1919.

NEW ZEALAND.

MINES DEPARTMENT:

GEOLOGICAL SURVEY BRANCH.

ANNUAL REPORT.

Laid on the Table of the House of Representatives by Leave.

Geological Survey Office, Wellington, 12th June, 1919.

SIR,—

I have the honour to forward herewith the thirteenth annual report of the Geological Survey Branch of the Mines Department. This report gives a summary description of the work of the Geological Survey during the twelve months ended 31st May, 1919.

SUMMARY OF FIELD-WORK.

During the twelve months that ended on the 31st May, 1919, I visited a number of localities in Auckland, Nelson, Westland, Canterbury, and Otago in order to report upon their mineral possibilities or to obtain information for departmental purposes.

Owing to the fact that systematic boring was in progress an inspection of the coal-bearing area between the Seven-mile and Nine-mile creeks, State Coal Reserve, Greymouth district, was made last October. From my previous knowledge of the area and the examination then made I believe that a large amount of coal can be won from this easily accessible area, the development of which will not be at all expensive. In January last I was associated with Messrs. I. A. James and Boyd Bennie in making a careful examination of a coal-bearing area in the Waikokowai district, west of Huntly, which was under option to the Mines Department. In October I visited the Reefton district in order to examine the Waitahu Coal-mine, Boatman's Consolidated Mine, and the Keep-it-Dark Mine.

During February a long-deferred examination of the scheelite-mines of the Glenorchy and Barewood districts, Otago, was made, with the result that I am able to express the opinion that vigorous prospecting of the various lodes will probably result in valuable discoveries being made. Unfortunately, at the moment of writing, tungsten-ore has fallen to less than its pre-war price, and therefore, until the market improves, scheelite-mining in New Zealand can hardly be conducted at a profit.

In February and again in April I visited St. Bathan's and adjoining localities in Central Otago where alluvial mining is being carried on. The special object in view was to ascertain the prospects of mining in the older auriferous quartz-drifts or gravels which are extensively exposed at Naseby, St. Bathan's, Cambrian, Matakanui, and many other places. I am of opinion that these quartz-drifts have not been sufficiently prospected, and that unprospected portions will yet yield considerable quantities of gold.

Visits were also made to the phosphate-quarries near Milburn and Clarendon, and to limestone-quarries at Milburn, Sandymount (Otago Peninsula), and Dunback. In April the Glentunnel district, Malvern Hills, Canterbury, was examined in order that some knowledge of the coal-measures might be obtained, and advice given *re* proposed boring near the Homebush Coal-mine.

Dr. J. Henderson, Mining Geologist, last spring made a special survey of a considerable area near Huntly, the chief objects in view being to ascertain the coal possibilities of the Waikokowai district, and to locate bore-sites on the area under option to the Mines Department mentioned above. The influenza epidemic prevented further field-work until January, when the survey of the Mokau district was resumed. In this work Dr. Henderson has been assisted by Mr. M. Ongley, Assistant Geologist, who was released from military duty towards the end of January. Field-work in the Mokau Subdivision terminated on the 10th May, and a detailed report is now being prepared. About the middle of May Dr. Henderson visited the Reefton district in order to report upon the Boatman's Consolidated Gold-mine, where search for the Walhalla ore-shoot worked and lost many years ago has so far been unsuccessful. He also visited the Waitahu Coal-mine and the Seven-mile Creek coal area (State Coal Reserve).

Huntly Subdivision.

The Huntly Subdivision comprises Rangiriri Survey District and the northern half of Newcastle Survey District. As already indicated, work in this part of the Waikato coalfield was begun owing to a report upon a coal-bearing area under option to the Mines Department being required. In order to obtain a better idea of the geological conditions likely to exist over this area, the surrounding districts were also examined, though not in as detailed a manner as was desirable. The field-work was in charge of Dr. Henderson, who was thus engaged from the 13th July to the 8th August, and again from the 17th October to the 14th November. During the first of these periods he was assisted by Mr. G. E. Hyde, A.O.S.M., who was temporarily employed as field assistant. The information obtained during the survey, together with that available from other sources, will enable a detailed report upon the coal, clay, and other mineral resources of the district to be written. This, if time permits, will be prepared in the next few months.

Mokau Subdivision.

Field-work in the Mokau Subdivision was resumed on the 11th January and completed on the 10th May. Unfortunately, owing to the late start in field-work, caused by the examination of the Huntly Subdivision and by the influenza epidemic, Ohura Survey District, which contains the promising Waitewhena coalfield, could not be surveyed. This district, however, was examined and briefly reported upon by Mr. Ongley over two years ago. The detailed report on the Mokau Subdivision now being written will contain a full description of the lower Mokau coalfield, and will include information concerning the Waitewhena field. It will contain also a description of the Te Kuiti district, in which, north-east of Te Kuiti, coal-outcrops occur. These were briefly mentioned in the eleventh annual report of this Survey, 1917, page 7.

Benmore District, Marlborough.

Dr. J. Allan Thomson, Director of the Dominion Museum, was engaged for a period of two months from the 18th March in making a geological survey of the Benmore and Ure River districts, Marlborough, where indications of petroleum had been observed. The time allotted to the survey was too short to enable a large area to be examined, but Dr. Thomson considers that he has mastered the main details of the structure, which depends largely on faulting. So far as can be judged, this structure is unfavourable to the presence of oil in quantity within the area surveyed.

Limestone Deposits.

During the year the limestone deposits of the Huntly and Mokau subdivisions have been given special attention. Visits, as already mentioned, were made to several localities in Otago where limestone occurs, and a hasty examination of a marble deposit in the Malvern Hills was also made. The publication of Part I of the bulletin mentioned in my last annual report, "The Limestone and Phosphate Deposits of New Zealand," was delayed for some time on account of war conditions, but the bulletin is now passing through the press. It contains general information about limestone, and a careful summary of all available data concerning our limestones, arranged so as to give each county separate consideration. Part II is to deal with the treatment of limestone by calcination or pulverization, and with phosphate occurrences in New Zealand.

Coal Deposits.

The Geological Survey continues to give as much attention to the coalfields of this Dominion as its present attenuated staff permits. In my last year's report it was suggested that special legislation was necessary in order to enable coal-bearing lands held by private owners to be advantageously surveyed, and that the present system of granting leases of coal-bearing areas to almost every applicant ought to be drastically modified, if not entirely abolished. In evidence lately given by me before the Parliamentary Industries Committee attention was drawn to the comparatively small extent of our known coal resources, and the systematic exploration and prospecting of the coalfields was urged as necessary.

Publications.

The only report actually issued by the Geological Survey during the year was the twelfth annual report. As originally prepared this was a lengthy document, but owing to the shortage of paper it was deemed advisable to cut it down to a few paragraphs. During the past few months, however, portions of the report, giving information concerning magnesite, dolomite, chrome-iron ore, mica, tungsten-ore, manganese-ore, and graphite in New Zealand, have been published in the *New Zealand Journal of Science and Technology*.

The final proof sheets of Palæontological Bulletin No. 7, entitled "Descriptions and Revisions of the Cretaceous and Tertiary Fish-remains of New Zealand," by Mr. F. Chapman, A.L.S., F.Z.S., Palæontologist of the National Museum, Melbourne, were corrected and returned to the Printing Office last December, but owing to the press of other work this bulletin at the time of writing has not been issued.*

A paper of some importance, entitled "The Trias of New Zealand," by Dr. C. T. Trechmann, F.G.S., a well-known British geologist, who has twice visited New Zealand, was published in the *Quarterly Journal of the London Geological Society*, vol. 73, part 3, November, 1918. This paper is largely of a palæontological character. Many of the fossils described by Dr. Trechmann were sent to him on loan from the Geological Survey collections. Early in the present year all the material, except a few specimens retained for further study, was returned by him to New Zealand.

* A few days after this was written copies of the report became available for issue.

Office-work.

The office-work of the Geological Survey has been of the usual character. In addition to the preparation of official reports, numerous requests for information concerning New Zealand minerals and ores have been answered. Oral information has also been given to callers at the office. As in past years, considerable attention has been given to the library, which now contains over four thousand publications.

General Remarks.

Owing to the want of a palæontologist it has not been possible satisfactorily to determine fossils collected during the past year, or to continue work on the great collections made during the time Sir James Hector was Director of the Geological Survey. It is hoped that a trained palæontologist will soon be added to the staff. Arrangements to appoint two extra field geologists have been made, and thus the staff of the Geological Survey will be brought up to something like its pre-war strength.

In a former report I have pointed out that in order satisfactorily to perform the work that falls to its lot the Geological Survey, besides increased staff and office accommodation, needs a laboratory and sufficient space for storing and sorting its collections. A mineral museum and various other adjuncts are also desirable. Fortunately, the Survey has lately obtained better office accommodation than it has had for many years, but the other desiderata mentioned above are still lacking.

P. G. Morgan,
Director, Geological Survey.

APPENDIX.

REPORT ON PROPOSED BORING FOR COAL AT DOBSON FLAT, GREYMOUTH.

By P. G. Morgan.

Geological Survey Office, Wellington, 10th December, 1917.

On the 23rd November last, in accordance with a promise made to the Greymouth Harbour Board some time ago, I examined the neighbourhood of Dobson with a view to locating suitable sites for coal-prospecting bores.

In 1902 and 1903 the Greymouth Harbour Board drilled three holes on its endowment near Dobson. The first of these bores was at the foot of the hill east of the township, and proved 12 ft. of coal (the Brunner seam) at a depth of 572 ft. 6 in. to 584 ft. 6 in. The second bore was about 45 chains to the south-west, on the east bank of Mill Creek, and, like the first, close to the main road. At 1,140 ft. it passed through 2 ft. 6 in. of coal, supposed (no doubt rightly) to be the Brunner rider (a small seam overlying the Brunner seam). At 1,144 ft. the bore got into difficulties owing to the caving-in of its walls, and was abandoned. The third bore was somewhat over half a mile to the west-south-west of No. 2 bore, and was also near the main road. This bore was drilled to a depth of 2,165 ft., but found no coal except a 1 ft. 8 in. seam at 1,493 ft. 6 in. This seam was probably the Brunner rider.

It is fairly certain, apart from the geological evidence to be mentioned presently, that No. 2 bore encountered faulted ground, and in New Zealand Geological Survey Bulletin No. 13, 1911, page 131, I expressed the opinion that No. 3 bore also encountered a fault, which had the effect of preventing it from proving the Brunner seam. In view of the lenticular nature of our New Zealand coal-seams it would perhaps be more reasonable to suppose that the Brunner seam had thinned out at No. 3 bore, and I have since thought that this view ought to have been expressed in No. 13 Bulletin. There was, however, evidence of faulting in the cores from the bore at the depth where the Brunner seam might have been expected, and the examination lately made by me affords independent evidence of the strata there being affected by the same fault as No. 2 bore. Hence my original view of 1911 may well be the correct one.

One of the main objects of my examination was to determine, if possible, what faulting affects the strata underlying Dobson Flat. In 1909 I had traversed a small unnamed stream (Buckley Creek of map herewith) rising near Mount Buckley and flowing south-west to Dobson Flat. In its valley I suspected faulting, and a doubtful fault was marked on my manuscript map, but this was not shown on the map published in 1911. On the 23rd November last the stream was re-examined, with the result that the evidence of faulting was confirmed. It may now be said that in all probability a fault (perhaps a double fault) striking west-south-west traverses the valley of the little stream, and the line of this passes close to Nos. 2 and 3 bores. This dislocation, which I shall call the Buckley fault, is parallel to the well-known Dobson fault and a little over a quarter of a mile to the south of it. The downthrow is suspected to be on the south-south-east side. Not improbably there is another parallel fault somewhat over half a mile to the southward of the Buckley fault. This may be called the Mill fault.

There is undoubtedly coal beneath much of the Dobson Flat, and perhaps beneath all of it. Hence now or in the future boring is justified, but it does not follow that the Greymouth Harbour Board ought to undertake the cost of boring; and I wish specially to guard against taking any responsibility in the matter, or at least against my being regarded as recommending boring at the present time by the Board, or by any person or company not provided with substantial capital.

In order to ascertain the coal possibilities of the Dobson Flat somewhat numerous bores are necessary. One or two bores would be useless until supplemented by others, for the reasons that they could neither define the area of workable coal nor enable an estimate of the throw of the Buckley fault (probably a variable quantity) to be made. Other faults may also exist, and, if so, more bores will be needed to ascertain their directions and throws.

In selecting bore-sites the chief difficulty is to avoid the Buckley fault as well as other dislocations that possibly traverse the area. The bores ought not to be more than 20 or at most 25 chains apart, and ought to be so placed as to prove not only the area of workable coal, but also the throw of the faults.

I would tentatively suggest the following sites for preliminary bores :—

(*a.*) Close to Dobson Railway-station, preferably between the railway and the river.
(*b.*) 20 chains to the south-east of (*a*). There may be a fault at the foot of the terrace here, but some risk must be taken, for a bore in this locality is necessary.
(*c.*) On bank of Grey River, near mouth of Mill Creek, but a little up-stream.
(*d.*) Near old sawmill on Mill Creek, 20 to 25 chains south-east of Greymouth Harbour Board No. 2, and about 30 chains south-east of proposed bore (*c*).

If the results of these preliminary bores are favourable, additional bores to the south-west and on the low hilly country to the south-east of Dobson (Mill Creek valley, &c.) will be necessary. In no case after the first bore or two should a new bore-site be selected until the advice of a trained geologist has been obtained.

The accompanying map, on a scale of 40 chains to the inch, shows all the known details of the geology of Dobson Flat and the surrounding country.

Approximate Cost of Paper.—Preparation, not given; printing (1,350 copies, including map), £22 10s.

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Price 6d.]