour of inspection was made by the Mechanical Engineer of plant throughout the State. The result was the disposal of a number of obsolete compressor plants and engines. While on tour, investigations were made to improve conditions and modernise equipment at Cloncurry Assay Office.

Drill	Location	Drilled	No. of Bores Drilled	——
		Ft. in.		
Mindrill F.20 ..	West Moreton	3,599 7	14	
Sullivan 200A ..	West Moreton	5,061 9	6	One bore incomplete
Joy 125	West Moreton	9,227 5	3	One bore incomplete
Failing 2,500 ..	West Moreton	2,295 6	2	One bore from 1959 completed
Joy 225P ..	Bowen	10,028 4	12	One bore from 1959 completed
Mindrill E.1000 No. 2	Bowen	9,114 9	29	One bore incomplete
Sullivan 22HD No. 1	Rosewood ..	2,620 8	11	
Mindrill F.20 ..	Rosewood ..	2,842 3	14	One bore incomplete
Joy 22HD No. 2	Burrum ..	20,136 5	38	One bore incomplete. One bore from 1959 completed
Mindrill A.2000	Cracow ..	870 6	3	One bore incomplete
Sullivan 37 ..	Warwick ..	4,719 9	12	One bore incomplete
Mindrill E.1000	Charters Towers	1,471 6	4	One bore from 1959 completed
Sullivan 22HD No. 1	Liontown ..	829 7	3	One bore incomplete
Proline Drill ..	Brisbane Area	11,664 0	544	
Totals ..	..	84,482 0	696	

NORTHERN ELECTRICAL INSPECTOR OF MINES

Report of Mr. G. P. Chadwick

The following report is submitted on the administration of the Electrical Rules under the Mines Regulation Acts and the Coal Mining Acts in connection with the use of electricity and electrical machinery during the year ended 31st December, 1960.

Inspections were made during the year of electrical equipment installed on the surface and below ground at coal and metalliferous mines and also at ore reduction works in the Northern Division.

UTILISATION OF ELECTRIC POWER

Tables I and II have been compiled from returns submitted by those mines and ore reduction works in the Northern Division, which use electric power.

The total of 122,958 h.p. of which 14 per cent operated on D.C. shows an overall increase of 5.6 per cent. on the figures for 1959. By far the greater part of the increase comes from the North Western district of the division where

Table I

UNITS INSTALLED AND HORSE-POWER BEING USED, AT METALLIFEROUS MINES, COAL MINES AND ORE REDUCTION WORKS.

Locality	Number of Units Installed		H.P. Aboveground		H.P. Belowground		Totals	
	Metalliferous	Coal	Metalliferous	Coal	Metalliferous	Coal	H.P.	Units
North-Western District	2,737	..	78,936	..	11,409	..	90,345	2,737
Northern District	164	191	4,870·05	2,050·4	27	2,451	9,398·45	355
Central District	955	139	17,023·00	1,309·75	3,198·5	502	22,033·25	1,094
Maryborough District	..	55	..	894	..	287·5	1,181·50	55
Totals	3,856	385	100,829·05	4,254·15	14,634·5	3,240·5	122,958·20	4,241

Table II

HORSE-POWER OF MOTORS IN USE FOR ALL PURPOSES—ANALYSIS.

Purpose	Metalliferous	Coal
Aboveground—		
Winding and Haulage	21,736·5	680·00
Ventilation	5,178·5	892·5
Pumping	14,244·5	68·55
Milling and Ore Dressing	35,152·05	..
Smelting	7,997·0	..
Coal cleaning and screening ..	..	883·00
Air Compressors	4,983·5	658·75
Other Purposes	11,537·0	1,073·35
Totals Aboveground	100,829·05	4,256·15
Belowground—		
Hoisting and Haulage	2,356	1,012·5
Pumping	4,097	564·5
Scrapers and Loaders	4,483·75	360·0
Coalcutters	..	210·0
Conveyors	28	830·0
Air Compressors	..	..
Ventilation (Auxiliary)	1,168·5	129·0
Other portable machinery ..	..	83·5
Other Purposes	2,501·25	51·0
Totals Belowground	14,634·5	3,240·5

Mt. Isa Mines show an additional 5,977 h.p. which, however, is much smaller than their corresponding 1959 figure. The other three districts each make a small contribution to the total increase.

An analysis of the figures shows that since 1956, the ratio of horsepower to units of plant has varied a little between the limits of 26 and 29.4 h.p./unit with an average of 28 h.p./unit of plant. At the present time this division has increased 1.71 times in horsepower and 1.67 times in units of plant since its formation in 1956. In fact the stage has been reached when, in terms of h.p. and units of plant, the division is now larger than was the whole of the state in the year ended 1955.

The figures are as follows:—

Whole State: 1955—79,175 h.p. and 3,671 units of Plant.

Northern Division: 1960—122,958 h.p. and 4,241 units of Plant.

To further illustrate the remarkable advance made in mechanisation it can be shown that horsepower per man employed in this division was, in 1960, nearly double that for the whole State in 1955, the figures being as follows:—

1955—approximately 7.9 h.p./man.

1960—approximately 15 h.p./man.

ACCIDENTS AND OCCURRENCES

During the year one serious accident occurred at an underground winding engine where the driver was burned by hot switchgear oil. In this case a fault occurred in the windings of the drive motor and the circuit breaker, controlling the motor, attempted to clear the fault. However, the fault level at this point in the mine system was revealed to be beyond the capacity of the switch which was badly damaged. The switch, of the pedestal type, had its oil tank broken away from the fastenings and this allowed the oil to be projected widely about the winder enclosure.

Of the six minor accidents during the year, two are worthy of note. One of these involved what might be termed an innocent bystander in that he did not contribute in any way to the circumstances leading to his accident. A cable had been disconnected at its inbye end and partly withdrawn from an area where blasting was to be done. The controlling switch, at the supply end of the cable, had been put to "off" and had a "Danger" tag attached. Some time later this switch had been closed thus making the free end of the cable alive upon which the victim stepped to receive a shock. Investigation did not reveal the culprit neither did it discover the whereabouts of the tag. The "Danger" tag system has weaknesses and in this case it would have been far better to disconnect the cable at both ends.

The other noteworthy accident involved a mine electrician who worked on live starter connections and received a burnt hand as a result of neglecting to switch off the supply.

Six occurrences were recorded during the year. Particular attention must be drawn to two of these. One illustrates the comparative ease with which the poorer type of underground lighting arrangement can give rise to danger. In this case a 110-volt lamp normally protected by a tin shade had had the shade removed thus allowing the naked lamp bulb to rest on timber work. What could have become quite a respectable blaze was started when the timber caught fire.

The other occurrence arose during charging of a locomotive battery at an underground charging station. The battery charging cable was withdrawn from its plug-socket attachment on the battery, while energised and with the battery gassing freely. Sparking occurred which ignited the hydrogen being given off by the nearest cells and the ignition then spread to all 24 cells of the battery. Fortunately the explosion damaged only the cells and battery charging socket. Obviously liberties cannot be taken with this kind of apparatus any more than with any other, and the strictest attention is necessary to switching procedure and to charging station ventilation.

NEW INSTALLATIONS

Mt. Isa Mines

The major part of this year's additional loading appears to consist of auxilliary plant at the Mica Creek Power Station. This station now has an installed capacity of 30 M.W. with work already in hand to provide for a further 30 M.W. turbo-alternator set in the near future; the ultimate planned capacity being 120 M.W. The station was commissioned during the year and recently had its official opening.

In the mine, four additional substations came into use having a total capacity of 1,250 kVA. Eight slushers aggregating 640 h.p. and a further 100 h.p. of pumping plant make up the bulk of the increase in this section.

Activity in the Milling section appears to have been confined to replacement of existing plant.

Mt. Morgan

Another electric shovel was brought into use in the open cut. This has a capacity of 3½ cu. yd. and is supplied at 3.3kV.

Reorganisation of distribution for No. 1 Mill was continued. An 0.15 sq. in., 3 core armoured cable, operating on 3.3kV was installed, to feed No. 1 Mill; the original feeder was an overhead line. A new 800 amp, 150 M.V.A. circuit breaker was installed to control the feeder. In the Mill, older type distribution switchboards have been replaced. New conveyors were installed at No. 1 Mill crushing station. Automatic starting has been applied to the 150 h.p., 3.3kV motor on No. 4 ball-mill unit. The 200 h.p. D.C. motor drive to No. 1 ball mill was eliminated which adds further to the decline in the use of D.C. at Mt. Morgan.

Water supply facilities were augmented by the provision of 400 h.p. of pumping plant at 6A Dam.

More progress was made towards improvement in the standard of underground lighting installations with the use of armoured cable and well glass fittings on the 650 ft. level.

Central Queensland Salt Industries Ltd.

The increase predicted in the 1959 report has been realised with the salt refinery coming into production during the year. The installed horsepower is now nearly 50 per cent. greater than in 1959. The method of harvesting has been improved with the partial replacement of diesel loco trains by a set of self propelled, electrically driven conveyors. In view of the situation of the conveyors it was considered necessary to request the provision of earth leakage protection for that particular section. The company have conscientiously met this request.

Weipa

It is reported that the first mining electrical installations appeared on this field in connection with a small treatment plant. The total installed horsepower is 150 and is supplied from three McLaren-Brush diesel alternators, each of 87.5 k.V.A.

Collinsville and Scottsville District (Coal Mines)

During the year T.R.E.B. completed the transmission line to the district with the result that public supply is now available to the coal mines and to both townships.

In the No. 1 tunnel at the State Coal Mine, three 95 h.p. Joy 10SC-AC shuttle cars were commissioned and to cater for advancement a 60 h.p., 42 in. M & C conveyor belt was added to the existing trunk conveyor system. Also, as a result of advancement, it was necessary to move the 450 kVA portable substation further inbye.

At the Bowen Consolidated new coal mine no significant electrical installations have yet been made beyond a terminal sub-station to the overhead line from the old mine. A 60 h.p. haulage has been added to the underground transport system at the old mine.

Central District (Coal Mines)

In the sphere of new installations this district remained quiet on the whole although some activity is recorded in the matter of power generation and distribution and also in respect of coal cleaning plant.

At the *Ogmore State Mine* further diesel driven alternators have been installed to raise the total capacity, both steam and diesel driven, to 815 kVA.

Rearrangement of distribution facilities is being made at the *Dawson Valley* colliery. A new C.R.E.B. terminal sub-station has been brought into the mine premises to bring about a more satisfactory supply arrangement than has prevailed hitherto. New distribution switchgear is being installed at the mine compressor station.

At the *Blair Athol Open-Cut* colliery a new coal cleaning plant has required the provision of fewer but larger individual electrical installations than was the case with the old and now redundant plant.

Maryborough District (Coal Mines)

This district reveals the highest percentage increase, on its 1959 figures, of any in the Northern Division. The addition of the new No. 12 Burgowan has raised the number of mines in the district to seven and all except one, record additional electrical plant.

General

It is again pleasing to record that new installations are of a good standard. Also, the replacement of older, less suitable equipment is cause for satisfaction.

Improvement continued in the matter of underground lighting but at a slower rate than last year.

More extensive use of P.V.C. served armoured cables is noticeable while at Mt. Morgan Ltd. colour impregnated serving is becoming prominent with the adoption of the standard electrical orange. This colour aspect will assume increasing importance as the use of plastic hose extends. It is often difficult to distinguish between black plastic hose and armoured cable with black plastic serving.

From time to time it has been found necessary to condemn certain combinations of flameproof apparatus. One such case occurred during the year. There prevails the idea that flameproofness is assured if all components, of a whole, are themselves flameproof. The idea is valid only where such components have been tested and certified in the combination forming the whole.

REPORT OF THE CHIEF INSPECTOR OF COAL MINES—YEAR 1960

The Under Secretary, Department of Development and Mines, Brisbane.

I have the honour to submit herewith, my report for the year 1960. The report is presented under the following sections in respect of Coal Mining in Queensland:—

Section I—Output and Development
Section II—Persons Employed
Section III—Accidents
Section IV—General
Section V—Reports from Inspectors

By arrangement the report of the Northern Electrical Inspector of Mines is included under Section VII of the report of the State Mining Engineer.

Wm. ROACH, Chief Inspector of Coal Mines.

SECTION I—OUTPUT AND DEVELOPMENT

Saleable coal produced in the State during 1960 totalled 2,656,642 tons. This figure is an increase of 62,255 tons on the production for 1959. The value of the coal for the year under review was £8,022,544 sold at an average price of £3 0s. 3d. per ton; for comparison the production for 1959 was valued at £7,518,286 at an average market price of £2 17s. 11d. per ton.

Imported coal for the year totalled 9,153 tons and was consumed at the gas works at Cairns, Townsville and Rockhampton.

Export coal totalled 30,294 tons despatched from Kianga to Japan.

During 1959, 7,747 tons of coal were imported and 19,048 tons were exported.

Coal provided for ships' bunkers amounted to 2,242 tons whereas during 1959, 3,262 tons were despatched per this medium.

BUNKER ALLOCATION

Division	Port	Overseas	Inter-State	Intra-State	Total
		Tons	Tons	Tons	Tons
Northern	.. .. ..	..	..	..	..
Central	Bowen	248	..	..	248
Southern	Brisbane	..	..	1,994	1,994
Totals ..	.. ..	248	..	1,994	2,242

A total of 20,558 tons of coke were produced during the year. This production was derived from the State Coke Works at Bowen which carbonised Collinsville coal and Haighmoor coke ovens at Ipswich which used Tivoli coal. An analyses of the production reveals that the Bowen plant produced 19,268 tons which were offered at a selling price of £11 1s. 4d. per ton while Haighmoor produced 1,290 tons at an average selling price of £10 5s. per ton.

Comparative figures relative to coke production for previous years are tabulated below.

Division	Coke Works	1958	1959	1960
		Tons	Tons	Tons
Northern ..	Bowen ..	29,280½	23,547	19,268
Southern ..	Ipswich ..	1,399	1,060	1,290
Totals		30,679½	24,607	20,558

Outputs of Saleable Coal

Division	District	Saleable Coal	Increase	Decrease	Per Cent
		Tons	Tons	Tons	
Southern	Ipswich	1,628,633	108,112	..	+7·11
	Darling Downs	103,882	3,051	..	+3·03
	Maryborough	139,022	..	2,577	−1·83
Central	Rockhampton	75,942	2,306	..	+3·13
	Mount Morgan	126,736	23,018	..	+22·18
	Clermont	170,606	..	4,967	−2·82
Northern	Bowen	411,821	..	66,688	−13·92
	Totals	2,656,642	62,255	..	+2.38

Production and Values of Saleable Coal

Division	1958		1959		1960	
	Production	Price per Ton	Production	Price per Ton	Production	Price per Ton
	Tons	£ s. d.	Tons	£ s. d.	Tons	£ s. d.
Southern—						
Ipswich	1,490,735	2 17 3	1,520,735	2 17 3	1,628,633	3 0 9
Darling Downs	108,033	2 18 7	100,831	3 0 7	103,882	3 2 10
Maryborough	128,345	3 9 7	141,599	3 12 3	139,022	3 15 11
Central—						
Rockhampton	77,763	3 11 0	73,636	3 12 6	75,942	3 17 2
Clermont	190,285	1 9 4	175,573	1 10 0	170,606	1 10 0
Mount Morgan	153,760	1 6 4	103,718	1 13 7	126,736	1 13 8
Northern—						
Bowen	431,482	3 1 1	478,509	3 2 9	411,821	3 9 11

Price Variation of Saleable Coal—1916–60

Year	Average Value at Pit's Mouth	Year	Average Value at Pit's Mouth
	£ s. d.		£ s. d.
1916	0 8 6·9	1939	0 17 9
1917	0 11 4·74	1940	0 17 11
1918	0 11 7·7	1941	0 19 4
1919	0 13 2·2	1942	1 0 9
1920	0 15 1·9	1943	1 1 6
1921	0 17 5·01	1944	1 1 6
1922	0 17 6	1945	1 1 6
1923	0 17 5	1946	1 1 7
1924	0 17 8	1947	1 3 9
1925	0 17 8	1948	1 7 0
1926	0 18 0	1949	1 9 2
1927	0 18 0	1950	1 10 8
1928	0 18 0	1951	1 16 3
1929	0 17 6	1952	2 3 0
1930	0 17 5	1953	2 6 3
1931	0 16 8	1954	2 6 6
1932	0 16 3	1955	2 9 11
1933	0 15 10	1956	2 11 9
1934	0 15 11	1957	2 13 10
1935	0 16 0	1958	2 15 2
1936	0 16 5	1959	2 17 11
1937	0 16 8	1960	3 0 3
1938	0 17 2		

Distribution of Coal Mines Operating in State

Division	District	1958	1959	1960
Southern	Ipswich	54	54	55
	Darling Downs	6	6	6
	Maryborough	6	7	6
Central	Rockhampton	3	3	3
	Mount Morgan	2	3	3
	Clermont	2	2	2
Northern	Bowen	3	4	4
	Totals	76	79	79

Coal purchased by the Queensland Railways during the year amounted to 463,598 tons. Of this Southern Queensland required 245,411 tons, Central Queensland 111,462 and Northern Queensland 106,725 tons.

This total consumed by the railways is 42,513 tons less than that required in 1959 when 506,111 tons were used.

Coal Purchases—Queensland Railways—1945–60

Year	Southern	Central	Northern	Totals
	Tons	Tons	Tons	Tons
1945	311,324	161,340	129,901	602,565
1946	303,199	136,451	103,979	543,629
1947	359,000	185,858	104,937	649,895
1948	291,040	168,680	75,150	534,770
1949	318,274	247,910	66,796	632,980
1950	417,198	221,450	76,090	714,738
1951	388,335	282,977	74,164	745,676
1952	429,825	327,453	79,832	837,110
1953	331,972	275,625	53,770	661,367
1954	328,661	304,632	56,845	690,138
1955	347,508	256,663	62,558	666,729
1956	350,717	250,239	112,360	713,316
1957	312,624	174,126	118,240	604,990
1958	262,787	142,671	111,496	516,995
1959	257,986	122,476	125,649	506,111
1960	245,411	111,462	106,725	463,598

Each producing mine throughout the State furnishes through the inspectorate a four-weekly return which sets out shifts worked, both on the surface and underground, number of days on coal production, tons of coal raised, quantities of explosives and detonators used and number of miss-shots reported.

The following information is based on these returns:—

Division	District	Total Shifts U/g.	Coal Mined	Average Output M.S.
Southern	Ipswich	*322,224	1,826,241	5·67 (5·13)
	Darling Downs	*24,414	114,583	4·65 (4·38)
	Maryborough	*42,790	138,696	3·24 (3·25)
Central	Rockhampton	*24,373	78,617	3·22 (3·14)
	Clermont	†5,449	175,461	32·20 (27·64)
	Mount Morgan	‡11,110	126,969	11·43 (11·34)
Northern	Bowen	‡77,690	411,187	5·29 (6·17)
	Totals	508,050	2,871,754	‡5·65 (5·39)

* Underground. † Opencut. ‡ Underground and Opencut.

The following table gives the quantities of explosives used in pounds, tons of coal mined, tons of coal produced per pound of explosives used and number of miss-shots reported:—

Division	District	Coal Mined	Explosives Used	Tons/lb.	Miss-shots
		Tons	Lbs.		
Southern	*Ipswich	1,826,241	769,792	2·37	12
	*Darling Downs ..	114,583	47,603	2·41	6
	*Maryborough ..	138,696	67,707	2·05	9
Central ..	*Rockhampton ..	78,617	67,964	1·15	17
	‡Mount Morgan ..	126,969	119,905	1·06	..
	†Clermont ..	175,461	53,347	3·28	..
Northern	‡Bowen	411,187	215,881	1·90	..
	Totals ..	2,871,754	1,342,199	2·14	44

* Underground. † Opencut. ‡ Underground and Opencut.

The total quantity of explosives does not include ammonium nitrate and fuel oil mixture which is now used in open-cut work. Operators consumed some 86,680 lb. of this mixture.

Department drilling to prove coal reserves was continued, an aggregate footage for the year was 69,646 ft. recorded by 135 holes.

Particulars of drilling in each district are given below:—

Division	District	Holes Drilled	Aggregate Depth
Southern	Ipswich	47	25,647
	Darling Downs ..	11	4,720
	Maryborough ..	37	20,136
Central	Rockhampton ..	..	..
	Clermont	..	..
	Mount Morgan ..	..	..
Northern	Bowen	40	19,143
	Totals ..	135	69,646

Private by individual mining companies resulted in another 39,832 ft. of hole.

Thiess Brothers drilled 11,271 ft. on their Kianga leases, Bowen Consolidated 19,158, Howard Collieries 9,003 ft, and Queensland Collieries 400 ft.

SECTION II—PERSONS EMPLOYED

Throughout the year a total of 3,218 persons were employed at the various mines. The allocation of labour was as follows:—Employees engaged above ground, 923; employees engaged below ground, 2,295. Details from previous years are included for comparison.

Division	District	Employees Underground			Employees Surface			Total Employees		
		1958	1959	1960	1958	1959	1960	1958	1959	1960
Southern	Ipswich	1,570	1,469	1,474	473	506	498	2,043	1,976	1,972
	Darling Downs ..	115	106	106	35	37	35	150	143	141
	Maryborough ..	204	212	202	53	54	52	257	266	254
Central	Rockhampton ..	98	102	112	34	34	35	132	136	147
	Mount Morgan ..	32	29	30	15	51	56	47	80	86
	Clermont	24	32	28	62	55	50	86	87	78
Northern	Bowen	330	340	343	196	200	197	526	540	540
Totals	.. .. ..	2,373	2,290	2,295	868	938	923	3,241	3,228	3,218

SECTION III—ACCIDENTS

Accidents which resulted in loss of working time during 1960 numbered 695. Of these 226 caused a disability for more than fourteen days.

Only one fatal accident was reported. This resulted in the death of M. J. Horn on 2nd November, 1960, who died as a result of injuries received when he was crushed beneath a motor truck at *Moggill* colliery. Following heavy rain the motor truck was proceeding along a private roadway on the mine property, when due to the slippery nature of the road, it skidded and overturned down an embankment. Horn, who was travelling in the open rear of the vehicle was thrown and fell beneath the truck as it rolled down the slope.

Inquiries were held into three accidents.

The first of these accidents occurred when a rope rider was dislodged from and fell in front of a set of wagons. He sustained a fractured leg and it was later found necessary to amputate his left leg below the knee.

An accident due to shotfiring practice was the cause of another inquiry. Two men were injured when struck with flying coal projected from a shot blowing through onto a level on which they were working.

A second inquiry into a similar shot-firing accident revealed circumstances almost parallel to the first case. In this instance after giving warning of his intention to fire, a subordinate shotfirer did not await a reply that all was clear, consequently a miner who was not under cover was injured by flying coal.

Whilst the ratio of accidents to numbers of shots fired is low, it nevertheless remains a fact that such accidents should not have to be recorded.

For comparison with previous years the following table is presented:—

Year	Total Employees	Fatal	Over 14 Days	Under 14 Days	Total
1952	3,756	3	247	246	496
1953	3,625	5	231	600	836
1954	3,609	8	269	381	658
1955	3,749	..	288	362	650
1956	3,606	1	221	659	980
1957	3,507	3	256	755	1,011
1958	3,241	2	210	465	677
1959	3,228	2	237	475	714
1960	3,218	1	225	469	695

SECTION IV—GENERAL

MECHANISATION

The colliery proprietors of Queensland have shown their confidence in the future of coal industry. This is evidenced by many installations of mechanical equipment in various coal mines throughout the State. The first continuous-miner to operate in Queensland was put into operation on the West Moreton Field early in the year. Since then two other continuous-miners have been purchased for installation and production in 1961. The continuous-miner installations are supported by shuttle cars, and other essential equipment. Conventional type mining units, consisting of loader, cutter and shuttle car have also found favour in the mines. One company has obtained a mobile roof-bolting machine for use in suitable sections operated by the mechanical loading units. Rubber belts on scraper chain type conveyors are common in the mines. Coal preparation plants, mainly of the jig type have been commissioned at many collieries during the year.

QUEENSLAND (COAL MINES)—Table of Accidents, Year ended 31st December, 1960

NATURE OF INJURY	OCCUPATION								Total		AGENCY OF INJURY — UNDERGROUND — Explosives					Explosions, &c.			
	Officials	Miners	Shiftmen	Wheelers	Clippers	Roperiders	Machinemen	Others	Fatal	Injured	Making Up and Stemming of Shots	Blows from Coal or Stone Projected by Shot	Explosives Fumes	Others	Aggregate	Gas and/or Coal Dust	Asphyxiation or Poisoning by Gases	Others	Aggregate
Fractures	4	18	6	8	..	2	..	18	1	55	..	..	..	..	..	..	..	..	..
Dislocations	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Sprains and Bruises	3	49	20	4	1	1	..	20	..	98	..	..	..	..	..	..	..	..	..
Burns	..	1	..	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..
Asphyxiation	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Poisoning	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Respiration	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Electric Shock	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Septic	1	..	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..
Internal	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Contusions and Abrasions	1	8	9	2	..	..	..	7	..	27	..	..	..	..	..	..	..	..	..
Cuts and Lacerations	1	16	4	..	1	1	..	5	..	28	..	3	..	..	3	..	..	..	..
Other	..	5	2	1	..	1	..	3	..	12	..	..	..	..	..	..	..	..	..
Total	10	97	42	16	2	5	..	54	1	225	..	3	..	..	3	..	..	..	..
Percentage based on total of 226 accidents	4·42	42·90	18·58	7·18	0·89	2·23	..	23·80	0·45	99·55	..	1·33	..	..	1·33	..	..	..	..

NATURE OF INJURY	UNDERGROUND — Falls of Ground				Truck or Wagon					General						Total	
	At the Working Face	On Roads while Repairing or Enlarging	On Roads while Otherwise Working or Passing	Aggregate	While Engaged in Haulage Operations (Clipping, Spragging, &c.)	Run Over or Crushed	Lifting	Others	Aggregate	Falling Down Shafts	Materials Falling Down Shafts	Other Shaft Accidents	Machinery (in Motion)	Electrical	Miscellaneous	Fatal	Injured
Fractures	11	1	..	12	5	5	..	2	12	..	..	..	..	..	23	..	47
Dislocations	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Sprains and Bruises	8	..	..	8	8	..	21	1	30	..	..	..	..	..	49	..	87
Burns	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Asphyxiation	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Poisoning	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Respiration	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Electric Shock	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Septic	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
Internal	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Contusions and Abrasions	7	..	2	9	..	1	..	1	2	..	..	..	..	..	12	..	23
Cuts and Lacerations	7	2	2	11	..	1	1	1	3	..	..	..	..	..	8	..	25
Other	..	..	..	..	..	..	1	..	1	..	..	..	..	..	9	..	10
Total	33	3	4	40	13	7	23	5	48	..	..	..	..	..	105	..	196
Percentage based on total of 226 accidents	14·60	1·33	1·77	17·70	5·75	3·10	10·18	2·21	21·24	..	..	..	..	..	46·46	..	86·73

NATURE OF INJURY	SURFACE — General			Total		LOCATION OF INJURY															(Stating Categ…
	Machinery (in Motion)	Electrical	Miscellaneous	Fatal	Injured	Hand	Fingers	Arm	Foot	Toes	Leg	Head	Chest	Abdomen	Eyes	Back	Shoulder	Thigh	Other	Multiple	Fatal Accident. M. J. Horn, 2-11… beneath collie… from private …
Fractures	..	..	9	1	8	6	11	2	11	7	8	..	5	..	..	2	..	..	3	1	
Dislocations	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	
Sprains and Bruises	..	..	11	..	11	5	4	3	12	3	12	..	6	2	..	40	6	..	3	2	
Burns	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	
Asphyxiation	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Poisoning	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Respiration	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Electric Shock	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Septic	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	
Internal	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Contusions and Abrasions	..	..	4	..	4	1	4	..	6	3	6	1	..	..	..	1	1	..	..	4	
Cuts and Lacerations	..	..	3	..	3	3	8	2	4	..	6	..	..	..	1	2	..	..	1	1	
Other	..	..	2	..	2	..	1	..	4	1	1	..	1	..	2	1	..	..	1	..	
Total	..	..	30	1	29	16	28	7	37	14	34	1	12	2	3	46	8	..	9	9	
Percentage based on total of 226 accidents	..	..	13·27	0·45	12·82	7·18	12·38	3·10	16·37	6·17	15·02	0.45	5·30	0·89	1·33	20·34	3·53	..	3·97	3·97	100·00

QUEENSLAND (COAL MINES)—Table of Accidents, Year ended 31st December, 1960

al	AGENCY OF INJURY																															LOCATION OF INJURY															REMARKS (Stating Categories of Fatal Accidents)
	UNDERGROUND																										SURFACE																				
	Explosives					Explosions, &c.				Falls of Ground				Truck or Wagon					General						Total		General			Total																	
Injured	Making Up and Stemming of Shots	Blows from Coal or Stone Projected by Shot	Explosives Fumes	Others	Aggregate	Gas and/or Coal Dust	Asphyxiation or Poisoning by Gases	Others	Aggregate	At the Working Face	On Roads while Repairing or Enlarging	On Roads while Otherwise Working or Passing	Aggregate	While Engaged in Haulage Operations (Clipping, Spragging, &c.)	Run Over or Crushed	Lifting	Others	Aggregate	Falling Down Shafts	Materials Falling Down Shafts	Other Shaft Accidents	Machinery (in Motion)	Electrical	Miscellaneous	Fatal	Injured	Machinery (in Motion)	Electrical	Miscellaneous	Fatal	Injured	Hand	Fingers	Arm	Foot	Toes	Leg	Head	Chest	Abdomen	Eyes	Back	Shoulder	Thigh	Other	Multiple	
55	..	..	..	..	..	..	..	..	..	11	1	..	12	5	5	..	2	12	..	..	..	..	..	23	..	47	..	..	9	1	8	6	11	2	11	7	8	..	5	..	..	2	..	..	3	1	Fatal Accident. M. J. Horn, 2-11-60, Moggil Colliery. Crushed beneath colliery motor truck which rolled from private mine roadway.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	
98	..	..	..	..	..	..	..	..	..	8	..	..	8	8	..	21	1	30	..	..	..	..	..	49	..	87	..	..	11	..	11	5	4	3	12	3	12	..	6	2	..	40	6	..	3	2	
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
27	..	..	..	..	..	..	..	..	..	7	..	2	9	..	1	..	1	2	..	..	..	..	..	12	..	23	..	..	4	..	4	1	4	..	6	3	6	1	..	..	..	1	1	..	..	4	
28	..	3	..	..	3	..	..	..	..	7	2	2	11	..	1	1	1	3	..	..	..	..	..	8	..	25	..	..	3	..	3	3	8	2	4	..	6	..	..	..	1	2	..	..	1	1	
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	9	..	10	..	..	2	..	2	..	1	..	4	1	1	..	1	..	2	1	..	..	1	..	
225	..	3	..	..	3	..	..	..	..	33	3	4	40	13	7	23	5	48	..	..	..	..	..	105	..	196	..	..	30	1	29	16	28	7	37	14	34	1	12	2	3	46	8	..	9	9	
99·55	..	1·33	..	..	1·33	..	..	..	..	14·60	1·33	1·77	17·70	5·75	3·10	10·18	2·21	21·24	..	..	..	..	..	46·46	..	86·73	..	..	13·27	0·45	12·82	7·18	12·38	3·10	16·37	6·17	15·02	0.45	5·30	0·89	1·33	20·34	3·53	..	3·97	3·97	100·00

MINE FIRES AND EXPLOSIONS

Eight instantaneous outbursts of coal and carbon dioxide gas were experienced at Collinsville State Mine No. 1 tunnel during the year. The displacements of coal on these occasions have varied from 170 to 400 tons. It is pleasing to report that in all cases these outbursts were induced by simultaneous firing. Operations are carried out in complete safety and generally the practice of inducer firing has proved very satisfactory. Research continues in respect of determination of the instant of outburst by instrumentation.

All the outbursts have been associated with fault planes intersected by the coal seam.

From the results achieved during the year, the benefits of the system are established, however it is equally apparent that continued vigilance is required to ensure that no weakness occurs in the teamwork which, could in turn detract from the efficiency which has occurred. The competence of management and men regarding these induced outbursts is highly commended.

COAL DUST

There has become a greater awareness among mine managers of the correctness of rules and regulations regarding coal dust. Much sampling and resultant application of inert material has taken place. There is however, still room for improvement in the manner of treatment of accumulations. Inspectors will insist on action regarding the elimination of this invidious menace so far as is practicable.

Most mines have efficient reticulation systems which provide adequate quantities of water at working faces for the suppression of coal dust at its source.

MINES RESCUE STATIONS

The principal Mines Rescue Station at Booval experienced another year free from calls for assistance following a disaster. The station, however, along with its superintendent and teams of trainees maintained their efficient preparedness.

During the year a change was made from caustic coke as the absorbent in the Proto breathing apparatus to a soda lime mixture. This change should effect more comfortable breathing conditions for the trainees by virtue of the fact that soda lime does not generate the same heat as does the caustic coke and the soda lime is manufactured to a recognised standard while the caustic coke production was by a somewhat haphazard method. This more efficient absorbent will mitigate any possibility of a build-up to dangerous proportions of any carbon dioxide in the breathing circuit.

THE COAL MINING ACTS

Three prosecutions were conducted against persons for breaches of *"The Coal Mining Acts,* 1925 *to* 1952." In each case the defendant pleaded guilty and was dealt with by the court.

The rules under which action was taken were Rule 8 (4), Rule 5 (6) and Rule 9 (8).

The introduction of mechanised methods of mining has developed very considerably during the year. The application of the Coal Mining Acts has enabled recognised safe practices on general principles to be maintained. It is, however, apparent that special enactment is required for some particular applications. These are now pending and early recommendation for the introduction of suitable legislation will be made.

SECTION V—REPORTS FROM INSPECTORS

SOUTHERN DIVISION—IPSWICH, ROSEWOOD AND DARLING DOWNS DISTRICTS

R. M. HENDERSON, Inspector of Coal Mines

Mining activity in all districts was brisk throughout the year, the collieries continued on full production, this in turn kept those engaged in the industry in full employment.

Prospecting and Development, Ipswich District

Aberdare No. 8.—The total number of contract miners working at the above colliery at the start of the year was 19 pairs. Two men were employed on the Scraper Loader in the Main No. 2 dip. Coal won came from the Rob Roy seam.

Box Flat No. 5.—During the year many changes took place at this colliery, the period was one of transistion from Scraper Loader to conventional units as the adopted method of working. At the commencement of the year the Lee-Norse continuous miner was installed together with one Torkar shuttle car in No. 5 tunnel. A second Torkar shuttle car was installed in this panel in July. No. 2 North which is also in the Bluff seam was opened up with 14 B.U. Joy Loader and 6 S.C. Joy shuttle car in July. In August the 8 B.U. 4 and a Torkar shuttle car were installed in this panel, some difficulty was encountered here in driving over a fault with a displacement of 15 feet down to the North and subsequently an overlap fault with a displacement of 8 ft. up. 30-in. conveyors have now become standard and all 24-in. conveyors are being withdrawn to the surface.

Box Flat No. 7.—The panel in this colliery advanced a distance of 500 yd. with three bords abreast; this section has been very successful. The A.B. cutter and Joy loader together with the Joy shuttle car proved to be a very efficient combination. A Fletcher roof bolting machine was installed in March, and this also has been a great success. 24-in. conveyors have been used in this panel since its inception.

Blackheath No. 5.—Coal won from this colliery comes from the Wright seam. Very little development work was done during the year, most of the coal came from pillar extraction in the old cross dip district.

Rylance No. 6.—Mining operations at this colliery continued in a seam not defined, and the method of working is bord and pillar. Faulting and sandstone runners or sills are common in the districts being worked.

Rhondda.—During the year, coal produced from this mine came from two seams, the Strip of Bacon and Rob Roy. Active workings in the Strip of Bacon seam are confined to the dip workings. The Rob Roy seam is being worked to the dip and rise.

Southern Cross No. 6.—Production from this mine comes from the Bluff seam worked on the bord and pillar method. The dewatering of the top seam appears to be near completion, every precaution being taken in the process.

Southern Cross No. 10.—This mine is still in the development stage, with eight miners working at the coal face. During the year, the development of underground workings was carried out to meet the requirements for mechanisation which is to be introduced early in the new year.

Bogside No. 2.—This mine is a member of the Rhondda group and the coal won comes from the Four Foot seam, the method of working being bord and pillar with pillar extraction in the second working. As the mine's areas are nearing the boundaries of the property it can be expected that the bulk of the coal in the coming year will come from pillar extraction on the retreat system.

Bogside No. 3.—Also a member of the Rhondda group working the Bluff seam on the bord and pillar system. During the year development work was confined to driving the main dip and the forming of the air circuit.

Haighmoor.—Early in the year work commenced on the installation of the conveyors to feed coal from No. 1 West Level to the surface. A new Continuous Miner was delivered in November and will be put into operation early in the New Year. Work is in progress on the erection of a 1,000 ton capacity coal bin on the river bank. This should greatly speed up the shipment of coal from this colliery.

Rosewood District

Rosewood No. 2.—During the year mining operations in this mine were carried on in the two seams known as the Walloon. Development proceeded and new districts were opened out, one being worked on the pan conveyor system. The reasonably flat nature of the seam makes it ideal for diesel locomotives to operate.

New Amberfield.—Due to the deterioration of conditions in the mine together with the amount of dirt in the top seam, this mine ceased production at the end of September, 1960.

Moorefield.—Coal won from this mine comes from the top seam. The first attempt at long wall in the top seam was not successful owing to the hard nature of the coal and damage to pan conveyors. However, the new step wall is taking shape and will be operating early in the new year. In the meantime double or Welsh bords are being worked.

Rosemount.—The method of mining is bord and pillar with pillar extraction in the second working. The main dip on my last visit was showing a very good section of coal. When this district comes into production, it is expected to get some relief from stone work as there is every indication that the stone is thinning out.

Smithfield.—The mine produces coal from the Walloon series, the flat nature of the seam makes it ideal for locomotive haulage. The coal on reaching the surface is prepared for market with the McNally jig washing plant together with a small vibrator in conjunction with the scraper conveyor.

New Mountain View.—Produces coal from the Walloon series on the bord and pillar method. Most of the output came from the Main dip district and the Cross dip district. With the thinning out of the seam together with the large amount of stone contained in the seam the Cross dip district was abandoned in September.

Roughrigg No. 5.—Production from this colliery comes from one of the seams in the Walloon series. The method of working is single and double bords with pillar extraction in selected areas in the second working. Most of the output came from the main dip district.

Roughrigg No. 7.—A sister mine to Roughrigg No. 5, all coal won from this colliery goes to No. 5 to be washed. The method of mining is bord and pillar with pillar extraction in the second working, and the coal seam is one of the Walloon series.

United No. 8.—Coal won from this colliery comes from the bord and pillar method in a seam belonging to the Walloon series. This mine has been partly mechanised. During the year trouble was experienced with roof conditions and falls took place bringing the machines to a halt.

United No. 7.—Production from this colliery comes from one of the lower seams in the Walloon series. The method of mining is the double bords system, which allows ample space for stowage of stone contained in the seam.

Darling Downs District

Acland.—Most of the coal won comes from the bord and pillar method. To overcome the handling of large quantities of inferior coal, a long wall district was set up to mine the four feet of clean coal, but difficulties were experienced with bad roof conditions, falls putting the wall out of action for some considerable time.

Sugarloaf.—The method of mining coal at this colliery is bord and pillar, the miners at the face filling the coal on to conveyors which takes the coal to the transfer points, i.e., into skips. The coal is then hauled to the pit-bottom by diesel locomotives.

Willeroo.—The method of mining at present is bord and pillar, miners filling the coal into skips, however consideration is being given to the introduction of pan conveyors to transport coal from the coal face to loading points, on the main haulage road.

Ventilation

At most mines this was found to be receiving attention and very few complaints were received. The installation of larger surface fans together with better maintained air courses has made it possible for the air to reach the places where it is needed.

To again raise a matter I have mentioned in previous reports, it is important that constant attention be given to airways to see that the air is not lost en route to the faces because of short-circuiting.

The sealing of old workings that could not be properly ventilated has helped to direct the air to the active workings.

Explosives and Shotfiring

Explosives and shotfiring is a matter to which attention is continually devoted, however there are times when officials at the mine could stop the careless handling of explosives by better supervision in this department.

The rigid code of precautions with which every official and miner should be familiar, sets forth the precautions to be adopted to ensure the safe handling and use of explosives in mines.

Fire Damp or Methane

Two reports of gas being found in mines working under non-gassy conditions were received during the year.

On the 29th July gas was reported by the Deputy making the pre-shift inspection of the south dip *Rhondda* colliery. Investigations revealed that a small quantity was found near roof, left hand corner of cut-through, the Deputy further reported that the brattice had been lifted and the air was not reaching the face when he entered the place.

The other report came from the *Haighmoor* colliery, 25th November, where gas was found in a small cavity in roof of cut-through. Investigations again revealed that the brattice line had been lifted allowing the bulk of the air to short circuit.

In both cases inspections were made not only of the bords concerned, the whole districts were covered and tests taken with the Riken Gas Detector, results of these tests were forwarded to the Chief Inspector of Coal Mines.

Fires

No reports were received of fire in mines covered by this report.

Accidents

Accidents reported during the year were of a minor nature and many could have been avoided by a little foresight. The supposedly good roof together with leaving loose or overhanging coal on face after shotfiring has caused many accidents. To overcome this, adequate and suitable timbering should be carried out to support the roof at the earliest possible moment. A little more time given to taking down loose roof or coal will also go a long way in preventing injury.

Stone Dusting

It is pleasing to report that more attention is being given to this side of mining. The need for precautions against coal dust has increased with mechanised mining, and steps have been taken to allay the dust at its source. Managers are again reminded that any accumulation of the dust in circumstances that might be dangerous or harmful is minimised by action taken as near as possible to the point of origin and that the coal dust that does so accumulate is systematically cleaned up and removed or treated in an approved manner to render it harmless.

Cap Lamps

No complaints were received during the year in connection with the above lamps. These lamps are being serviced and maintained in a satisfactory manner.

Diesel Locomotives

Special attention has been given to the height and width of roadways where locos are operating, in many cases the larger area of the roadways has improved the ventilation in other parts of the mine.

Haulage Ropes and Tests

The number of ropes tested during the year from mines covered by this report is twenty-five, two of which were passed out as unfit for further use. More care of ropes and attention to haulage tracks together with proper lubrication has assisted in maintaining them in a safer condition.

Shafts and Winding Gear

During inspections it was noted that the mechanism had been kept clean and well lubricated to ensure effective action at all times. Safety catches on cages when tested showed that they would act quickly and effectively in an emergency.

Colliery Managers' Examinations

Three days were spent at the Technical College, Ipswich, supervising Colliery Managers' Examinations which were held during the month of December.

Mechanisation

During the year other mines have introduced modern cutting and loading machines and the trend at present appears to be machine mining in the future. The installation of these machines together with shuttle cars, pan and belt conveyors has come a long way during the year and everything is being done to march with the times.

Conclusions

The installations of modern mining machinery underground is one good sign that the coal mining industry is here to stay, with the cleaner and cheaper product now available, I feel that the incoming year will be better than the one we have just left behind.

IPSWICH-ROSEWOOD-MARANOA-DARLING DOWNS DISTRICTS

V. E. BULL, Inspector of Mines

Regular inspections were made to the following mines and quarry in the above Districts:—

Bundamba and North Ipswich Areas.—Rylance Abermain No. 1, Rylance Abermain No. 2, Rylance No. 3, Jones No. 1, Box Flat No. 6, Southern Cross No. 9 and No. 11, United No. 5 and No. 10, New Hope No. 5, Rothwell Haigh Extended No. 2, Moreton Extended, New Whitwood No. 2.

Rosewood Area.—Mt. Elliott, Caledonian No. 5, Coalfields, Lanefield Extended No. 3, Lanefield No. 5, Westvale No. 5, Oakleigh No. 3, Glencoe Extended No. 1 and No. 3, Normanton No. 1.

Darling Downs.—Tannymorel No. 4.

Maranoa.—Maranoa No. 4.

Quarries.—Booval Quarry.

At various times, I gave relief at the Mines Rescue Station.

On all inspections, particular attention was paid to safety devices to ensure that they were in safe working order and safe mining practices were being carried out. Where any laxity was found, a discussion with officials and men generally rectified the position.

Bundamba and North Ipswich Area

Rylance Abermain No. 1 (Eclipse Seam).—Workings of this mine are now advancing towards the unworked area of the seam. A major fault is bounding the workings on the western side. There has been a departure from the scraper loader method of mining, skips and rails have been re-introduced and are working with a fair amount of success.

Rylance Abermain No. 2 (Tantivy Seam).—At this mine a gradual changeover in the method of working is being made. Conveyor chains are gradually replacing the scraper loaders. So far, the chains are working successfully.

Rylance No. 3 (Rob Roy and Bergins Seam).—Two seams are still being worked from the main shaft, the remaining portion of the bluff seam is being worked from a nearby tunnel.

Jones No. 1 (Four Foot Seam).—This is a mine of the Rhondda Group. The mine is working under the scraper chain system delivering coal on to a main belt, which conveys the coal to surface bins. This system is working successfully, causing little trouble.

Box Flat No. 6 (Bluff Seam).—This mine is working successfully under the scraper loader system.

Southern Cross No. 9 (Lagoon Seam).—This mine is working about 9 ft. of a seam. The basaltic sill met with some time previously and which caused some concern due to emissions of CO_2 has now been stripped and passed with no further trouble with CO_2.

Southern Cross No. 11 (Wrights Seam).—This is a new mine. Air connections have been made and the mine is being developed with a view to mechanisation.

United No. 5 (Lagoon Seam).—As advance workings of this mine have either reached boundary or crop, the workings of the mine are now confined mainly to pillar extraction.

United No. 10 (Wrights Seam).—Only a small area of this seam to work and the boundaries of same have almost been reached.

New Hope No. 5 (Lagoon Seam).—This mine is preparing for full scale mechanisation and should be a suitable seam for successful mechanisation. Prospecting has proved a large area of workable coal.

Rothwell Haigh Extended No. 2 (Benley Seam).—This mine is situated at North Ipswich and is working the lower seam on the field.

Moreton Extended (Fiery Seam).—No connection has yet been made to a lower seam previously worked by *Klondyke* colliery. All development work appears to be driven towards the east. A washing plant has been installed at this mine.

New Whitwood No. 2 (Bergins Seam).—During the year this mine was re-opened after being closed since 1958. A washing plant has been installed. The seam is approximately 13 ft. high. Chain conveyors have been installed and are working quite successfully.

Rosewood Area

Caledonian No. 5.—Workings are advancing towards a new area that has been prospected.

Lanefield Extended No. 3.—The workings of this mine have now advanced from underneath the worked-out area above that was lying full of water. As a result of this, the water that was previously pouring through the roof has now ceased.

Westvale No. 5.—This mine ceased operations last June due to the deterioration of the seam.

Glencoe Extended No. 1.—This is a new tunnel being sunk on to No. 5 Seam. The seam has been struck and a drive is being driven from the existing No. 3 Mine to connect for an airway. It is intended to work the area Long Wall.

Glencoe No. 3.—This mine has been working No. 3 Seam but has now reached the boundary and pillars are being removed. A portion of No. 2 Seam is also being worked.

Mount Elliott.—This mine is working two seams, with approximately 90 ft. between. The method of working in the top seam is Long Wall and filling on to scraper chains. This system is meeting with a fair amount of success.

Coalfields.—The major portion of this lease is worked out and mining is now restricted to a small corner bordering Moorefield workings.

Lanefield No. 5.—A new section of this seam has been developed in the dip area. Thick stone has been encountered but this is being overcome by working under the stone. It is found the stone makes a fairly good roof. The air circuit has been reversed and return air is now passing over the old workings.

Oakleigh No. 3 *Colliery.*—Development work at this mine has been driven on to No. 5 and No. 6 seams. Long Wall workings using scraper chains along the face have been introduced and are working with a fair amount of success.

Normanton No. 1.—This mine is still working Long Wall using scraper conveyors.

Maranoa Area

Maranoa No. 4.—Workings of this mine are still being hampered by severe faulting, however, an area that has been recently prospected will be developed.

Darling Downs Area

Tannymorel No. 4.—Prospecting is still being carried out in this area to prove the seam being worked or other seams.

Quarries

Booval Quarry.—This quarry closed down during the year. Prospecting is being carried out by the City Council in other areas for suitable material.

Rope Testing

Regular testing of ropes was carried out on the machine at this office.

Prospecting and Development

Drilling has been carried out in the New Hope area, where I understand suitable reserves of coal have been located. Prospecting that had been carried out in the Westvale area (Rosewood) has apparently been unsuccessful as the mine closed down due to the deterioration of the seam.

Electric Headlamps

Very few complaints were made in this direction, due, probably, to the maintenance staff becoming more familiar with their lamp.

Coal Dust

Stone dusting is being carried out in most mines, also water spraying. As a result of this, dust is being kept under control.

Mine Gases

Regular tests for gases were made at all mines with the Riken Gas Detector. Tests in most mines with the exception of one mine on the North Ipswich Field gave negative results. The mine referred to is working under gassy conditions and gives off gas freely. The reversal of the air current at *Lanefield No.* 5 has freed the active workings of Black Damp. Any gases from old workings are now taken directly into the return airway.

Ventilation

Regular checks were made to ensure that ventilation was receiving the correct attention.

Underground Fires

The only trouble experienced in this direction was at *Box Flat No.* 6 mine where a fire broke out in some old workings on the return side of the active workings. This occurred on the Friday, the day the mine broke up for the Christmas vacation.

Apparently some heating had taken place in some abandoned coal in an old roadway. This had reached the fire stage on the day mentioned. The position was brought under control with fire extinguishers and water and the area sealed off. The brigade's services were not required.

Examinations

The Annual Examinations for Mine Managers were held at the Ipswich Technical College on the 5th, 6th and 7th December. 17 candidates presented themselves for the various examinations—First Class Mine Manager's (Coal and Metalliferous), Second Class Mine Manager's (Coal), Mine Electrician and Mine Surveying.

Mr. Gee, College Principal, was, as usual, very kind and provided a comfortable room for the examinations, for which we are deeply thankful.

Prosecutions

Three prosecutions were launched during the year.

In one case a Deputy was found with a faulty safety lamp in his possession whilst underground. He was reprimanded and asked to obtain another one. This was also brought into the mine and found to be faulty. In this case the Deputy was proceeded against for having a faulty safety lamp in his possession and the Manager was also proceeded against under Rule 8 (4) of Second Schedule of C.M.A. and Rule 5 (*b*) of Third Schedule. Both men pleaded guilty and were fined.

In another mine in the Rosewood area, a miner was prosecuted for a breach of Rule 9 (8) Second Schedule of C.M.A. The defendant pleaded guilty and was fined £10 with 7s. costs of Court.

Mines Rescue Station

The brigade had a successful year under the leadership of Superintendent W. Owens. No calls of a serious nature were made.

Where heating was noticed the position was brought under control before the services of the brigade were required.

General Summary

Mines have worked fairly constantly. Some mines have closed and the men have been absorbed elsewhere.

During inspections I have experienced complete co-operation by mine officials. Men have also been happy to correct any errors they have made. This simplifies the job of the inspectorate and creates greater harmony.

IPSWICH AND MARYBOROUGH DISTRICTS

P. L. ADAMS, Inspector of Coal Mines

I have the honour to submit a report covering inspections made during 1960 at the following collieries:—

Ipswich—
- Aberdare No. 9
- Blackheath Nos. 1 and 7
- Edward S. Cornwall
- Moggill
- Rylance No. 5
- Rylance No. 5 Extended
- Sunrise
- Westfalen
- Whitwood No. 3

Maryborough—
- Burgowan Nos. 7 and 11
- Churchill
- Churchill Extended
- Globe
- Victory East

Accidents

Two accidents were the subject of inquiries under section 74, the Coal Mining Acts, and details appear in the report of the Chief Inspector as do also details of a fatal accident at *Moggill* colliery.

A third accident will be the subject of a further inquiry. Two miners were filling coal in a rising bord. They were easing the rear wheels of a full skip onto the rails preparatory to lowering the skips down to a cuddy wheel on a grade of 1 in 5½ when a fall of roof occurred knocking both men down. One miner sustained a fractured pelvis and the other bruises to the back.

Coal Dust

The results of analyses viewed during the year were not entirely satisfactory. The average incombustible content of samples was 66.4 per cent. and 29 per cent. of the samples showed less than 60 per cent. of incombustible matter. It is not sufficient merely to collect samples and have them analysed. Nor is it satisfactory to sample only after roadways have been cleaned up and stonedusted. A regular plan of sampling should be followed. Sampling and analysis should serve as a guide to show what parts of a mine are in need of corrective treatment.

Ventilation

Ventilation was reasonably satisfactory in most mines. In the Maryborough District some difficulty was experienced in maintaining a reasonable degree of humidity on some occasions of adverse surface atmospheric conditions.

Auxiliary fans have a useful part to play in assisting the main ventilation but more thought should be given to their installation. They must be so installed that there is no possibility of recirculation of air and a quantity of air considerably in excess of the capacity of the auxiliary fan must reach such a fan. Ducting must be of adequate size and well maintained so that air may be directed to the face with a minimum of leakage. The foregoing are only a few of the requirements for safe operation of auxiliary fans.

Leakage of air in main and secondary airways continues to be a problem. More air would be directed to the working area and to the working faces by proper attention to stoppings and brattices.

Mine Gases

The value of portable apparatus capable of enabling rapid and reasonably accurate determinations to be made of gases encountered in mines was well illustrated on several occasions. It would be beneficial for companies to make such apparatus available to mine officials and for officials to make themselves familar with the use and limitations of such apparatus.

Normal ventilation was sufficient, in all cases but one, to clear away inflammable gas where this was detected by the flame safety lamp on pre-shift inspections and during normal working. The importance of keeping brattice well forward at all times is stressed.

At one colliery in the Maryborough district an unusual emission of firedamp occurred. Some development had been done in a seam below the working seam but this development had been abandoned. The lower seam was known to be gassy and the roadways were inspected regularly. On the day in question a large volume of firedamp was given off in the lower seam and this entered the working section of the mine, necessitating the withdrawal of employees. A temporary re-arrangement of ventilation cleared the accumulation of gas from the bottom seam. The cause of this emission of firedamp was not determined. At this colliery the Riken firedamp detector was in use prior to and has been used since the incident in detecting small percentages of firedamp. This incident emphasises the need for deputies to have their flame safety lamps in view at all times. On this occasion this resulted in the early detection of the presence of firedamp.

At a colliery in the Ipswich district it was necessary to determine the nature of the atmospheres behind stoppings and in some roadways being cleaned up for future operations alongside sealed off areas. The staff of the Government Analyst assisted in the sampling and results of tests for oxygen, carbon dioxide and carbon monoxide were available on the spot. No firedamp was detected here.

Haulage

The attention of managers is drawn to Rule 25, Second Schedule, the Coal Mining Acts. No person may be employed in the riding of skips or sets of skips without the approval of the inspector. It is the duty of the manager to ensure that due regard has been paid to the safety of a rope-rider. Before making application to employ a rope-rider he must ensure that roadways have adequate clearance, that efficient signalling arrangements are conveniently placed, that skips are maintained in good condition, that track is well laid and clear of obstructions. These and other points must receive attention before and during the time a rope-rider is employed.

Special attention must be given to haulage ropes. Careful examination of those parts of ropes in contact with side rollers and "tommy-dods" when starting out of lyes under load is essential.

It has been necessary in several instances to draw attention to inadequate fencing of machinery.

Improvements in the safety and efficiency of haulage operations would result from an extension of general lighting of haulage junctions where skips are coupled and uncoupled. The use of whitewash at such points would also be beneficial.

General

Coal preparation plants were completed and put into operation during the year at *Whitwood No.* 3 and *Sunrise* collieries. *Moggill* colliery purchased a washing table and associated equipment formerly in use at *Westvale No.* 5 colliery and work was commenced on installation.

Rylance No. 5 colliery closed down in August due to depletion of reserves and operations at *Blackheath No.* 6 colliery were suspended.

In the Maryborough district production of coal commenced at *Churchill Extended* colliery and preparatory work was started by the Burgowan Coal Company for a new mine.

In my last report mention was made of a scheme of pre-entry training for recruits to the coal mining industry. This training course was successfully carried out and the lessons learned should enable improvements to be made in the second course to be started in Ipswich early in 1961. Such a scheme will only succeed if given full support by management. The main part of the course is concerned with safety and safer working will only be achieved if a proper example is set by management.

NORTHERN AND CENTRAL DIVISIONS

R. N. HARDIE, Inspector of Coal Mines

The year's outputs and trading did not follow the same trends as previous years, when we saw big losses incurred by the Central division being partly offset by increases in the North.

Central division's increases were largely due to export shipments from Kianga with small advances by Callide and the Rockhampton district mines. A further shrinkage of demand was felt by the open-cuts of Blair Athol.

Working force strengths in the districts have shown alterations with output fluctuation and proportionate increase and decrease of opencast to underground won coal in the districts.

Miss shots totalling 17 were reported showing an improvement on the previous year as from 5.25 per 10,000 shots to 3.3 per 10,000 shots fired in the one particular mine where there has been a prevalence. Still further research into this matter is necessary to obtain greater reduction.

Ammonium nitrate mixture explosives were used in most open-cuts during the year in the work of breaking overburden. Experimental blasting in coal was successfully carried out under supervision and observations have shown this blasting medium to be efficiently applicable to coal breaking in open-cuts.

Mine Ropes and Haulage Appliances

Only one occurrence in connection with haulage arrangements was reported for the year. This was the result of faulty handling of a coil of new rope.

Maintenance of cages, safety gear, brakes, &c., was always found adequate and satisfactory as the result of tests carried out.

Winding and haulage ropes of the divisions were subjected to regular testing in addition to visual inspections made on site.

Results of tests made on winding and haulage ropes for the year were:—

TABLE 1

Year	Total Ropes Tested	Ropes Passed	Ropes Failed
1960	42	38	4

Rope failures under test showed a sharp fall off during 1960, when managements showed a readiness to voluntarily renew a rope the moment it came under suspicion or query.

Prospecting and Development

Mt. Morgan District—Dawson Valley Colliery.—Other than development by cross measure drift and north heading extension, no prospecting was carried out on the Mt. Morgan Ltd. leases.

Thiess Callide Open-cut.—Activity at this mine is now to a much reduced scale.

Kianga Open-cut and Coalfield.—From the Kianga open-cut three coal shipments totalling 30,294 tons departed Gladstone, and at the end of the year, a further 8,000 tons were stockpiled at Gladstone in readiness for shipment to Japan during January, 1961.

Clermont District.—Blair Athol Coal and Timber Open-Cut. Exploratory boring on the Coal and Timber leases has not been pursued during 1960 and the work for production has continued in the Northerly direction at an average rate of 350 tons per day extracted.

Blair Athol Open-Cut.—No major development or prospecting work was executed and overburden removal and face advancement was continued to the South-West.

The new coal handling plant was opened in late March and put into service. Lump breaking is handled by a Northern pick breaker satisfactorily.

Rockhampton District—State Coal Mine, Ogmore.—No boring was carried out at this mine and development was by means of driving and connection of West headings. A North section from this West section was prepared for pillar extraction and this retreat was commenced and continued as to the end of 1960.

Cambria No. 3 *Colliery.*—The *Cambria* mine produced an average tonnage of 72 tons per day for the 217½ production days which it worked.

Maryborough District—Burnett No. 2 *Colliery.*—Driving and connecting in the right hand or Southern section of this mine formed the only developmental work on this lease.

Bowen District—State Coke Works, Bowen.—State Coke Works operated on a restricted scale for 50 weeks of 1960 carbonising 36,956 tons of coal for the production of 22.244 tons of coke. The average weekly coal consumption was 739 tons for an output of 444 tons showing a coke from coal yield of 60 per cent.

Bowen Consolidated Coal Mine No. 1.—Work for the year was again concentrated to the rise and dip areas of East dip only with retreat from the badly intruded rise section being made. Dip driving of East dip has been but intermittent with only small yardage driven. The slope dip was driven and connected to the right.

Bowen Consolidated Mine No. 2.—An average gang of six men was employed in preparation work only and concreting and roofing of the trenched portals of the two tunnels was completed, in addition to completion of the inside arrangements of the bath-room, office and administration building. Three circular air shafts of 16 ft. diameter inside, were sunk to a depth of 40 ft. to the seam.

Bowen Consolidated Open-Cut.—A slump of demand from the Bowen field was borne mainly by the opencast mine whose production of 99,815 tons was 68,159 tons below that of 1959. The operator's extensively used Ammon. Nitrate-fuel oil mixture explosive for the breaking of ground and consumption for the year was 86,680 lb. of Ammon. Nitrate in addition to 40,805 lb. of fixed explosive.

State Coal Mines, Collinsville, Nos. 1 *and* 2.—The combined productions of the two tunnels for 1960 shows an increase over the totals for 1959, obtained by an increase in No. 1, reduced by the decrease from No. 2.

Face to mother belt scraper chain conveying was eliminated by the introduction of three Joy 105C-AC shuttle cars, and these cars have proved highly satisfactory in both operation and mine condition left. Scraper chain spillage was always a matter of concern.

Accidents

Again it is pleasing to report a year of operations not attended by any fatality in the divisions.

Summarised, the report of accidents for the year is:—

TABLE 2

No Time Lost	Less than 14 Days Disablement	Over 14 Days Disablement	Fatal	Total Reports
368	211	70	Nil	649

TABLE 2 (*a*)

CLASSIFICATION OF ACCIDENTS OF OVER 14 DAYS DISABLEMENT

Classification	Fatal	Seriously Injured
Below Ground—		
Falls of Ground	Nil	6
Machinery accidents	Nil	Nil
Truck and Wagon	Nil	20
Miscellaneous	Nil	31
Total accidents below ground ..	Nil	57
Above Ground—		
Miscellaneous, &c., at brace pit bank in connection with operations about the mine only	Nil	13
Total accidents surface	Nil	13
Total accidents	Nil	70

Comparison with the corresponding categories for 1959 shows falls of ground decreasing from 14.1 to 8.5 per cent. Truck and wagon decreasing from 33 to 28.4 per cent.

Back injuries are responsible for 14.3 per cent. of the total injuries from 10.9 during 1959. Strain injuries represent 35.7 per cent. of the total accidents and include the 14.3 per cent. of accidents to the back. Perusal of the detail of the above, plainly exhibits the cause as lifting and commends this form of misadventure to further research on the part of Department, management and individual. More guidance to the individual as to posture for taking strain, etc., under the sometimes awkward physical conditions met with underground is required in addition to steady and persistent dissuasion from the use of direct lifting, as against the use of lever aids.

Coal Dust

It is again reported that despite continued efforts to clean up and stone dust mines, much work must still be done to achieve a fully satisfactory standard. In many cases, it is now found that previously cleaned and dusted roads are in need of further cleaning up and redusting. This matter is a source of persistent criticism during inspections and some headway is being made. All mines are face equipped with taps and hoses for the wetting down of shot coal at the face, whilst atomiser sprays are installed at transfer points in belt equipped mines.

Electric Headlamps and Flame Safety Lamps

Only minor criticisms of maintenance and operation of electric headlamps have been found necessary during the year under review. All but three of the underground mines are using the lead acid type of cell with its self service type of charging rack.

The nickel iron cell has always proved an eminently satisfactory type of lamp provided that the maintenance schedule and cycle is constantly and intelligently applied. Failure in this department can lead to serious fall downs in performance.

Flame safety lamps are regularly checked for safety condition both in the lamp room and in possession of officials underground, and results showed adequate attention to detail in this department.

Mine Gases

CH_4—Methane.—No report of the presence or accumulation of firedamp has been noted or received from any mine other than the three which are subject to the conditions of installation and work as applied to gassy mines. The three mines so regulated are *Cambria No.* 3, *Excel No.* 3 and *State Coal Mine,* Ogmore. At *Cambria No.* 3 the CH_4 incidence was in the dip workings and with the change of working section to inbye of the fault from 10 and 12 levels no emission has been found. Standing dip workings are being ventilated and kept clear at all times.

Both *State Mine, Ogmore,* and *Excel No.* 3 give constant face emission but are kept free of accumulation by vigorous ventilation. Either of these mines are subject to accumulation on any local or general breakdown in the ventilation system, and in knowledge of such, constant alertness is essential.

CO_2—*B.C.C.M.*—Gas at pressure in the East dip contract section of this mine has not to date been found. Pilot holes are kept forward of work in all places where virgin ground is being mined in an effort to locate any change of state. Research work carried out by Mr. Hargraves of Sydney University includes an investigation of mining conditions at B.C.C.M.

S.C.M. No. 2.—With the introduction of full face firing in No. 3 East section and the closing down of this section shortly after, activity in the West sections produced no evidence of gas at pressure.

S.C.M. No. 1.—The stress systems have provided a total of eight instantaneous outbursts—induced—of gas and coal during 1960. These induced bursts were, for the purpose of logging identification given alphabetical sequence prefixed by the year of occurrence, i.e. "60A" to "60H" inclusive. "60A", 4th March, 1960, initiated from the main reversed fault from which the disastrous burst of 1954 originated when No. 4 dip was back driven to make the ventilation connection. Prior to this burst, two advance holes had been bored ahead, one in the left rib at 40 deg. to the advance line and one on the driving line to stone at 35 ft. ahead of the face. Pressure measurement at the flank hole gave 37 p.s.i. Four hundred tons of coal were displaced by this burst which came from the upthrown or rise side of the fault. Inspection made after the burst showed fine dust laying thickly in the heading 119 ft. back from the foot of the coal ejected. Approximately 40 vertical feet was found from the pavement of the downthrown side of the fault to the ceiling of the burst, the coal being displaced from this crushed zone. The outthrown coal filled the drive to within 2 ft. of the roof and the heap top was flattened by the pressurised issue of gas. This coal was emitting CO_2 two hours after the burst, giving a visible haze effect in the drive.

Outbursts "60B," "60C" and "60D" succeeded on 22nd April, 1960, 13th May, 1960 and 27th May, 1960 from dips Nos. 3, 2 and 1 and from intersection of the same fault which was a normal fault, upthrown to the dip, and of displacement between Nos. 3, 2 and 1 dips of 1 ft. 3 in., 2 ft., and 2 ft. 3 in. This fault is part of the described system of stress which is found across the strike line. Coal yielded from these three outbursts was 370, 200 and 170 tons respectively. Prior to these bursts, face conditions were:—

"60B."—Face conditions were normal with high, but no higher than normal gas pressures from pilot holes. After this burst information was given that in the boring of a pilot hole, a soft zone of coal had been passed through in a position coinciding with that of the fault. Employees working in the vicinity of O/B "60B" three days after the occurrence, reported their hearing of distinct strata bumps, which indicates the expected readjustment of stress. With the direction and position of this normal fault known, a burst from No. 2 dip was predictable. Face conditions were again normal before firing with 45 p.s.i. measured at a pilot hole bored to a depth of plus 30 ft. of the fault. No damage to roof or floor was occasioned by the "60C" outburst and no CO_2 was found to be given off from the burst coal 1½ hours after the event. Dust concentration in the drive after firing was not great. O/B "60D" also was predictable and No. 1 dip had been standing for more than four weeks approximately 26 ft. from the projection of the fault line. In the driving of this 26 ft. the nature of the face had been noted to change to a greyish or splinty lustre and the normally soft sooty band—5 ft. from pavement—had hardened to a coke like texture. No damage to ribs, roof or floor resulted from this "60D" burst and the CO_2 emission from the outthrown coal heap was found to be but slight after 1½ hours. There was no flattening of the heap top, indicating in this case that there was no vigorous gas emission post deposition. Eight days after this O/B about 20 strata bumps were reported from the left hand rib of No. 2 dip from the direction of the site of O/B "60D".

A further burst from this fault occurred in No. 2 West heading on 21st June, 1960. This heading was being driven approximately along the strike of the seam to the West and was making an oblique crossing of the fault which was carrying across the face from left to right with advancement. Strata bumps from this heading had been reported on the 1st June at 10.40 and 11 p.m.

With the fault plane travelling with advancement some shootings had been attended with long pulls and high yields which was normal expectation with the probability of gas emission giving some measure of assistance to blasting on the end provided by the fault plane. The outthrown heap of coal was top flattened 12 in. below the stone roof, indicating gas emission post deposition. Fine dust was evident on inspection.

On the 5th August, O/B "60F" occurred in No. 3 West heading displacing approximately 300 tons of coal. The fault of origin proved to be a reversed fault of approximately 8 ft. displacement. Previous to this bursting intersection a fault was crossed without incident, and in light of further knowledge this fault is converging to a meeting of the plane of the outbursting reversed fault in the solid to the right of No. 3 West and between Nos. 2 and 3 West. On the 10th and 17th November, 1960, O/B's "60G" and "60H" occurred from the same fault and in almost adjacent positions in a down driven cutthrough from No. 15 level and at the projected point of intersection with No. 1 West heading. O/B "60G" yielded 180 tons of coal from a normal fault of 1 ft. upthrow to the dip. This fault had an associated broken zone of approximately 4 ft. inbye of the plane. The outburst coal was fine, bright and sheared with no great dust deposition. On the top of the heap and to the right hand side a gutter existed, which appeared to have been formed by a strong outflow of gas after the heap had been deposited.

On completion of the cleaning up of O/B "60G" the down-driven cut through was turned to drive back along the projected line of No. 1 West heading to make an air connection with that heading, at the inbye end of which a fall had occurred. On the third shooting out in this back drive to the East, an outburst off the fault in the right hand rib eventuated opening up an area of broken roof—the 4 ft. broken zone as mentioned under O/B "60G"—which fell to the upper Bowen seam roof 10 ft. above the roof of the Bowen. This outburst was not of major proportions as regards displaced coal, but presented a further mining difficulty with the large quantity of fallen roof which followed.

Throughout the year, information re occurrences, bore hole gas samples, &c., has been fed to Mr. Hargraves of Sydney University whose activities in the field of research into such phenomena continues. Mr. Hargraves made three visits to the field during 1960 conducting associated work.

Diesel Locomotives

Only in Central division is use made of this form of mine transport in two mines, viz.: *Dawson Valley* colliery and *Burnett No.* 2 mine, Maryborough district. In both mines operating results have given rise for no complaint.

Mine Fires

Sound planning to the minimising of spontaneous combustion in mines has borne fruit in a year of no report of heating. There have occurred, cases of leaking seals enclosing areas of fire, but such incidents have caused no state of emergency other than the organisation required to systematically deal with the repair and maintenance of stoppings. It behoves mine management to study the characteristics of the seams they are working in order that they may shape work to clear seam sections liable to fall and spontaneous combustion and also to block out their plan of work so as to render isolation of areas as simple a task as possible when the necessity to do so arises.

Subsidence and Falls of Ground

Two reports of subsidence of major proportions were received during 1960, both of which demanded instant action to ensure continuance of life of the mines concerned. Investigation of a subsidence at *Dawson Valley* colliery on the 14th January, 1960, revealed that a creep was developing in the South section of the mine in the lower Dunstan seam and in the Dawson seam (upper), with the affected areas from No. 8 to No. 14 bord South—Dunstan workings—and from 6 South to 16 South—Dawson workings. Pillar crush and floor heave had developed and timber was badly broken in the whole of the affected area. Both seams are overlain by a strong and massive sandstone, whilst the rise workings of the Dunstan seam were heavily robbed during the change over stage from Dunstan to Dawson working after the flooding of the Dunstan seam during the 1954 flood.

Creep action eased after the first 24 hours, but again became active after 36 hours, with heavy indications that the massive overlying sandstones were setting up a cantilever action over the Southern areas of Dunstan and developing through to Dawson, and the only emergency recovery action which could be contemplated within the time limits set by creep and probable flooding would be the breaking off of the sandstones to relieve this cantilever action over the badly robbed area which pitches at 30 degrees. Work to build a flood protection levee was completed giving protection to the affected surface area against any river rise. Concurrent with this work, bore holes were put down for the purpose of blasting to cut the sandstone and relieve stress. Sand stowing was commenced and continued throughout the year.

A major subsidence was reported from *Burnett No.* 2 colliery, Selene, as having taken place on 11th April, 1960.

Burnett tunnels Nos. 1 and 2 are driven in contra direction—West and East—into this seam of fairly light grade, and with the closing of No. 1 and opening of No. 2 use was made of No. 1 drives and air shaft as return airway and ventilating shaft for No. 2 workings. No change to this system had been made, despite repeated falls and drive closures in the shallow and friable ground between the two tunnels until only one return drive was left open as at the beginning of 1960. The reported fall occurred in this drive, completely blocking it, falling up to a height of 40 ft., which was within 15 ft. of a surface breakthrough within half a chain of the branch railway to the mine.

On the three shift basis of work, this connection was made on the 18th April, and production was resumed on the 19th and later a new return was completed.

Mine Ventilation

In this all important section of mine work, it can be claimed that whereas deterioration has occurred in some cases, advancement has been made in others. The new fan installation as made at one central divisional mine at the close of 1959 has shown some improvement to ventilation condition, but will not be fully effective until the air coursing work has been completed.

The results of constructive work and planning over a long term are now being felt as improved conditions in a Northern mine which has had a long record of repeated reduced shift readings. Concentration of area of work to which two intakes and two returns are now established have achieved this improvement. The mines of smaller scale with their lower outputs and consequent slower advancements do not vary considerably during a single year of operation, provided that the provision of sound stoppings, ventilation doors, air crossings, &c., are provided as part of the process of driving. Some instances or unintelligent use of auxiliary ventilation have again been subject to criticism on the basic principle that normal means of supply of adequate ventilation must at all times be provided to working faces, with the use of auxiliaries acting only as a local boost to such ventilation as it is required.

Prosecutions and Inquiries

No person was prosecuted and no Mining Inquiry into any matter was deemed necessary during 1960.

SOUTHERN DIVISION—ELECTRICAL INSPECTOR OF MINES

Report of Mr. J. Newborough

The following report is submitted on the administration of the Electrical Rules under the Coal Mining Acts and the Mines Regulation Acts in connection with the use of electricity and electrical machinery during the year ended 31st December, 1960.

During the year frequent and regular inspections were made of surface and underground electrical equipment associated with the 64 coal and metalliferous mines contained in the Southern Division.

Use of Electric Power

Tables I. and II. are compiled from returns submitted by coal mines, metalliferous mines and ore reduction works in localities comprising the Southern Division of the State.

The total for all purposes above and below ground of 25,478 h.p. shows an increase of 1,890 h.p. over that recorded for 1959. With the exception of such items as ventilation, air compressors, and underground hoisting and haulage, all items registered increases of installed horsepower, the largest increases being registered under the headings of coal cleaning and screening, conveyors, and coal cutters.

The total number of individual units installed increased by 189 and was due mainly to the increased use of conveyors below ground and the installation of three new washing plants.

TABLE I

HORSEPOWER OF MOTORS IN USE FOR ALL PURPOSES—ANALYSIS

Purpose	Metalliferous		Coal		Purpose	Metalliferous		Coal	
	1959	1960	1959	1960		1959	1960	1959	1960
Aboveground—					Belowground—				
Winding and Haulage	141	133	4,115	4,446	Hoisting and Haulage	..	..	2,172	2,075
Ventilation	13	20	2,004	1,976	Pumping	8	8	1,207	1,277
Pumping	3,936	4,058	368	396	Air Compressors ..	..	..	..	..
Air Compressors ..	79	80	1,855	1,760	Auxiliary Ventilation	..	..	224	248
Smelting	..	..	..	..	Scrapers and Loaders	..	..	809	811
Milling and Ore Dressing ..	581	731	..	..	Conveyors	..	..	1,275	1,621
Coal cleaning and screening ..	..	..	2,893	3,418	Coalcutters	..	..	370	690
Other Purposes ..	214	272	767	700	Other Portable Machinery ..	..	..	408	488
					Other Purposes ..	..	..	149	170
Total Aboveground	4,964	5,294	12,002	12,796	Total Belowground	8	8	6,614	7,380

The increases shown for 1960 in the number of individual units and installed horsepower, particularly at metalliferous mines, is due mainly to resumed operations of Rutile Sands Pty. Ltd., together with new installations carried out at the Queensland University Experimental training mine. With the continued restricted operations of the beach sand mining companies, very little variation can be expected in respect to installations at metalliferous mines in the Southern Division.

TABLE II

USE OF ELECTRICITY AT COAL MINES AND METALLIFEROUS MINES AND TREATMENT PLANTS

TOTAL UNITS INSTALLED AND HORSEPOWER IN USE

Locality	Number of Units Installed				H.P. in Use Aboveground 1960		H.P. in Use Belowground 1960		Total Horse-power	
	Metalliferous		Coal		Metal-liferous	Coal	Metal-liferous	Coal		
	1959	1960	1959	1960					1959	1960
Ipswich	..	..	1,436	1,513	..	12,022	..	7,223	17,753	19,245
Darling Downs ..	..	..	67	69	.	774	..	157	863	931
South Coast	514	609	..	..	4,998	..	..	..	4,700	4,998
North Coast	54	52	..	..	172	..	..	..	171	172
Brisbane	9	36	..	..	124	..	8	..	101	132
Totals ..	577	697	1,503	1,582	5,294	12,796	8	7,380	23,588	25,478

Table II. above indicates the total number of units and horsepower installed where electricity is consumed. Two mining companies in the Southern Division generate their own power.

The total number of 2,279 individual units installed in the Southern Division at the 31st December, 1960, is more than double the total of 1,096 units installed and in use in 1950 in this division and is nearly equal to the total number of units in use in 1950 at all coal and metalliferous mines of the State and is practically twice the number of 1,290 individual units installed and in use in 1940 throughout the State.

The total number of individual units now installed in both coal and metalliferous mines throughout the whole of the State is 6,520 representing a five-fold increase since 1940.

The total installed horsepower of 25,478 is also more than double the figure recorded in 1950 which was then 11,870 horsepower for the whole of the Southern Division. The increases in the number of installed units and horsepower represent approximately a 10 per cent. increase on the figures recorded in 1959.

Accidents

During 1960 there were no fatal accidents attributed to the use of electricity. One serious accident and one dangerous occurrence were reported during the year. The serious accident can only be attributed to negligence and bad practice or foolhardiness by the mine electrician concerned who received second degree burns to the head, face, chest, and forearm as he attempted to start a motor driving a vibratory screen and the starter blew up in his face. He had just repaired the starter having put a complete new unit into the case and as he pressed the starter button with the door open, the accident occurred.

The person concerned had removed the pins from the starter door hinges making it possible to remove the door completely from the starter enclosure and as this was an interlocked starter, it enabled him to close the isolator and put power on to the starter and operate it with the door removed resulting in his subsequent injuries.

The dangerous occurrence was the result of a cable of a power borer catching fire adjacent to the gate end box controlling it. Approximately two ft. of the cable was burnt but fortunately no other damage resulted.

Investigation showed there were two contributing causes in that the oil in the overload dashpots was too heavy and prevented the operation of the dashpot plungers and the earth leakage mechanical linkage had fallen out of adjustment, thus the control panel was unable to provide either overload or earth fault protection to the cable or borer.

The above occurrence cannot be regarded lightly because the consequences could have been most serious as both a fire and ignition hazard had been provided by what was obviously a case of poor maintenance together with neglect of two vital pieces of protective equipment designed primarily for the protection against fire, ignition and shock.

Mine Electricians

At the Annual Examinations for Mine Electricians' Certificates, held in December, 1960, there was only one candidate and he was successful in obtaining his certificate.

The standard of candidates is still below average and the necessity for a course for Mine Electricians completely and entirely separated from any other mining course of instruction is again emphasised.

At the present time there is virtually a shortage of certificated mine electricians working in the industry and it is very obvious the numbers employed are insufficient to maintain the equipment installed, in and about the 73 coal mines, at its maximum safety.

The reluctance to employ apprentices is still difficult to understand, since a person fully trained at a mine from the

beginning of his career must eventually prove the best investment to the industry and to any company who has trained him. It is hoped with the implementation of the preliminary training schemes that employers will be tempted to select the more promising youths for selective training as tradesmen in the industry.

General

During the year another three collieries made application for permission to use an 11,000 volt supply below-ground mainly due to proposed mechanisation schemes necessitating the use of Continuous Miners and A.C. Shuttle Cars. This also necessitated approvals for new surface switchrooms and out-door substations.

Two visits were made to Sydney during the year, firstly to the Joy Manufacturing Coy's works at Rosebery and later to the Fox Manufacturing Pty. Ltd. works at Greenacres, for discussions with their respective technical staffs regarding necessary alterations to their equipment so that it would meet the requirements of the Queensland Mining regulations before being delivered into the State.

As a member of the committee formed to examine the draft for "Electrical Equipment in Hazardous Locations" prepared by the Australian Standards Association a meeting was attended in Sydney during April. This committee, reconstructed on a Commonwealth basis, has a wide representation of industry, manufacturers and Statutory Authorities throughout Australia. The meeting dealt thoroughly with all comments, many of which were submitted from Great Britain, America, New Zealand and the Continent of Europe from which a final publication, conforming closely to International and British Standards, should be published early in 1961.

Two displays of Fire Fighting Equipment were attended during the year. The displays were confined mainly to oil and petrol fires using water, CO_2 fire extinguisher, the Foam Extinguisher and the Dry Chemical Extinguisher. Comparisons were made of each type and it was established beyond doubt that for fires with oil and petrol, the Dry Chemical Extinguisher was the most effective. This extinguisher is highly suitable for electrical fires since the powder used smothers the fire and is a non-conductor, non-corrosive, non-toxic and non-freezing. It is easily swept up after use and will do no damage to electrical equipment or rotating parts.

It is again pleasing to record that new installations are now maintaining a set standard and that the workmanship displayed generally indicates a much higher degree of pride by the persons concerned with the carrying out of these installations.

Telephone and signalling equipment being installed is more robust and generally applicable to the conditions encountered in mining and this together with improved maintenance indicates that at last there is a growing awareness of the importance of these two services.

During the last ten years there has been a tremendous extension in the use of electricity below ground at both metalliferous and coal mines. In respect to coal mines, this brings with it, particularly, the serious hazard of incendive sparking which to a great extent is being met by the use of flameproof equipment and intrinsically safe circuits but much remains to be done to continue and maintain safe practices; this particularly applies to conveyor belt installations.

It is encouraging to note that with the considerable increase in the use of electricity it has been possible to keep pace with the increasing hazards in most instances by the development of safer means for its utilisation; the number of accidents attributed to its use, whilst not offering ground for complacency, does reflect very favourably on the class of equipment introduced over the last ten years as well as on those concerned with the installation and maintenance of the electrical installations and associated equipment.

ANNUAL REPORT OF THE GEOLOGICAL SURVEY OF QUEENSLAND FOR THE YEAR 1960

A. K. Denmead, Chief Government Geologist

The year 1960 was characterised by further expansion of staff and diversification of activities. For the first time in its history the Geological Survey has a trained palaeontologist on its permanent staff and it is expected that further appointments to this section will follow.

Diamond drilling to prove coal reserves was conducted on the Ipswich, Rosewood, Burrum, Bowen River, and Darling Downs (Tannymorel) coalfields, and the staff of eight geologists in the Coal Section were kept busy selecting drill-hole sites and computing reserves on all these fields except Bowen River, where geologists of Bowen Consolidated Coal Mines Pty. Ltd. did the logging of cores. Significant additions to reserves were recorded at Ipswich, Bowen River, and Howard.

There were four mapping parties in the field; three of them were joint Geological Survey–Bureau of Mineral Resources parties, the fourth comprising Bureau of Mineral Resources personnel only. Work was begun on the mapping on the scale of four miles to an inch of the Bowen Basin, commencing with the Clermont and Mount Coolon four-mile sheets. In continuation of the work done in 1959 on the Atherton four-mile sheet a full-scale party mapped the greater part of the adjacent Mossman sheet. The vexed question of the relation of the Hodgkinson beds to the Barron River Metamorphics was not completely resolved, though the answer is unquestionably much nearer. A party of three Bureau of Mineral Resources geologists completed the mapping of the double row of four-mile map sheets adjacent to the Northern Territory border by mapping the Mount Whelan, Bedourie, Machattie, Birdsville and Betoota sheets. This brought them into the areas which had already been mapped in some detail by Delhi-Frome-Santos, and gave a complete coverage to the regional seismic traverse from Maree to Boulia carried out by the South Australian Department of Mines. These projects are expected to assist materially in elucidating the basement geology of this part of the Great Artesian Basin.

In Engineering Geology a field staff of four was kept particularly busy on investigations related to engineering projects in many parts of the State, in association with engineers from other Government Departments, local authorities and others. Two hydrogeological investigations were undertaken during the year. Arrangements are being discussed for an officer to work full time on projects proposed by the Main Roads Commission.

In the micropalaeobotanical section we were obliged to relinquish temporarily the fundamental studies on the Ipswich Coalfield in order to comply with requests from oil search companies for palynological study of bore cores. In the predominantly continental type sediments encountered in the Great Artesian Basin the Company geologists are depending almost entirely on spore assemblages found in coal and the finer sediments to define the geological age of the strata penetrated.

The systematic geological mapping of the Greater Brisbane Area was stepped up, and the completion of the necessary field work was in sight at the end of the year. From April a Proline mechanical auger was in continuous service to obtain subsurface evidence in areas of no outcrop and to secure samples of clay and other materials which might be of economic value. Several areas of possible economic interest were thus delineated.

The Geological Survey kept a close watch on all oil prospecting activity. Company applications for Commonwealth subsidy have been scrutinised and recommendations made in connection therewith. Numerous request for non-confidential data from our rapidly expanding files have been met. Inspections of drilling activities were made at frequent intervals and production tests were witnessed. In connection with the gamma-ray and temperature logging of selected artesian wells conducted by the Bureau of Mineral Resources composite gamma-ray-temperature-lithological logs of 23 bores were prepared for printing and distribution to interested parties.

By arrangement with the Irrigation and Water Supply samples of cuttings from all new artesian bores are now being forwarded to the Geological Survey for identification and storage. This will greatly facilitate correlation and sedimentology studies in the Great Artesian Basin.

In the metalliferous sphere general inspections of tin mining activities in the Cairns hinterland and of the manganese province in the Mary Valley were the most important activities. Following a detailed geological examination Departmental drilling was carried out at the Golden Plateau mine at Cracow in an effort to augment the Company's dwindling reserves.

CONFERENCES

Interstate Geological Conference

The Chief Government Geologist attended an Interstate Geological Conference held in Canberra and the Snowy Mountains area from 29th February to 5th March. The conference was attended by representatives of the Bureau of Mineral Resources and all the States except Tasmania. The most helpful aspect of the Conference was, perhaps, the interchange of information on new techniques in geological mapping, draughting, and map reproduction. Following a lively discussion a new code of standard symbols and colours was adopted. The new colour scheme is very much more flexible than the old and is expected to result in cheaper map production.

Artesian Well Logging Conference

Following a conference of representatives of the Mines Department, the Irrigation and Water Supply Commission, Queensland Petroleum Exploration Group (QUPEX) and representatives of a number of oil exploration interests it was decided that the Geophysical Section of the Bureau of Mineral Resources should conduct an experimental programme of gamma-ray logging of artesian bores, designed to ascertain first the feasibility of such testing and secondly whether adequate data could be got from cased bores to enable reliable correlations to be made. The subsequent activities in this connection are summarised in R. J. Allen's report.

EDUCATION

A member of the staff gave a lunch hour talk, illustrated by colour transparencies on "Geology as a Profession" to senior boys at three High Schools in Brisbane.

COMMITTEES

The Geological Survey was represented on the following Committees:—

Stratigraphic Nomenclature	J. B. Cameron
Tectonic Map	G. W. Tweedale
Great Barrier Reef	A. K. Denmead
Standards Association of Australia (Queensland Panel)	H. G. S. Cribb

GEOLOGY OF QUEENSLAND

During the year Volume 7 of the Journal of the Geological Society of Australia, *The Geology of Queensland* was published. The preparation of this work was a combined effort by the University of Queensland and Federal and State Government officers, as well as geologists employed by mining and oil companies and others. Its publication in an expanded form was made possible by generous donations by many mining companies and by the Governments of the Commonwealth and the State of Queensland.

LIBRARY

New steel shelving was provided by the Department of Public Works and it has been proposed that the library be serviced by the Public Library. No decision has yet been reached, however, and the books remain in storage at the Bulk Store.

PUBLICATIONS

Three Geological Survey Publications were issued:—

No. 293 "Coal Resources, West Moreton (Ipswich) Coalfield." Part 12 "New Whitwood Mine Area, Dinmore" by B. W. Hawkins. Part 13 "Cooneana Estate Mine Area" by D. C. Mengel.

No. 294 "Jurassic Spores and Pollen Grains from the Rosewood Coalfield," by N. J. de Jersey.

No. 297 "The Uranium Deposits of North-Western Queensland" by J. H. Brooks.

The following geological reports were published in the *Queensland Government Mining Journal*:—

(1) "Fossil Plants from the Goodna District," N. J. de Jersey, Ph.D., Jan., p. 829.

(2) "Palygorskite Clay, Redbank Plains," T. H. Connah, M.Sc., Jan., p. 834.

(3) "Ipswich Bore N.S. 187, Haighmoor, North Ipswich," H. R. E. Staines, B.Sc., Jan., p. 837.

(4) "Pozzolana Deposit near Tully Falls, Ravenshoe," W. E. Bush, B.Sc., Feb., p. 21.

(5) "Limestone Inspection in Repulse Islands," N. A. H. Simmonds, B.Sc.App. (Geol.), and R. M. Tucker, B.Sc., Feb., p. 23.

(6) "Welcome Gold Mine, Sala Siding," K. R. Levingston, B.Sc., April, p. 161.

(7) "Carrington's No. 2W Shaft, Liontown," K. R. Levingston, B.Sc., April, p. 161.

(8) "New Names in Queensland Stratigraphy—Tertiary Formations in the Ipswich District," H. R. E. Staines, B.Sc., May, p. 221.

(9) "Spore Distribution and Correlation—Rosewood Coalfield—Smithfield No. 3 Mine Area," N. J. de Jersey, Ph.D., M.Sc., June, p. 272.

(10) "Coal Resources Darling Downs—Sugarloaf Mine Area, Oakey," W. L. Hawthorne, B.Sc., July, p. 358.

(11) "Mt. Victor Silver-Lead Prospect, Widgee," by J. H. Brookes, B.Sc., Aug., p. 395.

(12) "Dover Castle and Midas Tin Mines, Petford," by K. R. Levingston, B.Sc., Sept., p. 459.

(13) "Gold Workings, The Highway Lease, Charters Towers," by T. H. Connah, M.Sc., Sept., p. 461.

(14) "Mica Creek Pegmatites, Mount Isa, North-western Queensland," J. H. Brooks, B.Sc., Oct., p. 511.

(15) "Coal Resources, Burrum Coalfield—C.P.A. 329 (Maryborough)", W. L. Hawthorne, M.Sc., Nov., p. 575.

(16) "Coal Resources—Rosewood–Walloon Coalfield. Neath Mine Area." J. B. Cameron, Nov., p. 585.

(17) "Underground Development and Exploration Golden Plateau Mine, Cracow, 1959-60," J. H. Brooks, B.Sc., December, p. 658.

The revised paper on oil and natural gas in Queensland went to the printer and will be issued in 1961 as G.S.Q. Publication 299. Printing of Mr. Hawthorne's paper (G.S.Q. Publication 296) on the Burrum Coalfield was almost complete by the end of the year. Mr. Connah's comprehensive report on beach sand mining in Queensland is now ready for printing. A report by Mr. Brooks on manganese mining in the Mary Valley should be completed early in 1961.

LABORATORY

Samples and specimens amounting to 1,297 were received during the year involving 5,079 determinations.

The Coal Section submitted a total of 618 coal samples to the Government Chemical Laboratory.

Twenty-two rock and/or mineral collections were supplied during the year. Collections were donated to State High Schools at Innisfail, Melbourne, Redcliffe and North Rockhampton; Wondai State School; State Industrial High School. A number of private collections were classified.

Of considerable interest, though not of economic importance, was the occurrence of a uranium bearing mineral closely associated with black slickensided chloritic material, magnetite and pyrite in a granitic segregation on Teemburra Creek, 32 miles west-south-west of Mackay. The radioactive mineral was present as small disseminated amber coloured semi-translucent grains with a vitreous to, at times, almost splendent lustre and a conchoidal fracture. Under the microscope the mineral was reddish-brown in colour with a markedly high refractive index. On analysis the mineral was found to be a member of the uraniferous niobate–titanate–rare earth group. The results of the analysis made by the Government Chemical Laboratory on a concentrate of the uranium mineral are given below:—

	Per cent.
Tantalic and niobic pentoxides (Ta_2O_5 and Nb_2O_5, principally Nb_2O_5)	6.1
Titanium dioxide (TiO_2)	2.9
Rare earth oxides (principally yttria group)	8.0
Uranium oxide (U_3O_8)	0.68

The physical, chemical and optical properties of the mineral correspond closely with those of euxenite and fergusonite but positive identification has not yet been made.

An earthy yellowish-white radioactive mineral in a highly altered granitic rock was submitted for determination from the *Why Not* mine, 24 miles west-north-west of Cloncurry, ¼ mile west of *Wonder Valley* copper mine. On submission to the Government Chemical Laboratory for analysis it was found to contain 3.5 per cent. thoria (ThO_2) and 0.06 per cent. uranium oxide (U_3O_8). Tests carried out on the mineral tend to suggest it is most likely weathered thorite (thorium silicate) or one of its varieties. A sample has been submitted to the Mineragraphic Section of the C.S.I.R.O. for confirmation of this identification.

From the material submitted during the year and other sources the following new mineral localities have been verified:—

Anhydrite.—Between 1,038 ft. and 1,048 ft. in Conorada No. 1 bore on Mackunda Creek, west of Winton.

Native copper (in very minor amounts) in greenstone at varying depths.—Diamond drill holes at proposed North Pine damsite and quarrysite on por. 70, par. Whiteside and pors. 157 and 158, par. Warner.

Manganese.—A number of new manganese occurrences were recorded in the Mary Valley. These are detailed in a report being prepared by Mr. Brooks for publication.

Sphalerite, galena, pyrite, chalcopyrite and very minor *malachite* in limestone and quartz.—Por. 99v, par. Brooyar, County Lennox.

Uranium (?euxenite or ?fergusonite) associated with chlorite, magnetite and pyrite in quartz-feldspar segregation in granite.—Teemburra Creek, timber reserve 431, par. Mia Mia, County Carlisle, 32 miles west-south-west of Mackay.

Meteorite

Polished sections of the Gladstone meteorite referred to in last year's report were prepared and studied by N. A. H. Simmonds, who also assembled particulars of traceable fragments of the specimen recovered from the same area many years ago.

A stony meteorite from Windorah, submitted for examination, was identified as an olivine–hypersthene–chondrite. It is probably another representative of the Tenham shower of 1879.

FIELD WORK

1. REGIONAL MAPPING

Major activities for the year are summarised in G. W. Tweedale's report below. Work continued in the Dotswood area—See K. R. Levingston's report.

2. METALLIFEROUS

The principal investigations are listed hereunder. For particulars see the reports of the officers mentioned:—

Antimony.—Caboolture and Strathpine—see J. H. Brooks' report. Norman Park—See T. H. Connah's report.

Copper.—Ruddygore area, Chillagoe and *Mixer* mine, Bloomsbury—See K. R. Levingston's report.

Gold.—Charters Towers area; Southern Cross Mine, Thornborough—See K. R. Levingston's report. Cracow and Imbil—See J. H. Brooks' report.

Short inspections were made of small-scale prospecting at the *Deaf Cat* and *Australian* mines, Pratten, and advice given by N. A. H. Simmonds, Geologist.

Manganese.—Mary Valley—See J. H. Brooks' report.

Molybdenite.—Ravenswood—See K. R. Levingston's report.

Silver-Lead.—Liontown drilling—See K. R. Levingston's report. Upper Widgee—See J. H. Brooks' report.

Tin.—Herberton-Emuford-Sunnymount area; Garrawalt Creek—See K. R. Levingston's report.

Uranium.—Interest in uranium had waned, and the only field work done by this Survey was an inspection by J. H. Brooks of a discovery at Teemburra Creek, near Mackay, which, though insignificant in itself, suggests the possibility of other uraniferous mineralization in the vicinity. The occurrence provided mineralogical interest—See report of Laboratory.

3. NON-METALLIFEROUS

Clays.—Systematic investigation of potentially useful clay deposits in the Greater Brisbane area continued throughout the year, and is summarised by G. W. Tweedale. A brief visit was paid by Miss B. R. Houston to the Kingaroy area as a result of industrial interest in the white clays around Goodger. Geological advice was given in connection with a search for new sources of clay near Wondai for local brick-making. There is a rapidly growing interest in industrial clays in both the metropolitan and provincial centres of population.

Magnesite.—Upper Widgee—See T. H. Connah's report.

Opal.—Increased activity in opal prospecting in the Cunnamulla district was responsible for a brief visit by N. A. H. Simmonds in November, in company with the Inspector of Mines. Very little can now be seen of the manner of occurrence of the noble opal, and while such conditions prevail it is doubtful whether geological field work could make any effective contribution to the search for new areas of gem material.

Silica Sand.—A further visit of inspection to the west coast of North Stradbroke Island was made by J. H. Brooks in connection with expanding industrial requirements of high-silica sand.

Talc.—Talc schist at Mourilyan Harbour was reported by the District Geologist to have been found on land only as hillside boulders, but similar rock has lately been encountered during blasting operations in the floor of the entrance. The highly talcose nature of specimens subsequently obtained from the latter source indicates that prospecting of the scrub-covered hillside adjoining the harbour could produce a deposit of economic interest.

4. ENGINEERING GEOLOGY AND HYDROGEOLOGY

Activities are summarised by Dr. Watkins.

5. PETROLEUM GEOLOGY

The one officer (R. J. Allen) assigned full-time to petroleum geology made excursions to Delhi–Frome–Santos Betoota 1, Standard Gas Cribb Island 1 and Aspley Scout 1, Queensland American The Overflow 1, Associated Australian Oilfields Timbury Hills 2 and Pickanjinnie 1, Smart Oil Orient 1, and Union–Kern–A.O.G. Cabawin 1, to observe drilling and testing; Roma–Rewan area, to study outcrop sections; and to Charleville, to observe gamma ray logging of water bores.

6. PALAEONTOLOGY

J. T. Woods undertook two visits to North Queensland, on which he made valuable collections for study. See his report.

COAL SECTION

H. G. S. Cribb, Assistant Chief Government Geologist

W. L. Hawthorne, Supervising Geologist

As in previous years, the major activity of the Coal Section of the Geological Survey was the geological direction and control of the Departmental drilling programme being undertaken to establish reserves in the coalfields of the State, and the assessment of results. In addition to routine reports submitted on areas completed, progressive reviews were made covering the various fields to provide information for inter-departmental planning based on utilisation of coal resources. Information and advice were given to colliery operators.

During 1960, the geological staff of the Coal Section numbered eight. W. L. Hawthorne undertook the planning and direction of drilling at Burrum and Warwick in addition to the supervision of routine duties at the Redbank office and core library. J. B. Cameron was again responsible for geological control of drilling on the Rosewood field. H. R. E. Staines was occupied in planning and directing the various phases of the drilling programme in the Bundamba district of the Ipswich field. Messrs. D. C. Mengel, E. S. Chiu Chong, W. E. Bush, L. G. G. Pearce and I. B. Freytag carried out detailed mapping of parts of the Ipswich field in addition to logging of bore cores from current drilling on the Ipswich, Rosewood, Warwick and Burrum fields.

COALFIELD INVESTIGATIONS

During 1960, Departmental drilling for coal was carried out on the Ipswich, Rosewood, Warwick, Burrum and Bowen River coalfields. A total of 135 holes was completed and six were in progress at the end of the year. Total footage drilled was 69,646 ft. 5 in. of which 59,725 ft. 8 in. was cored.

Ipswich

Drilling in the *Silkstone* area was concluded in the early part of the year with the completion of one hole and drilling of another. Footage totalled 1,395 ft. 2 in. A preliminary estimate of reserves in the unnamed, New Found Out and Aberdare seams in the area is some 20 million tons.

As part of the programme, two holes were drilled in the old golf links in Queen's Park to test the extension of the seams worked in this direction from the south-western slope of Denmark Hill. Neither hole was successful in intersecting a workable seam; nor could the sections be correlated satisfactorily with the succession in the Blackstone area.

During the year, the opportunity was taken to compile a tabulated summary of the short term drilling programme, inclusive of Silkstone and Queen's Park drilling, which had been in progress during the past ten years. In that time, 193 holes were drilled, aggregating 147,456 ft. 2 in. Reserves proved totalled 126,387,000 tons, comprising 103,817,000 tons "measured" and 22,570,000 tons "indicated".

On completion of the short term drilling recommended by Powell Duffryn Technical Services Ltd. in 1949, and the subsequent Silkstone programme, two rigs were assigned to drill widely spaced holes to test extension of the seams to the outer flanks of the Bundamba Anticline. This programme was designed to provide a necessarily rapid assessment of reserves, which could be checked by intermediate holes at a later date. Sites were selected to the dip of mine areas at *Swanbank Lagoon, Southern Cross No.* 9, *New Hope* and *Blackheath,* in which measured reserves had been established to the limit of earlier drilling. Seven holes were completed and two were in progress at the end of the year, aggregate footage being 15,189 ft. 6 in.

Because of a known zone of major dislocation traversing the *Swanbank Lagoon* area obliquely, selection of the deeper sites were preceded by detailed geological mapping.

In the *Swanbank Lagoon* area, drilling has indicated a substantial north-westward extension of reserves proved in *P.D.T.S. Nos.* 1, 2, *and* 3 mine areas in the Bluff, Wright and Lagoon seams, and also in the Aberdare bottoms. A preliminary estimate of additional reserves indicated by this drilling, subject to confirmation when analyses become available, is approximately:—

Aberdare bottoms	1 million tons
Bluff seam	17 million tons
Wright seam	5 million tons
Lagoon seam	6½ million tons

Three holes totalling 6,686 ft. 2 in. were completed during the year and a fourth was in progress at 2,289 ft. 4 in.

A single hole to 1,165 ft. 8 in. failed to extend reserves in *Southern Cross No.* 9 area.

Reserves in the Lagoon seam in the *New Hope* area were increased by some 3 million tons by two holes totalling 2,419 ft. 4 in.

Drilling has commenced to the east of *Blackheath,* and, in the one hole completed, a workable section has been penetrated which may be the Four Feet seam. Footage drilled totalled 2,629 ft.

At *Westfalen No.* 2, one hole, 154 ft. deep, was drilled to test the Top seam to the south-west of the workings. The section penetrated was comparable in quality to that worked underground, but of less thickness.

One hole was drilled to 423 ft. 3 in. near the old Bonnie Dundee shaft on *P.D.T.S. No.* 6 mine area to check early reports of the seams passed through in the shaft and provide a basis for proposed drilling towards their crops.

With availability of a third, small rig, supplementary drilling was undertaken to the west and south-west of *Haigmoor Extended* colliery, North Ipswich, to test the Haighmoor bottom seam as a project for mechanised mining. Three holes, including one redrill, were completed, footage totalling 1,278 ft. 5 in. Both the Haigmoor bottom seam and the overlying Tantivy seam showed thinly banded sections which, though high in ash, are amenable to washing. Preliminary estimates of reserves of unwashed coal have been calculated as 610,000 tons in the Tantivy and 790,000 tons in the Haighmoor bottom seam.

The lowest seam in the North Ipswich succession, the Waterworks seam, has been traced at the surface over a length of some 5 miles as a conspicuously thick, banded section which, where exposed in Sandy Creek with low dip, had an estimated thickness of 70 ft. It showed a coal to stone ratio sufficiently high to suggest the possibility of development by selective open-cast mining followed by washing, under favourable conditions regarding proximity to water supply and power house market.

Nine scout boreholes, including one redrill and aggregating 1,743 ft. 11 in., were drilled at half mile intervals to test the seam under 100 ft. cover. Selection of sites followed detailed field mapping of the outcrop and floor measures. Drilling showed that the seam ranges in thickness from 58 ft. to 100 ft. and consists of thin interbedded coal and shale bands, the proportion of coal being much less than was expected from the outcrop exposure. Washability tests are now in progress to provide data for future consideration.

Drilling on the field during the year totalled 20,184 ft. 3 in., of which 17,473 ft. was cored with overall recovery of 95.2 per cent. (91.6 per cent. in coal seams).

A report on *P.D.T.S. Nos.* 11, 12 *and* 14 mine areas (*Rhondda*), together with accompanying plans, was completed early in the year and is now in the hands of the Government Printer for publication.

Geological mapping of *P.D.T.S. No.* 5 mine area (*Box Flat*) was completed and a report on reserves proved by drilling is now in course of preparation. Drilling showed that the bottom section of the Bluff seam should be workable over the whole area, but the top and middle sections both deteriorate progressively northward. Total reserves amount to 7.68 million tons, carrying an average 34.7 per cent. ash. Washing, with 20.1 per cent. discard, would reduce the ash content to 23.0 per cent. and the marketable tonnage to 6.14 million tons.

Rosewood

Testing of *Caledonian No.* 5 mine area, which was in progress at the end of 1959, was concluded early in the year with the drilling of a further three holes, totalling 793 ft. 5 in. A report on the area sets out the reserves established by drilling as follows:—

	Tons
Top (Lanefield No. 5) seam	408,000
Caledonian No. 5 seam—	
Western section	239,000
Northern section—	
East	600,000
West	380,000
Total	1,627,000

It is of interest to record that in the area south of Mt. Marrow, thin sills and dykes of basalt intrude the measures and in places coke the coals.

Drilling of eight holes (1,827 ft. 3 in.) in the *New Malabar* area followed. It was designed to test for possible access from the south-east to reserves, amounting to 500,000 tons, proved by 1953 drilling, which were lost with the abandonment of *New Malabar* colliery due to roof troubles. Unfortunately, it showed more pronounced splitting of the seam in the area drilled. The results of this exploratory programme are now being assessed.

The programme on the Rosewood field was suspended during the period April-September, when the rig was required for urgent work at North Ipswich.

Drilling was resumed at *Mount Elliott* to test the extension southwards of the reserves in the Top working seam, which were established by emergency drilling in 1956. Satisfactory reserves were proved in this area, in spite of the presence of a major fault. Testing of the Bottom working seam and underlying seams is now in progress in the northern part of the mine area. Thirteen holes were completed and one was in progress, footage drilled totalling 2,842 ft. 3 in.

Reports for publication were submitted on *New Mountain View, United No.* 7, *Rosewood No.* 2, *Rosemount No.* 4 and *Oakleigh* mine areas and also a progress report on *Roughrigg No.* 5 drilling.

Oakey

As current drilling commitments on other fields permitted, and concurrently with the preparation of drafted plans, reports were prepared on *Acland* and *Sugarloaf* mine areas. Measured reserves in *Acland* mine area have been calculated as 5,250,000 tons and indicated as 400,000 tons. In *Sugarloaf* mine area, measured reserves have been established in three seams as follows:—

	Tons
Sugarloaf working seam	2,420,000
Sabine top seam	325,000
Sabine bottom seam	895,000
	3,640,000

Outstanding analytical results for *Willeroo* mine area are recently to hand and a report is in course of preparation.

Warwick

Drilling in the *Tannymorel–Killarney* area commenced in late January to locate reserves for development by the operating colliery. Five holes drilled at *Tannymorel* colliery showed that the working seam deteriorates to unworkable quality and thickness south-east of the workings and an area to the east of the old workings is now being tested. In the area north of Killarney, three coaly sections were tested without success although near workable sections were cored in some holes. Two holes drilled at Tannymorel Township to prospect seams reported from percussion bores failed to locate workable coal.

Area	Number of Holes	Footage Drilled	Average Recovery in Coal Seams
		Ft. in.	Per cent.
Tannymorel Colliery	5 complete 1 incomplete	2,993 5	96
North Killarney ..	4 complete	1,340 11	96
Tannymorel Township	2 complete	385 5	100
All Areas ..	11 complete 1 incomplete	4,719 9	96

Burrum

During the year exploratory drilling was carried out in three areas by 37 boreholes with aggregate footage of 20,136 ft. 5 in. including 4,758 ft. 4 in. openholing. Footages and core recoveries for the various areas are summarised in the table below.

Area	Number of Holes	Footage Drilled	Average Recovery in Coal Seams
		Ft. in.	Per cent.
C.M.L. 75, C.P.A. 331 (formerly C.P.A's. 315, 316) ..	12 completed	5,646 5	84
C.P.A. 334	12 completed	6,714 9	92
C.P.A's. 332, 335, 336 C.M.L. 59	13 completed 1 incomplete	7,775 3	95
All Areas ..	37 completed 1 incomplete	20,136 5	91

In C.M.L. 75 and C.P.A. 331, where drilling had already proved a mine area with reserves of 1,500,000 tons of coal, exploratory drilling was continued to test three potentially workable seams. A second mine area may exist at shallow depth in one seam, but, because of lenticularity further drilling by non-coring methods would be necessary to prove sufficient reserves. In C.P.A. 334, twelve holes were drilled, the main objective being two seams previously prospected by non-core company boreholes. These seams proved thinner than had been anticipated but further prospecting may prove a workable area. The drilling plant was moved from this locality to the southern end of the Burrum Syncline where exploratory drilling was in progress at the end of the year. Reasonable prospects exist of proving workable reserves in three seams and drilling will continue in this area in 1961.

Callide

No Departmental drilling was undertaken on this field during the year, but the advice of the Geological Survey was sought on the present reserve position and it was later called on to assess the results of non-core company drilling. Fourteen bores were put down at sites selected by the company in the area west and south-west of Petersen's Gully, in an effort to extend low-ratio reserves in these directions. Assessment confirmed the westerly deterioration of the seam in both thickness and quality shown by earlier Departmental drilling and showed that no radical amendment is required to the southern or western limits of reserves.

Kianga

The results of exploratory and developmental drilling on the field by Messrs. Thiess Bros. (Qld.) Pty. Ltd. have been recorded and studied for Departmental information.

Baralaba

Following discussions with Mount Morgan Ltd. in October, preliminary arrangements were made to carry out Departmental drilling to prove reserves in the mine leases of Dawson Valley colliery. It is proposed to initiate the programme by testing the seam succession ahead of workings within the limits imposed by the course of the Dawson River. Geological field duties will be undertaken by a company geologist working in collaboration with the Geological Survey.

Nebo

A reassessment of Departmental drilling carried out in 1959 has been made and an official report on the programme is in course of preparation.

Bowen River

Drilling continued throughout the year with two plants working under an agreement with Bowen Consolidated Coal Mines Ltd., by which the company provides geological field services and the Department assumes responsibility for sectional sampling and analysis of seams.

State Mine Area.—During the first half year, drilling continued to test the Blake seam at shallow depths in search of an entry through the area between Nos. 1 and 2 tunnels where the seam has been partly removed by contemporaneous erosion. A further 17 holes were drilled, with aggregate footage of 5,623 ft. 1 in. Exploration was, however, unsuccessful in locating a possible line within the limits imposed by surface installations and topography.

Attention was transferred to the Garrick seam which, except for a high pyritic sulphur content towards the roof, offers ideal conditions for development. Seven additional holes drilled to test this seam at shallow depth were continued to the Scott and Denison seams. This drilling, totalling 2,554 ft. 4 in., confirmed previous testing at wider intervals and it is now proposed to sink a test shaft to obtain bulk samples of Garrick coal under 100 ft. of cover for tests aimed at reducing its sulphur content.

B.C.C.M. Area.—The Joy 225P drill was employed throughout the year in testing the Bowen seam in CPA 41 (now 51). Twelve holes, totalling 10,028 ft. 4 in. were completed. In all sections the Bowen seam was more or less intruded by sills.

Since November, the E1000 plant has completed two holes in CPA 45 on the western flank of the syncline where a line of holes at approximately 20 ch. intervals has been sited to test the Bowen and Blake seams at greater depth than in the earlier series. Although intruded at varying horizons by sills, the thick seam sections recorded offer prospects for selective mining of unintruded, though usually coked, parts of the seams. To date, two holes have been completed, footage drilled being 750 ft. 7 in. Two prospecting holes (186 ft. 9 in.) were also drilled to the west of the opencut.

MISCELLANEOUS

Advice was tendered to the Co-ordinator-General's Department and the Ipswich City Council regarding further work required in the investigation of the proposed site of a bridge across the Bremer River, following examination of subsurface exposures in Pengo boreholes. Further investigation was directed by the Engineering Geology Section.

The Ipswich City Council also sought assistance in the search for suitable road metal to replace Booval quarry. Preliminary investigation was made of a potential source at Mt. Juillerat and recommendations for testing the deposit and the material were submitted. Subsequently, the Council drilled a test hole, the core from which was logged.

The Assistant Chief Government Geologist collaborated with Mr. A. J. Norman, Fuel Technologist, Queensland Coal Board, in revising the Queensland section of Power Survey Report No. 3—The Coal Resources of Australia. He also took part in discussions with the Coal Utilisation Research Advisory Committee and the State Electricity Commission.

Table 1

SUMMARY OF DIAMOND DRILLING ON THE VARIOUS COALFIELDS, 1950–60

(1) Number of holes completed. (2) Footage.

Year	Field										Other Fields		Total	
	Ipswich		Rosewood		Darling Downs		Burrum		Bowen River					
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
		Ft. In.		Ft. In.		Ft. In.		Ft. In.		Ft. In.		Ft. In.		Ft. In.
1950 ..	2	5,981 9	..	..	..	..	..	160 0	..	..	3 (*c*) 2 (*d*)	917 0 1,650 4	7	8,709 1
1951 ..	18	14,711 4	..	..	..	..	3	1,506 6	..	..	6 (*d*) 5 (*e*)	3,439 0 1,337 4	32	20,994 2
1952 ..	27	16,630 7	9	3,980 1	..	..	8	5,915 11	..	..	..	..	44	26,526 7
1953 ..	21	15,815 3	12	5,103 5	..	..	11	4,832 1	..	..	..	..	44	25,750 9
1954 ..	33	22,567 6	16	3,901 4	..	..	12	5,238 2	..	..	..	..	61	31,707 0
1955 ..	21	16,032 5	17	5,102 2	12 (*a*)	1,556 1	15	5,824 5	5	3,721 7	..	..	70	32,236 8
1956 ..	23	14,044 2	27	6,536 11	2 (*b*)	589 0	12	7,141 6	59	17,088 5	..	..	123	45,400 0
1957 ..	24	14,277 10	24	7,449 1	29 (*b*)	3,904 4	19	10,913 0	99	23,781 0	..	..	195	60,325 3
1958 ..	11	13,847 10	41	8,689 11	108 (*b*)	16,574 1	32	17,114 1	85	22,466 1	..	..	277	78,692 0
1959 ..	9	11,575 1	38	7,079 0	71 (*b*)	17,199 8	51	30,268 2	47	19,210 1	30 (*f*)	6,236 7	246	91,568 7
1960 ..	23	20,184 3	24	5,462 11	11 (*g*)	4,719 9	37	20,136 5	40	19,143 1	..	..	135	69,646 5
Total ..	212	165,668 0	208	53,304 10	233	44,542 11	200	109,050 3	335	105,410 3	46	13,580 3	1,234	491,556 6

(*a*) Maranoa Colliery, Injune ; (*b*) Oakey ; (*c*) Callide ; (*d*) Styx ; (*e*) Mount Mulligan ; (*f*) Nebo ; (*g*) Warwick

T. H. CONNAH, Senior Geologist

During the year a large proportion of my time was occupied in administrative work and in general supervision of the work of the laboratory. During periods of absence by the Chief Geologist, I assumed charge of the routine functioning of the Office.

An application for financial assistance for opal prospecting was considered in detail in conjunction with the State Mining Engineer. The prospector was granted a trial period of subsidy assistance for specific work on the Yowah and Fiery Cross fields.

Progress results of a Departmentally-assisted drilling campaign for sapphires on the Anakie field were discussed with the prospector and plotted on aerial photos. A few small patches of gem wash have been found, but results to date are not very encouraging.

Brief summaries of mineral resources of several districts were prepared at the request of local authorities and other parties, and geological advice tendered in two cases on possible sources of road metal.

Field work was confined to short inspections. In January occurrences of magnesite at Upper Widgee were inspected. None of economically attractive size have yet been discovered. In August inspection confirmed the discovery in Council sewerage excavations at Milsom St., Norman Park, Brisbane, of a thin stibnite-bearing vein in lower Palaeozoic greywackes. Though of no economic significance, the deposit is of academic interest, and is a reminder that the Brisbane metamorphics are not without mineralization.

As opportunity offered, a considerable amount of time was devoted to completion of the report on heavy mineral beach sand deposits of the State, in somewhat greater detail than originally planned.

DISTRICT OFFICE, CHARTERS TOWERS

K. R. Levingston, District Geologist

Two officers, K. R. Levingston, District Geologist, and D. H. Wyatt, Geologist, were attached to the office throughout the year.

OFFICE WORK

Laboratory

The number of specimens and samples dealt with in the laboratory fell off considerably, reflecting the general decline in prospecting.

Core-logging

As in previous years, this office carried out the immediate work of core-logging and plotting of sites in the Department's metalliferous drilling programmes at the *Black Jack* mine, and at Liontown.

Regional Mapping

Mr. Wyatt's regional mapping involved him in a considerable amount of office work. Much of the area in which he is working is not covered by adequate base maps, and to overcome this handicap much time had to be spent in the preparation of maps from aerial photographs, in many cases without satisfactory ground control. In addition to this the preparation of overlays and the plotting of results had to be carried out.

General

In addition to these, there was the preparation of reports and plans as a result of field work, and the answering of enquiries for various items of information from prospectors, &c.

FIELD WORK

Gold

The Department's E1000 drilling rig was occupied at the *Black Jack* mine until July, completing the programme begun last year. One partly finished hole was completed, and three others drilled, a total of 1456 ft. This brings the complete *Black Jack* drilling to five holes, aggregating 1,984 ft. The object of the drilling was to test the *Black Jack–Lubra* (*Lewis*) and *John Bull* reef systems at short distances from the existing workings. The intersections were extremely poor, and the problem of finding new ore shoots still remains acute.

Two inspections were made of the *Highway* mine, south of Charters Towers, where some 150 ft. of exploratory work was done at the 50-ft. level. Portion of this work intersected material of satisfactory grade, and the party are now deciding what their next step to develop the mine will be. The mine is in the meantime idle.

Two small prospects close to Charters Towers were examined—the *Vital Link*, east of the *Black Jack*, and the *Imperial Central* on the *Imperial* link. In each of these a lone prospector proposes to sink a new shaft to explore old workings known to him, but of which there are no records. It is unlikely that much will be heard of either of these in the future.

An inspection was also made of the old *Southern Cross* mine, near Thornborough, on the Hodgkinson Goldfield, where some little exploratory work had been done recently. The mine is interesting in the association of gold with scheelite, but unfortunately the scheelite has virtually no value at present and the mine must depend on gold. However further exploration is warranted.

Silver-lead

Several visits were made to Liontown, where Departmental drilling totalled 832 ft. for the year. The drilling sites for this programme are based on the results of a Bureau of Mineral Resources Geophysical Survey conducted in 1959, and are not on the known ore-body.

Copper

A visit was paid to the Chillagoe district, where an Authority to Prospect is held by Mount Isa Mines Ltd. Field exploration was being carried out, and some drilling had been done, in the vicinity of the *Ruddygore mine*. Part of the work consisted of examination of a halo of metasomatism of monzonitic rocks surrounding the ore-body. There is the possibility that further ore-bodies of this type may be found by seeking similar metasomatic aureoles in the surrounding district.

A visit was also paid to the small *Mixer* mine at Bloomsbury, where several small ore-bodies containing various lead, zinc and copper sulphides have been discovered. No new work was recorded, as the mine has been closed for some time and was not completely dewatered. The present party hope to be able to produce a copper concentrate sufficiently clean to be acceptable to local buyers.

Tin

Inspections were made of various tin mines in the Herberton-Irvinebank-Emuford area. Of these only one, the *Dover Castle*, ranks at present as a producer of any magnitude. The *Gilmore*, owned by Clutha Development Ltd., is a potential producer, but the company is at present engaged purely in exploration and development. The others virtually all fall into the category of old producers on which new work was being done, or is to be done shortly, and as a whole the picture of the tin-mining industry in that area is not a bright one.

A visit was paid to the Garrawalt Creek area (Kangaroo Hills Mineral Field) where Mount Isa Mines Ltd. have an Authority to Prospect. The creeks in this area appear to have been the scene of furious activity in the early days of alluvial tin mining on the Kangaroo Hills field, when the creek-beds contained an abundance of the metal. However, little attention appears to have been paid to the occasional alluvial flats formed where these generally fast-flowing creeks were checked. These flats are not of large size, but are potentially profitable, as conditions are ideal for sluicing. At the time of inspection some six flats were being surveyed, on Garrawalt and Cleanskin Creeks. No drilling had yet been done (August).

Molybdenite

An inspection was made in the Barabbas Creek area, near Ravenswood, where North Broken Hill Limited carried out fairly extensive drilling (a total of 2,763 ft.) on a group of quartz veins carrying molybdenite and sporadic gold values. Unfortunately there was no opportunity of examining much of the core. At present operations have ceased, although the company still hold an Authority to Prospect over the area.

Talc

A visit was made to Mourilyan Harbour, where a potentially workable deposit of talc had been reported on the south side of the entrance. However the examination showed that at present the existence of the deposit is largely inferred, and much prospecting work is still necessary.

Water Supply

Some time was spent at Major Creek, near Woodstock, as a result of a request from the Irrigation and Water Supply Commission. Major Creek is on the eastern part of the large Quaternary alluvial plain traversed by the Reid and Haughton Rivers, and although there is every possibility of an enormous underground water supply, there has been very little attempt so far to exploit its potentialities in full. This is largely because of the presence of a perched water table which underlies the farming area at a shallow depth, and yields good supplies.

Engineering Projects

Two items were dealt with during the year. A brief reconnaissance was made in the Innot Hot Springs area, where possible damsites occur on The Millstream and the Wild River. The purpose of the investigation was to identify the underlying rock types and suggest weathering characteristics, as a preliminary to a geophysical investigation of depths of weathering, &c.

The other item was the site for the new bridge on the Great Northern Railway at Macrossan, where a geological reconnaissance was made and core-logging done in connection with drilling for foundations.

REGIONAL MAPPING

Ultimately the purpose of this programme is to produce a geological map of the whole of the Townsville 4-Mile Military sheet. As only one officer is employed, this will take a considerable period of time. For this year work was continued on from that of last year in the Fanning River–Dotswood area. The Devonian sediments of Fanning River and Dotswood were mapped in much greater detail than hitherto, and a group of interbedded volcanics and sediments of probable Carboniferous age was recognised, separated from the Dotswood Group by a major fault.

N. J. de JERSEY, Supervising Geologist (Palynology)

During 1960 investigations of the palynology of Queensland coals and other sediments were continued. This work can be considered under two headings:—(1) Basic research involving the description of spore species and their distribution in the major sedimentary formations of Queensland and (2) Applied research involving age determination of sediments on the basis of their microfloral content and the correlation of coal seams and other sediments.

During the year basic research was concentrated on the coal seams of the Ipswich district. Fifty samples were selected from all the major seams of the Ipswich Coal Measures, the purpose being to undertake detailed description of the spore and pollen species and their distribution. By the end of the year study of the seams of the Blackstone Formation was nearing completion. So far twenty species of spores and pollen have been distinguished in these coals and significant changes in spore distribution in the stratigraphic sequence have also been noted. In the coming year it is hoped to complete the investigation by extending it to samples from the seams of the Cooneana and Tivoli Formations. The work on these Ipswich spores and pollens will provide a reference succession of Triassic age and it has already found application in the study of Triassic sediments in the Artesian Basin.

Investigations classed as applied research were concerned with the age determination and correlation of sediments encountered in bores drilled by oil prospecting companies, mainly in the Artesian Basin. Samples have been examined from the following bores (listed in approximate chronological order):—Delhi-Frome-Santos Innamincka No. 1; Delhi-Frome-Santos Beetoota No. 1; A.A.O. Tinbury Hills No. 2 (Roma district); Queensland American the Overflow No. 1 (Beaudesert district); A.A.O. Pickanjinnie No. 1 (Roma district); A.R.O. No. 19 (Wallumbilla); A.A.O. Latemore No. 1 (Roma district); Union-Kern-A.O.G. Cabawin No. 1 (Surat basin); Conorada Ooroonoo No. 1 (Winton district). Reports on the palynology of these samples have been supplied to the companies concerned. Of particular interest was the work on samples from the Cabawin No. 1 bore, which had reached a depth of nearly 10,000 ft. by the end of the year. Sediments determined as Cretaceous, Jurassic, Triassic and Permian were encountered at various depths, the Permian being reached at approximately 9860 ft. The Triassic section in the bore was of considerable thickness in comparison with other areas in the Artesian Basin.

In addition to the above samples, the palynology of coal samples from the Colton district (Burrum coalfield) and Deighton River (Laura district) has been investigated, the former in relation to a correlation problem, and the latter for age determination (a Jurassic age being suggested). Samples submitted from the Springfield and Boolcunda districts of South Australia by the South Australian Mines Department were determined as Triassic in age.

Palaeobotanical determinations were also made on plant fossils from: Bore N.S. 1 (Warwick coalfield), portion 32A, parish of Chuwar, Bore N.S. 210, and a locality in the Goodna district (all in the Ipswich coalfield).

In the early part of the year the writer was assisted by I. G. Sanker, Geologist, who was engaged in a study of the petrology of a pillar sample of coal from the Balgowan Colliery (Oakey coalfield). Unfortunately ill health forced his transfer to other work before the investigation could be completed.

Later D. W. Dearne assisted in palynological work on samples submitted by oil prospecting companies.

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J. T. WOODS, Supervising Geologist (Palaeontology)

Following commencement of duty with the Geological Survey on 29th February, my attention was directed to the assessment of the palaeontological collections housed in the Bulk Store, William Street. Most of the exceedingly valuable series of type specimens, forming the basis of much of the early work on Queensland fossils by R. Etheridge Junior, as well as later contributions, were still stored in packing cases. This material was checked, rearranged, and the return of that part of it held on extended loan in other institutions initiated. With few exceptions, all type and figured specimens are now accounted for, and are in good order.

The extensive reference collections were found to be in urgent need of rearrangemnt, and this work has been carried out, as opportunity permitted, throughout the year. In addition, bulk material, collected by the officers of the Survey in more recent years, and not handled in the absence of a staff palaeontologist, is being progressively unpacked and absorbed in the collections.

In examining the various collections, one cannot fail to be impressed by the excellence of the fossil material obtained by the early Government Geologists, notably R. L. Jack, W. H. Rands, and B. Dunstan, in the days when these men often had to cover wide areas, under difficult conditions of transport. Some of the very early material was described by R. Etheridge Junior, but most of the remainder, with the exception of the unique collection of Triassic fossil insects from Denmark Hill, described by R. J. Tillyard, and the sections of Mesozoic and Tertiary fossil woods, described by B. Sahni, awaits detailed palaeontological work. Of particular importance are a large suite of Gympie fossils (Permian), which would not be obtainable today, and a fine collection from the Maryborough Formation (Cretaceous).

The greatest weakness in the reference collections is the paucity of material from the Cambrian and Ordovician sediments of the north-west of the State. However, taken as a whole, the collections, when brought to order, will be of great value in the immense amount of descriptive and revisionary work which confronts Queensland palaeontologists, as well as in stratigraphic studies associated with the regional geological mapping of the State.

During part of June and July, a visit was made to the Commonwealth Geological Party engaged in the mapping of the Mossman Four-mile Sheet, with a view to examining the Cretaceous sequence in the Wrotham Park area, and collecting fossils, especially ammonites, in connection with the projected zoning of the marine Cretaceous sediments of the Great Artesian Basin. A report, entitled "Mesozoic and Cainozoic Sediments of the Wrotham Park Area," has since been compiled.

In October, in the company of D. H. Wyatt, Geologist, a visit was made to fossil localities known to him in the Star Dotswood, and Fanning areas. The richly fossiliferous section of R. L. Jack's "Corner Creek" was also examined and measured. In all, a large amount of material was collected for study, in order to date formations recognized by D. H. Wyatt in the mapping of the Townsville Four-mile Sheet.

Routine laboratory work has involved the palaeontological examination of material connected with the search for oil, both subsurface samples and specimens from field surveys; specimens collected by officers of the Geological Survey during various investigations; and others forwarded by the public.

In the logging of bores penetrating the Cretaceous sediments of the Great Artesian Basin, one problem which arises relates to the separation of the marine sediments of Albian age (Tambo Formation and its equivalents) from underlying sediments of Aptian age (Roma Formation and its equivalents). The two formations can be satisfactorily distinguished by their molluscan faunas, but many of the forms are of large size and are not commonly preserved in core samples, and less so in cuttings. However microfossils, mainly foraminifera, are fairly generally distributed in these marine sediments. It is felt that the palaeontological section could be profitably expanded by the addition of a micropalaeontologist to handle this material. There is considerable scope for this work in Queensland, with the widespread Cretaceous marine deposits of the Great Artesian Basin, and numerous Palaeozoic marine formations in the eastern part of the State.

Examination of vertebrate fossils of several ages has yielded interesting results. The determination of fragmentary fish remains, collected by I. B. Freytag, Geologist, from black shales of the Silkstone Formation at Chermside Road, Ipswich, as *Notogoneus* sp. suggests that the Silkstone Formation is not younger than Oligocene. The genus has previously been recorded from the underlying Redbank Plains Formation. In material received from the University of Queensland there was recognised the first skull of an elasmosaurid plesiosaur to be recovered in Queensland. The specimen was originally found near Yambore Creek, north of Nelia, in deposits believed to be of Albian (Lower Cretaceous) age. Other material from Upper Cainozoic deposits at Homevale, west of Sarina, also received from the University, represented a a new occurrence of the little known extinct fresh-water crocodile, *Crocodilus nathani*.

A description of the first ammonite species recorded from the Laura Basin has been prepared for publication, on the basis of material from the collections of the University of Queensland and the Geological Survey.

J. H. BROOKS, Supervising Geologist (Metalliferous)

The main project for the year was the carrying out of a comprehensive survey of the Mary Valley manganese deposits. In addition, geological supervision of a programme of exploratory drilling by the Mines Department on the Cracow Goldfield was maintained, and short inspections were made of a uranium prospect at Teemburra Creek, Mackay, antimony prospects near Caboolture and Strathpine, a silver-lead prospect at Mt. Victor, Widgee, a gold prospect at Sandy Creek, Imbil, silica sand deposits on North Stradbroke Island and an occurrence of (?) alum at Bongmuller Creek, Woolooga.

The survey of the Mary Valley manganese deposits followed a reconnaissance of the main deposits in 1959. Field work extended over a total of 22 days between April and November. Nearly all the known manganese deposits were held as leases or claims in the 1958-60 period and exploratory work had been carried out on all but a few of the leases and claims. This provided an excellent opportunity to record the geology and assess the potential production of the deposits Plane table surveys were made of some of the more important deposits. I was assisted at various times by N. A. H. Simmonds and L. G. Cuttler. A report of the survey was still in preparation at the close of the year.

Exploratory drilling at Cracow was commenced in March but due mainly to difficult drilling conditions only two holes were completed, and a third was in progress at the end of the year. The drill holes were designed to test the possibility of the occurrence of a gold ore-shoot towards the western end of the Golden Plateau lode system. Although the quartz lode system was intersected in the two holes completed, no significant gold values were obtained. Visits to Cracow were made in May and October and on the latter occasion an inspection was made of recent underground developments at the *Golden Plateau* mine.

For the first year since 1954 no inspection was made of uranium exploration activity in North-Western Queensland. The Queensland Mines Ltd. drilling campaign at the *Counter, Skal,* and other uranium prospects was completed early in the year, and apart from a limited amount of diamond drilling near the *Mary Kathleen* deposit, and shaft-sinking on the *Duke* prospect, little exploratory work took place. An inspection of a discovery of uranium at Teemburra Creek, Mackay was made in September. This was the first record of uranium in this area but the occurrence is not of economic significance.

In July the Mt. Victor silver-lead prospect, Widgee, received a considerable amount of favourable publicity as a result of some additional exploratory work. However, an inspection showed that the optimism on the part of the lessees was not justified.

Inspections of small antimony prospects west of Caboolture and west of Strathpine were made in August and September. The potential production of these deposits is quite small but they are of some interest with respect to the distribution of metallic mineralisation in the Brisbane Metamorphics.

A report on the Mica Creek pegmatites was completed early in the year and is now in press. The economic geology section of the Commonwealth Bureau of Mineral Resources Bulletin No. 51 on the "Precambrian Mineral Belt of North-Western Queensland" was further revised and brought up to date. The typescript of the bulletin was sent to the printer late in the year and publication is expected in 1961.

ENGINEERING GEOLOGY SECTION

J. R. Watkins, Supervising Geologist

ENGINEERING INVESTIGATIONS

Slaty Creek Damsite

An investigation was commenced late in 1959 for the Cloncurry Shire Council of a proposed damsite on Slaty Creek to provide a water supply storage, at the request of the Council's Consulting Engineers. Two periods totalling four months were spent during the year by C. H. Shipway at the damsite in making a geological survey and providing technical supervision of the diamond drilling and water testing programme. The site has provided many problems of a stratigraphical and structural nature further complicated by the effects of faulting accompanied by mineralisation and subsequent leaching. An interim report was produced in August but further investigation will be required to provide a satisfactory estimate of the cost of remedial treatment to prevent foundation under-seepage and to estimate the protection necessary for the proposed rock cut spillway.

North Pine River Damsite

At the request of the Department of Local Government the Geological Survey has undertaken the technical and contract supervision of the diamond drilling and water testing programme for the proposed engineering structures at the damsite at mile 12.4 on the North Pine River near Brisbane. No geological problems have been met at this site and by the end of the year 2,800 ft. of contract diamond drilling had been completed under the supervision of J. Baird. Further diamond drilling and test pitting will be undertaken during 1961.

The New Bremer Bridge, Ipswich

Assistance was given to the Co-ordinator-General's Department in regard to their drilling programme for the foundations of the proposed new bridge over the Bremer River at Ipswich. Technical supervision of a programme of six holes was given by J. Baird and C. H. Shipway and contract supervision by the Ipswich City Council Engineer. A report was prepared for inclusion in the contract documents for the bridge construction.

Herbert River Hydro-Electric Investigations

Early in the year a commencement was made by the Co-ordinator-General's Department on an investigation of the hydro-electric resources of the Herbert River in North Queensland. The Geological Survey was requested to act as geological advisers during the course of the project and as a preliminary step K. W. Wolff spent the month of August in the field preparing a reconnaissance map on a one mile scale of the project area. Arrangements are in hand for the geophysical survey of certain of the sites by the Bureau of Mineral Resources and some intermittent drilling has been carried out by the Co-ordinator-General's Department drilling machine under their supervision.

Barron Falls Hydro-Electric Scheme

The site of the Underground Power House was visited by Dr. Watkins during April and the location of excavations for the proposed machine chamber and the necessary tunnels discussed with Engineers from the Co-ordinator-General's Department. Geological mapping of the exploratory adit for the proposed Underground Power House was undertaken by K. W. Wolff in August.

Bribie Island Bridge

Geological advice was provided in connection with the proposed bridge from the mainland to Bribie Island for the Co-ordinator-General's Department. A number of visits were made by Dr. Watkins and K. W. Wolff during the course of the foundation and test piling investigations. The bridge foundation is located on recent marine muds and sands and therefore the establishment of a suitable level for the point bearing of concrete piles presented an exploration problem. Hand augering, diamond drilling and seismic survey were used as exploration tools with varying success. A report was prepared for inclusion with the contract documents for the construction of the bridge.

Mount Isa Railway Project—Macrossan Bridge

The Geological Survey was consulted by the company of Ford, Bacon and Davis in regard to the foundations for the proposed Macrossan Railway Bridge across the Burdekin River near Charters Towers. A visit was made to the site during April by Dr. Watkins, and numerous visits were made during the course of the contract drilling programme by the District Geologist, K. R. Levingston. A report was prepared for inclusion with the contract document for the bridge construction.

Middle Creek Damsite

A visit was made by Dr. Watkins in July to examine the damage caused to the spillway of the Middle Creek Dam near Sarina at the request of the Department of Local Government. A report was provided which was of assistance in designing a modified ski-jump concrete spillway. Close liaison was maintained with the Civil Engineering Department of the University of Queensland and Department of Local Government Engineers during the course of the design work and model testing.

Rockhampton Weir Water Supply Scheme

An investigation was initiated by the Department of Local Government for the augmentation of the water supply of the City of Rockhampton. The Geological Survey was nominated as geological consultants by agreement with the City of Rockhampton and the Local Government Department. As a preliminary a visit was made during November by Dr. Watkins, and a report prepared which described the geomorphological factors of significance in relation to the change in the regime of the Fitzroy River which might be produced by the construction of a weir. A number of possible weir sites were also reported on and tentative drilling programmes proposed. The commencement of drilling is dependent on the solution of certain hydrological problems which will be studied by model tests at the Civil Engineering Department of the University of Queensland.

Bulwer Island Foundation Investigation

The supervision of a drilling investigation on Bulwer Island, near Pinkenba, Brisbane, was undertaken at the request of the Department of Secondary Industries for a possible industrial installation. The area of land between Brisbane and Moreton Bay represents valuable potential land for industrial use. However, the estuarine mud and sand which comprise the area present many problems for the design of suitable foundations of heavy industrial plant.

Main Roads Commission—Geological Investigations

Pending the finalization of suitable arrangements for providing geological services to the Commission, C. H. Shipway has from December 1960 been occupied on a full time basis with Main Roads Investigations. At the end of the year a report was made on the geology and operation of Coleyville Quarry in the Moreton Main Roads District and work was proceeding on the Mt. Marrow quarry and in connection with a materials search in the Redland Bay area.

An inspection of proposed road cuts near Cooroy in the North Coast–Burnett Main Roads District was made by Dr. Watkins in November and it is proposed to utilize this section as a testing ground for portable seismic refraction equipment presently on order.

HYDROGEOLOGICAL INVESTIGATIONS

Two hydrogeological investigations were undertaken during the year, one in the Burdekin Delta, an important Groundwater Irrigation area, and a start made on the investigation of North Stradbroke Island as a possible major source of water supply for the Brisbane area.

The Geological Survey continued to co-operate on various aspects of groundwater and hydrogeological investigations with the Irrigation and Water Supply Commission during the year.

The recent interest shown by the Federal and State Governments in sponsoring the Underground Water Conference has not been followed by any noticeable activity and the meeting of first conference had not been convened by the Federal Government by the end of the year.

Burdekin Delta Groundwater Investigation

A field investigation of the groundwater resources of the Burdekin Delta was undertaken at the request of the Irrigation and Water Supply Commission and with the co-operation of the local authorities concerned. K. W. Wolff spent the months of February and March in the delta assembling hydrologic and geological data, an interim report was produced in July and further work involving geophysical survey is currently being arranged with the Bureau of Mineral Resources.

The investigation to date has indicated the necessity of establishing the storage potential of the deltaic deposits which constitute the aquifer in order that a safe withdrawal of groundwater can be made, especially in dry years, without the risk of saltwater intrusion. Artificial recharge of the aquifer is a possibility but it is probable that high pumping costs may make a scheme of this nature uneconomic.

North Stradbroke Island Water Resources

An investigation was commenced towards the end of the year on the water resources of North Stradbroke Island with particular reference to groundwater at the request of the Co-ordinator-General's Department. The Island is wholly composed of sand dunes with the exception of a few isolated rock outcrops. Rainfall is absorbed by the sand and issues out from the base of the sand dunes forming coastal fresh-water swamps. The high yield of water in relation to the original rainfall and the storage effect given by the sand dunes which stabilizes the rate of flow are desirable pre-requisites of a water supply source. If the technical problems can be overcome there would be a major water supply available for the Greater Brisbane area. As a preliminary measure K. W. Wolff commenced work on the preparation of a photogeological map of the Island on a half-mile scale which will provide a useful base map for the planning of future work.

GEOLOGICAL MAPPING SECTION

By G. W. Tweedale, Geologist

The re-arrangement of the Survey collection of maps has been commenced, and a great deal of information has already been transferred from old maps to the modern map series.

The Tectonic Map of Australia was published late in 1960, the culmination of some years of collecting and assessing structural data by the Queensland sub-committee—Professor D. Hill and Messrs W. D. Mott and G. W. Tweedale. Structure in the Moreton District was replotted on the 6-mile map for reduction in Canberra to the 40-mile sheet.

During the early part of the year the compilation of maps of the Bowen Basin on the 4-mile Lands Department base was completed, and the drawing of the map on 8-mile scale for publication in the Geology of Queensland Volume of the Geological Society of Australia was supervised. Copies were taken of the 4-mile maps for the B.M.R.-G.S.Q. parties in the field and some preliminary photogeological interpretation undertaken.

G. W. Tweedale accompanied both Bowen Basin parties on preliminary traverses of the area and returned later to see some of the results of the season's mapping.

REGIONAL MAPPING

R. J. Paten was the Survey's representative with the Clermont party and spent some 22 weeks in the field. His major contributions to this project are:—

(1) A large collection of marine Permian fossils from the Denham Range, locally the base of the Bowen Basin sequence.

(2) The establishment of an unconformity between these sediments and underlying acid volcanics, and the determination of the age of the latter as lower Carboniferous or older, by the finding of lepidodendroid plant remains; these volcanic possibly extend across the Anakie High, as similar acid volcanics lie at the base of the sequence in the Drummond Basin.

(3) Observations on a probable Tertiary sedimentary basin between the Denham Range and the Anakie High.

(4) Discovery of a sequence of basic to acid volcanics intruded by granodiorite, with 100 ft. of marine sediments at the base, containing brachiopods and pelecypods of middle to Upper Devonian age.

Mr. Paten also continued his work on reports and maps covering the activities of joint B.M.R.—G.S.Q. parties in western Queensland, and has commenced a report on the Tertiary Lacustrine Sediments of Western Queensland.

P. E. Bock and L. G. Cuttler were, at different times, with the Mt. Coolon party and assisted in the regional mapping and in the measurement of sections in the Lower Bowen volcanics and Middle Bowen marine sediments on the eastern side of the basin. Results of major interest from this 4-mile area include:—

(1) Identification of lepidodendroid plant remains from sediments interbedded with acid volcanics in the Rosetta Creek area, on the north-western part of the sheet.

(2) Discovery of a shale-greywacke sequence overlying the Triassic? sandstones of the Redcliffe Tableland.

(3) Large collection of marine fossils from the Middle Bowen.

R. M. Tucker was engaged in the mapping programme of North Queensland, assisting the compilation of the Atherton 4-mile sheet, mapped during 1959, and from the end of April to mid-October in field work in the Mossman 4-mile area. The party did not establish any new sedimentary formations but extended the area of outcrop of the Dargalong Metamorphics, Chillagoe Formation, Mt. Garnet Formation, Hodgkinson Beds and Mt. Mulligan Beds. Acid volcanic rocks between the Mitchell River and the Featherbed Range were found to have sediments interbedded with "Glossopteris," and to be intruded by the Almaden monzonite.

With J. T. Woods a rich Aptian fauna was collected from the western part of the area (Wrotham Park).

The post-tectonic nature of granite intrusives into the Hodgkinson Formation was demonstrated; these show no evidence of granitization, and contain few mineral deposits of economic importance. Unsolved problems in the area are the thickness of the Hodgkinson Formation, and the nature of its boundary, if any, with the Barron River Metamorphics.

BRISBANE MAPPING

This project, which was undertaken at the request of the City Council, who wish to reserve from subdivision areas of the city where deposits of economic value occur, was continued during 1960 by Miss B. R. Houston and I. G. Sanker, J. W. Laycock, F. Cox, and C. H. Shipway, with further geological mapping of the outlying suburbs, and a much more intensive survey of the location and use of economically interesting clays, sands and gravels. Systematic testing at the Government Chemical Laboratory of the clays recovered from the Proline drilling programme has been initiated. A few areas have been tentatively delineated as economic possibilities, and these would benefit from further drilling on a closer grid. The drilling programme has also assisted the surface mapping, as exposures are very poor in certain large parts of the Brisbane area.

Surface Mapping

This has mostly been plotted on maps at a scale of 20 chains to an inch. The Topographic Branch of the Survey Office has recently compiled contours at 25 ft. intervals for parts of the city area, and these have been added to the 20 chain base maps.

Drilling

With the acquisition in April of a Proline Mechanical Auger, the Brisbane Mapping Programme gained a more directly economic bias. Since then some 544 holes have been drilled, the deepest of 42 ft., for a total footage of 11,664 ft. J. W. Laycock has supervised this work, and logged most of the holes, collected samples for analysis, and plotted drill sites on 20-chain maps, referable to a convenient grid. Drilling commenced in the Capalaba area and 351 holes were placed in the area south from Old Cleveland Road westwards to Sunnybank. Thirty-two holes were drilled in the Wynnum-Gumdale area and 153 in the Aspley-Bald Hills-Brighton-Virginia area. Local water boring and well sinking contractors have also provided much useful information; this is now collected and kept systematically on standard log forms.

DRILLING FOR PETROLEUM IN 1960

By R. J. Allen and I. G. Sanker, Geologists

This summary report supplements Section III: "Oil Prospecting" of the State Mining Engineer, to which reference should be made for information on other prospecting activities.

A.A.O. TIMBURY HILLS No. 2

This well was located at lat. 26° 33′ 38″ S., long. 148° 49′ 38″ E., approximately three miles east-north-east of Roma, to test the "Hospital Hill Sandstone" in a seismic high (the Timbury Hills Anticline). The drilling contractor was Mines Administration Pty. Ltd. and the rig a National T–32. Rotary table elevation was 1,110 ft. Drilling began on 29th February, 1960, and the total depth of 4,400 ft. was reached on 4th April. The electric logging only, of this well was subsidised by the Commonwealth Government under the *Petroleum Search Subsidy Acts*, 1957-59.

Twelve and one-quarter inch hole was drilled to 178 ft., and 9⅝ in. 40 lb. casing was run and cemented to surface. Eight and one-half inch hole was drilled from 178 ft. to total depth. Six and five-eighths inch 20 lb. casing was run to 3,792 ft.

Eight conventional cores were taken, all in the lower section of the hole; four were taken between 3,691 ft. and 3,742 ft., two between 3,915 ft. and 3,939 ft., one at 4,300–4,304 ft., and one at 4,394–4,400 ft. Sidewall cores were taken between 3,746 ft. and 3,765 ft., at 1 ft. intervals. Schlumberger ran an electric log from 179–4,304 ft., micrologs at 1,760–1,960 ft., 2,580–3,250 ft., 3,700–3,740 ft. and 3,755–3,765 ft., a section gauge from 177–4,302 ft., a velocity survey upwards from 4,302 ft. and an unsuccessful dipmeter survey. Mines Administration Pty. Ltd. ran an electric log from 179–4,200 ft., and a gamma log from 0–4,304 ft.

The stratigraphic succession was reported as:—

0– 300 ft.	Roma Formation	
300– 515 ft.	" Transition Beds "	Blythesdale Group
515– 695 ft.	Mooga Sandstone	
695– 875 ft.	" Fossil Wood Beds "	
875–1,375 ft.	Gubberamunda Sandstone	
1,375–2,590 ft.	Walloon Coal Measures	
2,590–3,305 ft.	Bundamba Sandstone	
3,305–3,843 ft.	Moolayember Formation	
3,843–4,400 ft.	Timbury Hills Formation (basement)	

The "Hospital Hill Sandstone" (Moolayember Formation) was penetrated from 3,707–3,736 ft., the permeable section being from 3,712–3,724 ft. The "Links Sandstone" was encountered from 3,760–3,772 ft. The "Showground Sandstone" was not met.

The Timbury Hills Formation consists of steeply dipping siltstone with thin sandstone and shale laminations, all indurated and fractured. It underlies the Moolayember Formation unconformably. The age is pre-Mesozoic.

Ten formation tests were carried out:—

3,697–3,733 ft.	Gas (1,250 mcf)
4,140–4,400 ft.	Nil (packer not seating)
4,142–4,400 ft.	Nil (packer not seating)
3,595–3,792 ft.	Gas and water
3,585–3,792 ft.	Gas (515 mcf) and water (275 gph)
3,738–3,792 ft.	Testing equipment
3,685–3,731 ft.	Gas (396 mcf) and water (300 gph)
3,413–3,731 ft.	Testing equipment
3,685–3,730 ft.	Nil, (tester clogged)
3,685–3,730 ft.	Gas (1,024 mcf)

The well was cased and perforated, awaiting equipping with tubing.

A.A.O. PICKANJINNIE No. 1

This well was located at lat. 26° 35′ 42″ S., long. 149° 07′ 26″ E., near Pickanjinnie, approximately 20 miles east from Roma, to test a closed seismic high. The drilling contractor was Mines Administration Pty. Ltd., using a National T–32 drilling rig. Ground elevation was 1,059 ft. and rotary table elevation (from which depth was measured) was 1,069 ft. Drilling commenced on 27th May, 1960, and total depth of 5,213 ft. was reached on 12th July. The work was subsidised by the Commonwealth Goyernment.

Twelve and one-quarter inch hole was drilled from surface to 184 ft., 178 ft. of 9⅝ in. 40 lb. casing then being run and cemented to surface. Eight and one-half inch hole was drilled from 184 ft. to total depth. Six and five-eighths inch 28 lb. casing was run to 4,497 ft. and cemented to 2,830 ft.

Twenty-two cores in all were cut, coring 194½ ft. with 78 per cent. recovery. Electric logs were run by Schlumberger from 178 ft. to total depth and micrologs from 3,910–4,945 ft. A section gauge, deviation surveys, temperature survey and velocity survey were also run. Rotary Engineering Co. operated an automatic gas detector from 2,500 ft. to total depth.

The stratigraphic units encountered in the well were reported to be:—

0– 365 ft.	Roma Formation	
365– 475 ft.	" Transition Beds "	Blythesdale Group
475– 750 ft.	Mooga Sandstone	
750– 937 ft.	" Fossil Wood Beds "	
937–1,428 ft.	Gubberamunda Sandstone	
1,428–2,898 ft.	Walloon Coal Measures	
2,898–3,448 ft.	Bundamba Sandstone	
3,448–4,185 ft.	Moolayember Formation	
4,185–4,490 ft.	Pickanjinnie Formation	
4,490–4,835 ft.	Latemore Formation	
4,835–5,213 ft.	Timbury Hills Formation	

The target beds were basal members of the Moolayember Formation:—

4,009–4,028 ft.	" Hospital Hill Sandstone "
4,044–4,054 ft.	" Links Sandstone "
4,178–4,185 ft.	" Showground Sandstone "

The Pickanjinnie Formation is Permian in age (on the evidence of the contained microflora). It consists of interbedded sandstone, siltstone and shale, with minor mudstone and coal. A slight unconformity separates this formation from the overlying Mesozoic rocks.

The Latemore Formation contains a similar microflora, and consists of interbedded sandstone, siltstone, shale, mudstone and coal seams.

The Timbury Hills Formation, which consists of fine grained, hard, quartzose sandstone grading in part to siltstone, is taken as local basement. Its dips in this bore are almost flat, in contrast with the steep dips found in A.A.O. Timbury Hills No. 2.

Petroliferous gas was met in the Moolayember Formation, and some minor hydrocarbon fluorescence, oil staining, oil and gas bleeding were noticed in the Permian section. Eight formation tests were run, the results of which are summarized below:—

3,952–4,030 ft.	Gas (2,414 mcf)
4,030–4,055 ft.	Gas (990 mcf)
4,137–4,290 ft.	Gas (25 mcf)
4,393–4,470 ft.	Nil (tester clogged)
4,393–4,470 ft.	Nil (equipment not working)
4,392–4,470 ft.	Gas (15 mcf)
3,976–4,368 ft.	Gas (5,603 mcf) Perf. 4,009–4,028 ft.
3,976–4,368 ft.	Gas (6,541 mcf) Perf. 4,009–4,028 ft. and 4,044–4,053 ft.

The hole was plugged from 4,520 ft. to total depth, filled with mud and capped, and completed as a gas producer on 29th July, 1960.

A.A.O. LATEMORE No. 1

This well was located at lat. 26° 35′ 13″ S., long. 149° 4′ 35″ E., about 18 miles east of Roma, to test Triassic and Permian sandstones in a seismic high (the Latemore Structure). The drilling contractor was Mines Administration Pty. Ltd., and the drilling rig a National T–32. Rotary table elevation was 1,075 ft. The well was spudded in on 12th August, 1960, and reached total depth of 4,775 ft. on 3rd September. The work was subsidised by the Commonwealth Government.

Twelve and one-quarter inch hole was drilled from surface to 180 ft., and 9⅝ in. 40 lb. casing was run to 175 ft. and cemented to surface. Eight and one-half inch hole was drilled from 180 ft. to total depth.

Four conventional cores were cut, all in the lower part of the hole, below 4,000 ft. Schlumberger took 21 sidewall cores below 4,100 ft. Schlumberger also ran electric logs from 175–4,775 ft., and micrologs from 3,910–4,443 ft. The Bureau of Mineral Resources ran a gamma ray log from 0–4,400 ft. Rotary Engineering Company prepared gas and lithological logs from 3,500 ft. to total depth.

The stratigraphic units penetrated in the well were:—

0– 367 ft.	Roma Formation	
367– 478 ft.	" Transition Beds "	Blythesdale Group
478– 702 ft.	Mooga Sandstone	
702– 894 ft.	" Fossil Wood Beds "	
894–1,410 ft.	Gubberamunda Sandstone	
1,410–2,943 ft.	Walloon Coal Measures	
2,943–3,450 ft.	Bundamba Sandstone	
3,450–4,200 ft.	Moolayember Formation	
4,200–4,405 ft.	Pickanjinnie Formation	
4,405–4,728 ft.	Latemore Formation	
4,728–4,775 ft.	Timbury Hills Formation	

The target horizons were:—

3,981–3,999 ft.	" Hospital Hill Sandstone "
4,005–4,010 ft.	" Links Sandstone "
4,195–4,200 ft.	? " Showground Sandstone "
4,231–4,242 ft.	Permian sandstone
4,310–4,314 ft.	Permian sandstone
4,346–4,348 ft.	Permian sandstone

Water bearing horizons were noted in the Bundamba Sandstone and Walloon Coal Measures. Gas shows were obtained in the Pickanjinnie and Moolayember Formations, and three formation tests were run, with the following results:—

3,450–4,015 ft.	Nil
4,189–4,243½ ft.	Gas (5 mcf)
4,249–4,449 ft.	Gas (621 mcf)

The hole was plugged from 4,260–4,360 ft., 3,950–4,050 ft., 3,400–3,500 ft. and 1,500–1,600 ft., and capped and abandoned on 7th September, 1960.

A.A.O. LATEMORE EAST No. 1

This well was located at lat. 26° 35′ 36″ S., long. 149° 5′ 40″ E., about 20 miles east of Roma, to test the eastern portion of the Latemore seismic high. The drilling contractor was Mines Administration Pty. Ltd., and the rig was a National T–32. Rotary table elevation was 1,045 ft., which was 10 ft. above ground-level. The well was spudded in on 17th September, 1960, and reached total depth of 4,724 ft. on 5th October, 1960.

Twelve and one-quarter inch hole was drilled from surface to 215 ft.; 9⅝ in. 36 lb. casing was run to 208 ft. and cemented to surface. Eight and one-half inch hole was drilled to 4,721 ft., and the last 3 ft. to total depth was cored with a 7⅝ in. bit. Other conventional cores were taken between 3,954 ft. and 4,008 ft. Sidewall cores were taken between 4,015 ft. and 4,097 ft. and at 4,330 ft. Schlumberger ran electric logs to total depth and micrologs between 1,600 ft. and 4,338 ft. in five intervals. An automatic gas detector was run from 1,620–4,570 ft.

The well penetrated the following section:—

0– 322 ft.	Roma Formation	
322– 442 ft.	" Transition Beds "	Blythesdale Group
442– 692 ft.	Mooga Sandstone	
692– 874 ft.	" Fossil Wood Beds "	
874–1,457 ft.	Gubberamunda Sandstone	
1,457–2,887 ft.	Walloon Coal Measures	
2,887–3,425 ft.	Bundamba Group	
3,425–4,150 ft.	Moolayember Formation	
4,150–4,411 ft.	Pickanjinnie Formation	
4,411–4,717 ft.	Latemore Formation	
4,717–4,724 ft.	Timbury Hills Formation	

The target horizons were:—

3,969–3,982 ft.	" Hospital Hill Sandstone "
3,990–3,995 ft.	" Links Sandstone "
4,145–4,150 ft.	? " Showground Sandstone "
4,220–4,230 ft.	Permian sandstone
4,295–4,297 ft.	Permian sandstone
4,328–4,332 ft.	Permian sandstone

Gas was met in the Walloon Coal Measures and in the Pickanjinnie Formation. One drill-stem test was run, of the interval 4,204–4,340 ft., to test the three "Permian sandstones"; petroliferous gas flowed at the rate of 197 mcf per day.

The hole was plugged from 4,200–4,350 ft., 3,920–4,050 ft., 3,500–3,600 ft. and 1,500–1,600 ft.: 5½ in. casing was run to 1,393 ft. for completion of the well as an artesian water producer.

A.F.O. No. 1 (COOROORAH)

This well was located at lat. 23° 07′ 30″ S., long. 148° 42′ 40″ E., on an anticline defined by surface geological mapping, gravimetric and seismic methods. The drilling was subsidised by the Commonwealth Government. The rig was a National T–32, and the drilling contractor was Mines Administration Pty. Ltd. Rotary table elevation was 605 ft., 10 ft. above ground level. Drilling began on 25th October, 1959, and total depth of 3,523 ft. was reached on 22nd January, 1960. Twelve and one-quarter inch hole was drilled from surface to 410 ft. and 9⅝ in. 40 lb. casing was run and cemented to surface. Drilling of 8½ in. hole continued to total depth. Twenty cores were cut during the drilling of the well. The hole was logged at various stages by a Schlumberger unit. Electric logs were run from 410 ft. to total depth, section gauge from 410–3,100 ft. and microlog from 410–2,779 ft. A gamma ray log was run from surface to 425 ft.

The following stratigraphic units were penetrated:—

surface–140 ft.	Crocker Formation	Permian
140–1,215 ft.	Maria Formation	
1,215–1,638 ft.	" Upper Siltstone "	
1,638–2,640 ft.	Churchyard Sandstone	
2,640–3,010 ft.	" Lower Siltstone "	
3,010–3,090 ft.	Andesitic tuff	
3,090–3,190 ft.	Breccia	
3,190–3,380 ft.	Andesite	
3,380–3,523 ft.	Basement	

The Crocker Formation consists predominantly of sandstone with minor interbedded mudstone. The Maria Formation consists of sandstone and siltstone in approximately equal proportions, with minor interbedded shale and mudstone, and with a thin coaly section between 150 ft. and 170 ft. The "Upper Siltstone" is composed dominantly of siltstone with some interbedded sandstone. The Churchyard Sandstone is characteristically sandy; it consists of sandstone much of which is extensively recrystallized, with interbedded sandy siltstone throughout the unit. The lithology is strikingly uniform. The "Lower Siltstone" consists of interbedded sandstone and siltstone, the amount of siltstone probably predominating, with minor interbedded mudstone. The section to the base of the "Lower Siltstone" at 3,010 ft. is believed to be Permian in age.

The andesitic tuff (3,010–3,090 ft.) is underlain by breccia consisting of angular fragments of quartzite, sandstone and mudstone set in a fine-grained matrix of siliceous sandstone or siltstone. This is underlain by holocrystalline andesite. The "basement" was described by the well-site geologists as highly silicified siltstone or quartzite. Later microscopic work makes it seem likely that the section below 3,470 ft. is igneous (spherulitic rhyolite), but the nature of the section above this to the base of the andesite is not certain.

Minor gas bubbling was noted in the mud sheath of core taken between 767 and 777 ft. No oil was noted in any of the cores or cuttings, although slight fluorescence was noted at several places. No indication was of sufficient intensity to warrant formation testing, and the well was plugged and abandoned as a dry hole on 23rd January, 1960.

C.O.L. No. 1 (SPECULATION)

Operations were resumed in April, 1960, and fishing for tools continued until the end of the year. The total depth remained 2,332 ft.

CONORADA OOROONOO No. 1

This well was located at lat. 23° 10′ 50″ S., long. 141° 33′ 09″ E., near the Ooroonoo Channel of the Diamantina River, about 110 miles south-west of Winton. It was drilled as an off-structure stratigraphic test to investigate the nature and thickness of the Mesozoic section and the nature of the underlying formations. The drilling contractor was Mines Administration Pty. Ltd., using a Sullivan 300A rig. Drilling commenced on 20th July, 1960, and total depth of 3,852 ft. was reached on 21st August. Ground elevation was 400 ft. and rotary table elevation 405 ft. The work was subsidised by the Commonwealth Government.

Twelve and one-quarter inch hole was drilled to 210 ft., and 9⅝ in. 40 lb. casing was run to 205 ft. and cemented to surface. Five and three-quarter inch hole was drilled from 210 ft. to total depth.

Twenty-one cores were cut for a total footage of 220 ft., 163½ ft. (or 74 per cent.) being recovered. Electric and gamma ray logs were run by Mines Administration Pty. Ltd. using a Failing Logmaster unit. The electric logs were run from 200–1,786 ft. and from 1,650–3,852 ft. The gamma ray log was run to 2,110 ft.

The following stratigraphic section was reported:—

0–1,010? ft.	Winton Formation
1,010–2,370 ft.	Wilgunya Formation (Roma–Tambo equivalents)
2,370–3,640? ft.	Longsight Sandstone (Blythesdale Group)
3,640–3,840 ft.	Permo–Triassic? This section consists mainly of coarse and fine sandstones, with red-brown and varicoloured shale, probably unconformable beneath the Longsight Sandstone
3,840–3,852 ft.	Gneissic granite

No oil or gas shows were noted. The reservoirs of the Longsight Sandstone are probably fresh-water bearing.

The hole was plugged from 3,025–3,075 ft., 2,300–2,350 ft., 180–230 ft. and from surface to 20 ft., capped and abandoned as a dry hole on 23rd August, 1960.

D.F.S. No. 1 (BETOOTA)

This well was drilled at lat. 25° 42′ 30″ S., long. 140° 49′ 46″ E. to test a large closed anticlinal structure (Betoota Structure) defined by surface geological mapping and seismic methods. The drilling was subsidised by the Commonwealth Government. Surface elevation was 345 ft., and elevation of the rotary table 359 ft. The drilling contractor was Delta Drilling Company, using a National "Ideal" 130 rig. Drilling commenced on 22nd December, 1959, and total depth of 9,824 ft. was reached on 17th April, 1960.

Twenty-six inch hole was drilled from surface to 44 ft., 20in. 94 lb. casing then being run to settling depth 39 ft. and cemented to surface. Seventeen and one-half inch hole was then drilled from 44–1,203 ft., and 13⅜ in. 54½ lb. and 48 lb. casing was run to settling depth 1,203 ft. and cemented to surface. Twelve and one-quarter inch hole was drilled from 1,203 ft. to 4,028 ft. and 9⅝ in. 40 lb. casing was run to settling depth 4,028 ft. and cemented to 2,130 ft. Eight and one-half inch hole was drilled from 4,028 ft. to total depth of 9,824 ft.

Thirty-four cores were cut for a total footage of 365 ft., with core recovery of 79 per cent. Sidewall sampling was carried out between 1,248 ft. and 3,251 ft. and between 4,150 ft. and 5,723 ft. Samples were recovered however, only in 13 cases out of 60. Welex Inc. ran electric, self-potential-resistivity, guard, contact-caliper, gamma ray and dipmeter survey logs.

The strata penetrated were reported as:—

120–1,350 ft.	Winton Formation equivalents	
1,350–2,490 ft.	Tambo Formation equivalents	
2,490–3,245 ft.	Roma Formation equivalents	
3,245–3,451 ft.	" Transition Beds " equivalents	Blythesdale Group
3,451–4,196 ft.	Mooga Sandstone equivalents	
4,196–4,484 ft.	" Fossil Wood Beds " equivalents	
4,484–5,000 ft.	Gubberamunda Sandstone equivalents	
5,000–5,727 ft.	Walloon Coal Measures equivalents	
5,757–9,824 ft.	Palaeozoic rocks	

Below a marked angular unconformity at 5,757 ft., the strata consisted entirely of steeply dipping conglomerate and conglomeratic or lithic sandstone, sheared at a high angle, with pebbles elongated along the line of shear.

Showings of hydrocarbons (yellow fluorescence and gas) were noted between 4,400 ft. and 5,757 ft. Formation tests were carried out over the intervals, 3,542–3,563 ft. (water aquifer in Betoota Artesian Well), 4,424–4,463 ft., 4,779–4,801 ft., 5,388–5,420 ft. and 6,910-7,036 ft. The only production was water from the intervals 3,542–3,563 ft. and 4,779–4,801 ft., and drilling mud and watery mud from the others.

The well was plugged from 3,913–4,213 ft. and from 330–530 ft., capped and abandoned as a dry hole on 18th April, 1960.

MAGELLAN CORFIELD No. 1

This well was located at Corfield, lat. 21° 42′ 40″ S., long. 143° 22′ 30″ E., 56 miles north-east of Winton. It was drilled to 2,630 ft. as a water bore by Winton Shire Council, and deepened to 4,507 ft. by Magellan Petroleum Corp. for stratigraphic information about the pre-Mesozoic section. The deepening was subsidised by the Commonwealth Government.

The driller was W. L. Sides and Son Pty. Ltd., and the rig a Cardwell Model HL. Surface elevation was 842 ft. and rotary table elevation was 847 ft. Drilling of 5½ in. hole below 6 in. casing set to 2,726 ft., began on 21st May, 1960. Total depth of 4,507 ft. was reached on 15th June, 1960. Five cores were cut, at 2,892–2,902 ft., 3,389–3,399 ft., 3,930–3,940 ft., 4,262–4,276 ft. and 4,504–4,507 ft. Electric logs were run by Mines Administration Pty. Ltd. with a Failing Logmaster on 20th June, 1960; self-potential and single-point resistivity logs were run from 2,707–4,500 ft., and a gamma ray log from surface to 2,390 ft.

Samples from surface to 2,630 ft. were examined at the Geological Survey of Queensland.

The samples from 2,630–4,507 ft. were logged by the Company. The following lithological distinctions have been made:—

0– 300 ft.	Sandstone, siltstone and shale, some carbonaceous and some calcareous
300–2,650 ft.	Mainly mudstone, most calcareous with some calcareous and argillaceous sandstone and some limestone, with *Inoceramus* recorded from 1,300–2,620 ft. This occurrence suggests a Tambo age for the fossiliferous section. P. R. Evans (BMR) on palynological evidence considers cuttings from 2,630–2,640 ft. to be Aptian in age.
2,650–2,920 ft.	Sandstone (fine and medium grained), siltstone, shale and coal.
2,920–4,100 ft.	Medium grained sandstone with shale and coal between 3,310 ft. and 3,470 ft., and fine grained sandstone and shale between 3,800 ft. and 4,100 ft.
4,100–4,488 ft.	Sandstone, siltstone, shale and coal
4,488–4,507 ft.	Granite.

Evans has made the following correlations in the lower section of the bore:

2,892–2,902 ft.	Lower Middle Jurassic	Bundamba
3,389–3,399 ft.	Lower Jurassic	
4,262–4,276 ft.	Lower? Triassic	

No hydrocarbon shows were encountered. The section penetrated many sandstones with high porosity and permeability, and these were all saturated with fresh water.

No marine rocks were encountered, and the hole proved that marine Cambrian and Ordovician rocks of the Georgina Basin do not extend as far eastwards as Corfield. The northward development of mid-Palaeozoic continental clastic sediments is also limited.

The hole was completed as a water bore for the Winton Shire Council.

SMART OIL ORIENT SCOUT No. 1

This bore was located at lat. 27° 40′S., long. 143° 9′E., 53·1 miles by road north-west of Thargomindah. It was drilled to investigate a seismic high (the Chesson Anticline) determined by seismic methods. The drilling contractor was J. R. Robinson, using a small percussion plant. Ground elevation was 446 ft. Drilling began on 23rd May, 1960, and reached a depth of 1,658 ft. (reported as the limit of the plant) on 8th November.

Eight inch hole was drilled from surface to 60 ft., and 6 in. casing was set and cemented to the surface. Five inch hole was then drilled. Cores were cut at 1,035 ft., 1,300 ft., 1,400 ft., 1,445 ft., 1,450 ft., and 1,500 ft.

Sludge samples from the bore were examined at the Geological Survey of Queensland. The succession was:

0– 55 ft.	Sandstone
55– 220 ft.	Mainly siltstone, with some mudstone and limestone below 150 ft.
220–1,658 ft.	Mainly mudstone and calcareous mudstone with some sandstone, siltstone and limestone

Palaeontological work indicated Tambo fossils at 285 ft., and Roma fossils from 1,300 ft.

A showing of gas was met at 1,075 ft. Analysis revealed this to consist mainly of inerts and hydrogen. Several cores were tested by the Government Analyst for the presence of mineral oil, with negative results. Water flows were met at 179–181 ft. and 960 ft.

The Company has stated that it proposes to deepen the bore with a more powerful plant.

SMART OIL HARKAWAY SCOUT No. 1

This scout bore was drilled at 26° 26′ S., 142° 59′ E., about 80 miles west-north-west of Quilpie; it is on the eastern flank of the Harkaway Anticline which was defined by seismic methods. The drilling contractor was J. R. Robinson of Quilpie, using a percussion plant. Ground elevation at the site was 685 ft. Drilling was commenced on 6th January, 1960, and finished on 5th May, at total depth of 1,850 ft.

Ten inch hole was drilled to 40 ft., and 6 in. casing was run and cemented to the surface. Thereafter 5 in. hole was drilled.

Sludge samples from the hole were logged at the Geological Survey of Queensland. These indicated that the sequence penetrated was rather uniform lithologically, consisting mainly of mudstone and siltstone, with some sandstone, coal and carbonaceous shale. The whole section, then, may have been Winton Formation, with perhaps some Tertiary sediments at the surface.

Gas shows were recorded at 635–655 ft., 771 ft., 927–935 ft., 970 ft., 1,375 ft., and 1,850 ft. Analyses revealed that these were hydrogen-methane gases, with a high proportion of nitrogen.

STANDARD GAS ASPLEY SCOUT No. 1

This bore was drilled at Aspley, about eight miles north-west of Brisbane, on resubdivision 2, subdivision 1, por. 152, parish of Nundah (2.9 chains bearing 310° from the corner of Graham Road and Hawbridge Street). It was drilled on a divined site near a mud "volcano" believed to be caused by hydrostatic pressure. Ground elevation is approximately 100 ft. The drilling contractor was S. H. Scells, a water driller, using a small percussion plant. Work was started on 28th March, 1960, and finished on 25th October at total depth 970 ft.

Six inch hole was drilled from surface to 500 ft., and 5 in. hole from 500–970 ft. The hole is cased with 6 in. casing to 500 ft. and 5 in. casing to 700 ft.

Sludge samples obtained from the bore were logged at the Geological Survey of Queensland, and the following stratigraphic sequence was determined:—

0– 744 ft.	South Pine Formation
744– 970 ft.	Basalt

The South Pine Formation consists of mudstone and calcareous mudstone, with numerous bands of oil shale. Ostracods indicating a Tertiary age occur. A composite sample of the oil shale yielded five gallons of oil per ton by destructive distillation. The basalt is fresh towards the top, but is extensively weathered below 805 ft.

Water was encountered at 14 ft., 28 ft., 57½ ft., 62 ft., 472 ft. (salty) and at 806 ft. Gas was recorded at 831 ft.

The casing was left in position, and the hole capped; the Company stated that it hoped later to deepen the hole.

STANDARD GAS CRIBB ISLAND No. 1

This well was drilled at Cribb Island, 10 miles north-east of Brisbane, on por. 283, parish of Toombul, one mile south of the Cribb Island State School. The site was selected by divination on the flank of a gravity high. The ground elevation was a few feet above high water mark. The drilling contractor was Godfrey Bros., using a Hydromaster 750 percussion rig. The well was spudded in on 23rd February, 1960; shortly after, it was abandoned at 55 ft. due to drilling difficulties, and the plant moved to a new site 15 ft. away. A depth of 1,420 ft. was reached on 31st December, 1960.

The hole was cased with 10½ in. casing set to 4 ft., 9½ in. casing set to 28 ft., 8 in. casing set to 172 ft., 6 in. casing set to 673 ft. and 5 in. casing set to 1,150 ft.

Lithological logging of sludge samples was carried out by the Geological Survey of Queensland. The following stratigraphic units were distinguished:—

0– 120 ft.	Mud, sand, gravel (Quaternary)
120– 340 ft.	Basalt (Tertiary?)
340– 640? ft.	Sandstone, mudstone, some basalt (Tertiary?)
640?–1,420 ft.	Ipswich Coal Measures equivalent

Gas was met in the coal measure sediments below 820 ft. and was recorded as far as 1,420 ft. Analysis revealed this to be essentially methane. Oily sludges giving a bluish fluorescence were recovered in several places. These are considered to result from contamination by drilling lubricants.

Salt water was met in the unconsolidated sediments above the basalt. Fresh (but alkaline) water-bearing horizons were met at 367–376 ft. and at 690–710 ft.

Drilling is continuing.

QUEENSLAND AMERICAN THE OVERFLOW No. 1

This well was located at lat. 27° 48′ 30″ S., long. 152° 51′ 4″ E., about 10 miles west-north-west of Beaudesert. The well was drilled to determine the stratigraphic succession and to test the oil and gas prospects of the Juberra (or South Moreton) Anticline, a large faulted structure defined by surface geological mapping.

The drilling contractor was Mines Administration Pty. Ltd., using a National 55 drilling rig. Ground elevation was 183 ft., and rotary table elevation was 194 ft. Drilling commenced on 8th April, 1960, and total depth of 2,993 ft. was reached on 16th May. The work was subsidised by the Commonwealth Government.

Twelve and one-half inch hole was drilled from surface to 214 ft., the top 185 ft. afterwards being reamed to 17½ in. Thirteen and three-eighths inch 54 lb. casing was inserted to 174 ft. and cemented to surface. Eight and one-half inch hole was drilled from 214 ft. to 2,990 ft. and 7⅞ in. hole from 2,990 ft. to total depth.

Sixteen cores were taken, nine in the upper sedimentary section and seven in the lower volcanic section. Schlumberger ran electric logs from 175–1,755 ft. and 1,655–2,931 ft., and microlog from 176–1,753 ft. Rotary Engineering Co. operated an automatic gas detector.

The following stratigraphic section was reported:—

0– 310 ft.	Bundamba Sandstone
310– 630 ft.	?Ipswich Coal Measures
630–1,605 ft.	Ipswich Coal Measures
1,605–2,993 ft.	Volcanics, largely andesite and andesitic tuff with some rhyolite and trachyte towards the bottom

The sediments below 630 ft. showed fluorescence and gave positive cuts with carbon tetrachloride. Some cores had a distinct oily smell. These "shows" are probably distillation products from coal seams coked by igneous intrusions. Gas shows recorded were considered to come from coal seams.

The well was plugged with 50 ft. of cement set at the casing shoe and with cement set in the top 20 ft. of the casing, the casing being left filled with mud. The well was capped and abandoned as a dry hole on 18th May, 1960.

UNION–KERN–A.O.G. CABAWIN No. 1

This well was drilled for Union Oil Development Corp., Kern County Land Co. and Australian Oil and Gas Corp. Ltd. in Authority to Prospect 57P. It was located at lat. 27° 28′ 16″ S., long 150° 11′ 19″ E., about 20 miles south-west of Tara, to test a structural high, defined principally by seismic methods.

The drilling contractor was Oil Drilling and Exploration Ltd. of Sydney, using a National 80B drilling rig. The well was spudded in on 6th October, 1960, and had reached a depth of 9,952 ft. by 31st December. Ground elevation was 951·4 ft. and rotary table elevation 966·9 ft. The work was subsidised by the Commonwealth Government.

Twelve and one-quarter inch hole was drilled to 562 ft., and 8¾ in. hole from 562–585 ft. The hole was then reamed to 17½ in. from surface to 585 ft. and 17½ in. hole was drilled from 585–620 ft. Thirteen and three-eighths inch 48 lb. casing was run and set to 591 ft. and cemented to the surface. Eight and three-quarter inch hole was drilled below 620 ft.

Thirty-two conventional cores and seventy-one sidewall cores were taken. Schlumberger ran electric logs from 591–9,945 ft. (six runs), and micrologs from 591–7,915 ft. (five runs). Rotary Engineering Company maintained an automatic gas detector.

The following stratigraphic sequence was reported:—

0–2,864 ft.	Roma Formation
2,864–4,200 ft.	Blythesdale Formation
4,200–5,444 ft.	Walloon Coal Measures
5,444–7,640 ft.	Bundamba Formation
7,640–9,860 ft.	Cabawin Formation (Permian–Triassic)
9,860–9,952+ ft.	Kianga Formation (Permian)

Numerous gas shows were recorded in the upper part of the hole, in association with coal seams. Gas shows were also recorded at 6,220–6,294 ft., 6,750–6,767 ft. (good show and fluorescent cut), 7,386 ft. and 7,840 ft. Fluorescence, oil staining and a kerosene odour were noted below 9,912 ft. A gas blow out occurred at 9,935 ft.

Four drill stem tests were conducted, the results of which are summarized below:—

6,728-6,776 ft.	Water, gassy water
7,388–7,406 ft.	Water, gassy water
7,822–7,915 ft. 7,834–7,916 ft.	Nil (packers failed)

By Authority: S. G. Reid, Government Printer, Brisbane