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GEOLOGY AND GEOPHYSICS.

REPORT No. 1948/14

GEOLOGICAL SERIES NO. 5.



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POSSIBILITIES OF SELECTING A SITE OF A BOREHOLE FOR THE
DISPOSAL OF EFFLUENT WATER FROM THE COMMONWEALTH
FLAX MILL, BALLARAT, VICTORIA.

P. B. NYE

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W. BROWN

GEOLOGIST.

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF SUPPLY AND SHIPPING.

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SECRETARY

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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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DIRECTOR

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TABLE OF CONTENTS

	Page
I Introduction	1
II Geology	1
III Possibilities of Disposal of Water Underground.	2
IV Conclusions and Recommendations	4

LIST OF PLATES

Plate 1	Cross section of part of City of Ballarat Mining Company's main shaft (0'-409') and Commonwealth Flax Mills effluent borehole.
Plate 2	Cross section of City of Ballarat Company's main shaft workings.

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I. INTRODUCTION

The Commonwealth Flax Production Committee conducts a flax mill at Ballarat. The flax is first treated with water and 25,000 gallons per day are used in the process. After the treatment, the water is allowed to run to waste, and is at present being conducted through an earthen drain to natural drainage channels. This disposal of effluent water is not approved by the Ballarat Council, and other means of disposal have to be found. The sewerage system is a considerable distance from the flax mill, and a considerable cost would be required to put the effluent water into the system. Further, it is stated that it is doubtful if the nearest part of the sewerage system could handle the above quantity of water.

One attempt has already been made to dispose of the effluent through a borehole, but it operated satisfactorily for only a few months. The objective of the present investigation was to determine if another borehole could be suitably sited to dispose of the effluent.

II. GEOLOGY

The country around the flax mill is undulating, well-soiled and grassed, and there are no outcrops of rock. The excavations for the collecting tank for the water and the excavations for the surface drain leading from it exposed basalt.

A perusal of Memoir No.14 of the Geological Survey of Victoria, shows that the country in the vicinity of the flax mill is situated on or near the Swamp Deep Lead, one of the numerous basalt-covered deep leads which exist in the vicinity of Ballarat.

The head of the Swamp lead is situated about two miles east of the flax mill, and the lead has a general westerly course and passes some 400 to 500 feet south of the flax mill. The

upper portion of the lead was worked from three shafts by the Durham Company. The lower portion was tested and worked to a small extent by the City of Ballarat Company. The main shaft of the latter company was put down a short distance to the south of the site of the present flax mill.

The rocks passed through in the City of Ballarat shaft are shown on plate 1. The log of the borehole put down by the Flax Production Committee immediately to the north-west of the plant is also shown on plate 1. The shaft and the borehole prove that there is at least 360 feet of basalt overlying the gravel, sand, etc. of the deep lead, but neither the total thickness of basalt nor the thickness of the underlying gravel etc. is known. The bed rock is slate of Ordovician age.

III. POSSIBILITIES OF DISPOSAL OF WATER UNDERGROUND.

The borehole put down by the Flax Production Committee disposed of the effluent water for a period of a few months, but after that failed to dispose of the whole of the effluent. The borehole did not pass through the basalt into any underlying gravel etc. or into the bedrock, although two feet of clay is reported at the bottom of the hole. The porous layer into which the water was passing is apparently the basalt between 263 and 394 feet.

The reasons why the borehole ceased to take the whole of the effluent cannot be determined, but could be either -

1. The porous layers in the borehole became saturated with water or -
2. Any suspended solids in the effluent gradually filled up the pores of the rock adjacent to the borehole.

It has been suggested that the water could be disposed of by boring into the old underground workings from the City of Ballarat Company's shaft or by boring into the gravels, etc., of the deep lead. These possibilities are discussed below.

Although the dump of the City of Ballarat shaft remains largely intact, it is impossible to determine the exact site of

the old shaft. There are two depressions in the dump which might possibly be regarded as indicating the old shaft from the viewpoint that either depression might have been caused by slumping of the dump into the shaft. The Flax Production Committee adopted this view, and actually drilled a hole from the bottom of one of these depressions. This hole was assumed to be down the old infilled shaft and was put down in an attempt to penetrate the old drives, etc. It is reported that clay materials were passed through and it was thought that this material represented the infilling of the shaft. If it was not the shaft, the borehole should have passed through basalt or weathered basalt.

A plan in the possession of the Victorian Department of Mines shows that a magazine was established in the vicinity of the dump and Mr. W. Baragwanath, Geological Consultant to the Victorian Department of Mines, states that he believes the two depressions in the dump were formerly occupied by magazine buildings. If such were the case, neither depression would represent the old shaft.

Most of the drain being used by the Flax Production Committee to take the effluent is an old one which conducted the water away from the collar of the City of Ballarat Company's shaft. This drain can be traced to the south of the mill, and to a point a short distance to the west of the western edge of the old dump. Mr. Baragwanath states, that as the two magazine buildings were built on the site of the old mullock dump the actual situation of the shaft would probably be a few yards west from the dump. He points out there would also be a shallow excavation for the balance bob of the pumping plant of the shaft. A search accompanied by a certain amount of excavation might reveal the exact site of the shaft, but it will be seen later such work is probably not justified.

No plans are available showing the underground workings from the City of Ballarat shaft. All available reports and plans

of the Victorian Mines Department have been perused, but did not enable the workings to be plotted accurately. They permit, however, a general idea of the direction, extent and depth of the workings to be obtained. This information has been used to construct the vertical cross-section shown on plate 2. Some distances are given in the old reports, but others have had to be assumed. The greatest lack of information was with regard to directions, e.g. the direction of the drives from the shaft were stated to be "southerly".

IV. CONCLUSIONS AND RECOMMENDATIONS.

It is obvious from the above descriptions that neither the site of the shaft, nor the position of the underground drives is known. It would, therefore, be impossible to drill a hole to intersect the underground workings.

The only other method of disposing of the water underground would be to drill into the gravel, etc. of the Swamp Lead. As the lead runs in a general westerly direction, and as it is known that the centre of the gutter is approximately 360 feet south of the City of Ballarat shaft, and the lead is at least 230 feet in width, it would be possible with this information to put down a borehole from the surface to intersect the lead. The site of such borehole would be approximately 360 feet south from an east-west line through the centre of the dumps (the probable site of the City of Ballarat shaft would be close to this line) and it should be measured from a point either at the western end of the dump, or not more than 50 feet to the west thereof. It would be possible to select such a site on land leased by the Flax Production Committee from Railway Department of Victoria. The hole would have to be drilled to a depth of approximately 560 feet.

It should be pointed out that, although the material in the lead is porous, it is already more or less wholly saturated with water. It cannot be stated therefore whether the lead would absorb the effluent water from the mill. If drainage can be

effected by a borehole, it would provide the cheapest means of doing this, and expenditure on the putting down of the borehole is justified.

P.B. Nye

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Assistant Director

W. Brown

(W. BROWN)
Geologist.

Melbourne.
2nd March, 1948.

1' Soil
7' Red Clay

0 Feet
1
8

Feet
0
5

1' Soil
4' Clay

NOTE: City of Ballarat's "Shaft" is approx 680' S.E. of the Flax Mill Borehole. Information for the Shaft was supplied by Southern States Drilling Co. who sunk the Flax Mill bore.

218' Basalt
4' Clay

226
230

20' Basalt
3' Clay
10' Sand & Gravel
12' Clay

250
253
263
275

55' Basalt
8' Scoria

330
338

24' Basalt
5' Cemented drift
(Water-bearing)

362
367

30' Basalt
2' Clay
10' Red Clay

397
399
409

187 Standing water level

220 216' Basalt
229 9' Clay

246 17' Basalt

263 17' Clay & loose mudstone
270 Casing down to 270'

281 5' Hard layer of basalt

Basalt in this section 263' - 294' is honeycombed with layers of very hard basalt between and appears to be the section that is water

Light reddish basalt

394 131' Basalt
396 Clay to bottom

CITY OF BALLARAT
MINING COMPANY'S
"SHAFT"

BALLARAT FLAX MILL
EFFLUENT BORE 100 FT.
N.W. OF RETTING TANKS

COMMONWEALTH OF AUSTRALIA
ALLIED WORKS COUNCIL-VICTORIAN OFFICE
CIVIL ENGINEERING SECTION

FLAX RETTING TANKS
BALLARAT
EFFLUENT BOREHOLE

Scale 1" = 40'

Drawn J.P.R. 5-8-44

J. Holliday
ENGINEER

W. J. Collier
WORKS DIRECTOR - VICTORIA

DRG No. G.3448

Dr. 244

CITY OF BALLARAT COMPANY

MINE WORKINGS — MAIN SHAFT

Scale 1 inch = 40 feet.

N.B. Workings marked with question mark - position uncertain.

All information based on N° 14. Mem. Geol. Sur. Vic.

