TR3-92-103

Coal Exploration — Mt. Lloyd

by K. L. Burns

Introduction

This report is a compilation of the information available following completion of two bore holes, and a detailed survey of a small portion of the coalfield.

Abstract

Despite the negative results to date, the field remains an economic possibility. Further surface prospecting and surveying is recommended.

REFERENCES

HUGHES, T. D., 1952.—Coal near Mt. Lloyd (unpublished report, 15.2.52).

HUGHES, T. D., 1955.—Coal near Mt. Lloyd (2nd report) 5.5.55. Annual Report of Director of Mines 1955, 23-24.

BURNS, K. L., 1956.—The distribution of coal at Mt. Lloyd 14.5.56.

BURNS, K. L., 1956A.—Supplementary note on Mt. Lloyd 26.11.56.

BURNS, K. L., 1957.—Interim Report on Coal Exploration Mt. Lloyd 5.12.57.

HUGHES, T. D., 1958.—Drilling at Mt. Lloyd memorandum of 10.1.58.

Relevant maps are 1372 Geology of Mt. Lloyd District 14.5.56, by K. L. Burns and

1533 A.N.M. Bore Plan, Mt. Lloyd 5.12.57, by B. G. Garrett.

Stratigraphy

The available information is tabulated below (bore logs are appended to this report):—

		Dolerite
Approx.	100′	Coal measures concealed under Mt. Lloyd (Hughes 1958).
Approx.	50′	Felspathic sandstone and shale, exposed near East Road (plan 1533).
Approx.	2′ 11″	Coal (East 1 seam) with ½″ band 6″ from the bottom.
Approx.	13′	Green shale, felspathic sandstone, black carbonaceous shale.
Approx.	2′ 9″	Coal (East 2 seam).
Approx.	48′ 6″	White fossiliferous shale under seam. Remainder unknown.
Approx.	28′ 6″	Sandstone and shale (Bore 1, 116′-144′ 6″)
Approx.	6″	Coal
Approx.	8′ 4″	Sandstone and siltstone (Bore 1, 145′-153′ 4″).
Approx.	3′ 9″	Coal (East 3, West 1 seam).

Approx.	6′ 6″	Siltstone and carbonaceous shale—"striped" shale. (Bore 1, 167′ 1″-173′ 7″).
Approx.	1′ 8″	Coal (West 2 seam).
Approx.	4′ 9″	Siltstone and carbonaceous shale (Bore 1, 183′ 6″-188′ 3″).
Approx.	102′ 9″	Sandstone and shale (Bore 1, 188′ 3″-291′).
Approx.	8′ 10½″	Shale and siltstone (Bore 1, 291′-299′ 10½″).
Approx.	1′ 1½″	Impure coal with 1″ sandstone band.
Approx.	21′ 1″	Sandstone and shale (Bore 1. 301′, Bore 2, 36′ 5″).
Approx.	23′ 7″	Shale and siltstone (Bore 2, 36′ 5″-60′).
Approx.	56′ 1″	Sandstone with carbonaceous laminae (Bore 2, 60′-116′ 1″).
Approx.	59′ 5″	Sandstone and shale (Bore 2, 116′ 1″-175′ 6″).
Approx.	94′ 6″	Green sandstone, shale and siltstone, with carbonaceous material and limestone (nodule?) (Bore 2, 175′ 6″-270′).
Approx.	97′	Coal measures, untested.

Ross Sandstone

An interesting feature of the bores is the green colour of all rocks below 175′ 6″ in Bore 2.

Note also that two seams outcropping in the creek south of Croswells Hut (Plan 1372) have not been identified elsewhere.

Correlation of these seams with New Town, Upper Derwent, or Sandfly is difficult. However a tentative corelation with the Sandfly area (Sandfly Bore A, Mineral Resources No. 7 Plate III) makes East 1 seem equivalent to Gamma, East 2 Delta, and the 6″ seam, West 1, and West 2 may be Eta, Theta, Iota, and Kappa. This agrees with the correlation of Hughes (1955), and may be used until pollen analysis provides positive information.

On this basis, seams Alpha and Beta remain undiscovered, and could be of workable thickness. Further, there is no reason to assume that the known seams are of constant thickness through the region, and systematic variations may well occur.

Structure

The bore plan (1533) shows the attitudes of the seams over a limited area, but this cannot be justifiably extended beyond the boundary of the map. It therefore becomes very difficult to predict which seams occur in the northern flat, or southern creek, of plan 1372.

Coal Quality

Analyses of the known seams are tabulated below.

MT. LLOYD: KNOWN COAL SEAMS

Name	Max. Thickness	Thickness Sampled or Recovery	Moisture	V.C.M.	F.C.	Ash	Sulphur	Calorific Value B. Th. U.	Sp. Gr.	Reference
East 1	2′ 11″	2′ 11″	4.6	15.9	50.5	29.0	0.28	9,480	1.54	Hughes, 1955
East 2	2′ 9″	1′ 6″	3.3	19.0	55.5	22.2	0.5	10,950	1.50	Hughes, 1955
Bore 1 (144′ 6″)	6″	....	....	....	....	....	....	....	....	Burns, 1957
East 3	3′ 6″	2′ 10″	3.1	18.3	50.8	27.8	0.32	10,090	1.53	Hughes, 1955
West 1	3′ 9″	1′ 9″	3.3	13.7	55.0	28.0	0.34	10,110	....	Burns, 1957
West 2	1′ 8″	1′ 1″	2.9	14.3	60.2	22.6	0.45	11,000	....	Burns, 1957

In this connection the origin of the flats is important. Initially, it was thought the flats were due to a resistant capping of flat lying sandstone, mantled with dolerite, and map 1372 reflects this view. However, this may well be in error, and the surface of the flat may truncate the structure, in which case coal would be encountered close to the surface on top of the flats. Open-cutting of limited areas may then be feasible.

Landslides

What appear to be large, deep deformational shear slides occur on the northern flat, and a smaller one in the southern area. However in the area of plan 1533 the mass movement is mainly dolerite sliding over the coal measures, the deformation of the seams being severe jointing within about ten feet of the surface. The repetition of coal seams by landsliding does not occur on an important scale in this area, which simplifies investigation.

Conclusions

The analysis of Hughes (1958) is supported in principle. The coal is of only fair quality, and the seams not of economic width. However there are at least two seams unlocated which may be economic, and the known seams may improve elsewhere in the region.

The structure is known over a small area as a result of prospecting, drilling and detailed surveying. This work could be usefully continued, particularly to the north, in an effort to locate the top seams, as well as to investigate thickness changes in the known seams. Landslides should present no major problem providing their existence is borne in mind, so that surface prospecting and surveying should be adequate for the next stage of investigation, which should be primarily the elucidation of the structure. There is reason to believe the coal measures outcrop across the Plenty River to the west. A geological survey, on a regional basis, may be justified over a wider area than the Mt. Lloyd coal field itself.

APPENDIX I

MT. LLOYD—No. 1 BORE

Footage.	Lithology.	Recovery.
0′ — 20′	Dolerite talus	2′
20′ — 30′	Dolerite talus	2′ 6″
30′ — 38′	Dolerite talus	6′ 2″
38′ — 46′	Dolerite talus	2′ 10″
46′ — 58′ 6″	Dolerite talus	4′ 4″
58′ 6″— 59′	Dolerite talus	4″
59′ — 62′	Dolerite talus	1′ 5″
62′ — 72′ 6″	Dolerite talus	7′ 6″

Footage.	Lithology.	Recovery.
72′ 6″— 86′	Dolerite talus	7′ 2″
86′ — 88′	Dolerite talus	1′ 4″
88′ — 92′	Dolerite talus	9″
92′ — 98′	Dolerite talus	4′ 2″
98′ —106′	Dolerite talus	2′ 8″
106′ —112′	Dolerite talus	1′ 9″
112′ —116′ 6″	Dolerite talus	5″
	Shale	2″
	Fine Sandstone	2″ 9″
116′ 6″—120′	Arenaceous shale	8½″
	Carbonaceous sandstone	1′ 7″
	Dark shale	4½″—2′ 8″
120′ —124′	Carbonaceous sandstone	1′ ½″
	Dark shale	4½″—1′ 5″
124′ —125′ 6″	Interlaminated shale and fine sandstone	1′ 2″
	Laminated carbonaceous shale	2″—1′ 4″
125′ 6″—132′	Laminated sandstone, crossbedded ¾″ sets	3′ 7½″
	Black shale	1′ 3″—4′ 10½″
132′ —137′	Interlaminated sandstone and shale	7″
	Carbonaceous shale with sandy layers	8½″
	Fine sandstone, shale and carbon laminae	2′ 7½″
	Interlaminated sandstone and shale	4″—4′ 3″
137′ —145′	Interlaminated sandstone and shale	10″
	Carbonaceous shale, sand laminae	3½″
	Interlaminated sandstone and shale	1′ 3″
	Fine sandstone, shale and carbon laminae. Depositional slumping	2′ 2″
	Dark shale with sandstone laminae	6″
	Dark shale	8½″
	Carbonaceous shale	8″
	Carbonaceous sandstone	2″
	Carbonaceous shale	4″
	Coal (100 percent recovery)	6″—7′ 5″
145′ —155′	Dark shale	3″
	Fine sandstone	6½″
	Fine sandstone, shale laminae	3″
	Grey siltstone	3″
	Siltstone, with sandstone laminae	3′ 10½″
	Medium grained sandstone,	1′ 8½″
	Interlaminated sandstone, siltstone and carbonaceous shale	9″
	Laminated siltstone	5″

Footage.	Lithology.	Recovery.
145′ —155′ (cont.)	Laminated carbonaceous shale Sandstone Carbonaceous shale with coal layers } recovery 4/5	2″ 2½″ 1½″
	Brown shale with penny band of bright coal (recovery 2½/5)	2½″
	Coal (recovery 10/10)	10″—9′ 4½″
155′ —165′	Coal (recovery 11/25)	11″
	Shale	8½″
	Interlaminated siltstone and carbonaceous shale	1′ 5½″
	Dark shale	1′ 4″
	Siltstone	1′ 2″
	Interlaminated siltstone and carbonaceous shale	1′ 6½″
	Sandstone with carbonaceous laminae	1′ 4½″—8′ 6″
165′ —173′ 9″	Siltstone with carbonaceous layers	3″
	Laminated siltstone	2″
	Siltstone with carbonaceous layers	5½″
	Laminated siltstone and shale	2′ 4″
	Siltstone	5″
	Laminated siltstone	3″
	Shale with siltstone laminae	6″
	Shale	1′ 0″
	Interlaminated shale and carbonaceous shale	1′ 10″
	Laminated dark shale	1′ 4½″
	Coal (recovery 2/2)	2″—8′ 9″
173′ 9″—182′	Coal (recovery 12/18)	1′ 0″
	Fine siltstone	8″
	Shale	2′ 1½″
	Carbonaceous shale	1′ 1″
	Shale	2′ 8″—7′ 6½″
182′ —192′ 1″	Black shale	1′ 7½″
	Interlaminated siltstone and black shale	9″
	Black shale	2½″
	Fine sandstone with carbonaceous shale laminae	1′ 3½″
	Black shale	1′ 2½″
	Carbonaceous shale, with penny band of coal	1′ 2″
	Sandstone with laminae of dark micaceous shale	3′ 10″—10′ 6″

Footage.	Lithology.	Recovery.
192′ 1″—203′	Sandstone interlaminated and interbanded with black micaceous shale	7′ 8″—7′ 8″
203′ —212′ 4″	Sandstone interlaminated and interbanded with shale	4′ 8½″
	Interlaminated shale and siltstone	4′ —8′ 8½″
212′ 4″—214′	White sandstone with laminae of carbonaceous, micaceous, black siltstone	1′ 8″—1′ 8″
214′ —225′	White siltstone with dark siltstone laminae	2′ 3″
	Black, micaceous siltstone with white sandstone laminae	1′ 5″
	Interlaminated black siltstone and white sandstone	3′ 3″
	White sandstone, with carbonaceous laminae	3′ 3″—10′ 2″
225′ —231′	White sandstone, carbonaceous laminae	3′ 7″
	Carbonaceous shale	1″
	Green shale	6″
	Interbanded siltstone and black shale	1′ 2″
	Sandstone	4″
	Siltstone, slump folded, with black shale bands	4″—6′ 0″
231′ —241′ 6″	Black shale (broken core)	9″
	Grey siltstone with white sandstone laminae	8″
	Sandstone, with carbonaceous shale and siltstone laminae	8′ 6″—9′ 11″
241′ 6″—251′	Sandstone with carbonaceous laminae	9′ 6″—9′ 6″
251′ —261′	Sandstone with carbonaceous laminae	6″
	Micaceous carbonaceous shale with sandstone laminae	1′ 4″
	Interbanded sandstone and dark shale	9″
	Micaceous carbonaceous shale with sandstone laminae	3′ 0″
	Sandstone with dark shale laminae	4′ 5″—10′

Footage.	Lithology.	Recovery.
261′ —271″	Sandstone with dark shale laminae	5′ 6″
	Carbonaceous shale with sandstone laminae	6″
	Interbanded carbonaceous shale and felspathic sandstone	3′ 11″
	Carbonaceous shale	1″—10′
271′ —281′	Interbanded coal and sandstone	1′ 11″
	Sandstone with thin carbon laminae	8½″
	Sandstone with bright coal laminae	3½″
	Carbonaceous shale	3″
	Fine sandstone	2′ 6″
	Weakly laminated sandstone	4′ 4″—10′
281′ —291′	Sandstone with laminae of shale and carbonaceous shale	8′ 1″
	Black, carbonaceous shale	1′ 2½″— 9′ 3½″
291′ —301′	Dark, carbonaceous shale	1′ 10″
	Interbanded sandstone and carbonaceous shale	5″
	Shale	½″
	Sandstone with coal bands	½″
	Black, carbonaceous shale	7″
	Interbanded siltstone and carbonaceous shale	8″
	Siltstone	5″
	Siltstone interbanded with black shale	11″
	Black shale	2½″
	Sandstone with carbonaceous shale laminae	10″
	Black shale	2′ 5″
	Coal, impure with bright seams	8½″
	Sandstone	1″
	Coal, impure	4″—9′ 6″
301′ —311′	Black, carbonaceous shale with penny band of bright coal	3′ 1″
	Felspathic sandstone	6′ 11″—10′
311′ —322′	Sandstone with about 20 bands of dark shale from ¼″-2″ thick	10′ —10′

MT. LLOYD—No. 2 BORE

0′ — 22′	Sandstone, weathered, with thin seams of plant material	2′ —2′

Footage.	Lithology.	Recovery.
22′ — 36′	Sandstone, weathered, with thin seams of plant material	3′ 3½″
	Sandstone, with numerous ½″-1½″ shale bands (35′ 10″ Bore 2 = approx. 321′ 6″ Bore 1)	3′ 5½″—6′ 9″
36′ — 40′	Sandstone	5″
	Black shale	2½″— 7½″
40′ — 50′	Brown, micaceous, carbonaceous shale	3′ 2″
	Interlaminated shale and siltstone	2′ 6″—5′ 8″
50′ — 60′	Interlaminated shale and siltstone	1″
	Brown, micaceous and carbonaceous shale	1′ 1″
	Sandstone with shale bands	2″
	Brown, micaceous and carbonaceous shale	2′ 3″—3′ 7″
60′ — 70′	Sandstone, with laminae and bands of carbonaceous shale	6′ 3″—6′ 3″
70′ — 80′	Sandstone with carbonaceous laminae	9½″
	Coarse sandstone with carbonaceous laminae	1′ 2″
	Interlaminated coal and sandstone	7″
	Sandstone with carbonaceous laminae	2″
	Interlaminated coal and sandstone	8″
	Sandstone with carbonaceous laminae	1′ 0½″
	Interlaminated coal and sandstone	1′ 0″
	Sandstone with carbonaceous laminae	7″
	Interlaminated coal and siltstone	2″
	Sandstone with carbonaceous laminae	9″
	Sandstone	5½″—7′ 4½″
80′ — 90′	Coarse sandstone, with carbonaceous laminae and penny bands of micaceous shale	5′ 4″
	Weakly laminated sandstone	1′ 2″
	Coarse sandstone	1½″
	Siltstone with plant fragments	3″
	Coarse sandstone with plant fragments	1½″
	Micaceous siltstone	9½″—7′ 9½″

Footage.	Lithology.	Recovery.
90′ —101′	Weakly laminated siltstone	5′ 8″
	Fine sandstone	1″
	Siltstone	5″
	Laminated sandstone with mud pellet conglomerates	2′ 10″—9′ 0″
101′ —111′	Sandstone, weakly laminated	6′ 5″
	Interlaminated sandstone and micaceous carbonaceous shale	3′ 5″—9′ 10″
111′ —122′	Interlaminated sandstone and coal	5′ 1″
	Laminated siltstone	7″
	Black shale	1′ 10″—7′ 6″
122′ —131′	Shale with carbonaceous and shale laminae	1′ 7″
	Sandstone, laminated	7½″
	Shale	7″
	Sandstone with carbonaceous and shale laminae	4½″
	Interlaminated shale and siltstone. Coal laminae	1′ 0″
	Sandstone with shale band, carbonaceous laminae	5½″
	Interlaminated and interbanded shale and siltstone. Carbonaceous laminae in siltstone bands	1′ 8½″
	Shale	9″
	Sandstone	1′ 4″
	Shale	1″
	Sandstone	5″
	Green shale with carbonaceous laminae	4″
	Shale	4″
131′ —141′	Laminated sandstone	1″—9′ 8½″
131′ —141′	Green shale with fine sandstone laminae	8½″
	Sandstone with carbonaceous laminae	6½″
	Interlaminated shale and siltstone	8½″
	Black shale with plant moulds	9½″
	Fine sandstone with shale bands and carbonaceous laminae	4′ 7½″
	Dark shale with carbonaceous laminae	1′ 0″—8′ 4½″
141′ —144′	Dark shale	2″
	Interlaminated and interbanded sandstone and shale. Carbonaceous laminae	5½″
	Black shale	6½″
	Sandstone with occasional shale laminae	10½″
	Shale with siltstone laminae	10½″—2′ 10½″

Footage.		Lithology.	Recovery.
144′	—154′	Black shale	2′ 4″
		Sandstone with occasional shale laminae	2′ 10½″—5′ 2½″
154′	—161′	Coarse sandstone	5′ 10″
		Black shale	1′ 0″—6′ 0″
161′	—167′	Black shale	2′ 9″
		Coarse sandstone	7″
		Green shale with carbonaceous matter	1′ 2½″—4′ 6½″
167′	—175′	Black Shale	6½″
		Coarse green speckled sandstone	4′ 9″
		Green shale	3″—5′ 6½″
175′	—180′	Green shale with carbonaceous laminae and fragments	4′ 6½″—4′ 6½″
180′	—186′	Green shale with carbonaceous laminae and fragments	6′ 0″—6′ 0″
186′	—192′	Green shale with carbonaceous laminae and fragments	4′ 10″—4′ 10″
192′	—197′	Green shale with carbonaceous laminae and fragments	1½″
		Limestone	1½″
		Coarse green sandstone	6½″
		Interbanded green siltstone and shale. Slump structures	4′ 0″—4′ 9½″
197′	—208′	Coarse green sandstone	2′ 2½″
		Green sandstone with shale pellets and penny coal bands	3″
		Green coal with carbonaceous spots	4′ 0″—6′ 5½″
208′	—214′	Green shale	4′ 10″—4′ 10″
214′	—221′	Green shale	3½″
		Green shale with siltstone laminae	4′ 0″
		Green shale	1′ 1″
		Green shale with siltstone laminae	1′ 2½″
		Black shale	4″—7′ 0″
221′	—228′	Green shale with carbonaceous fragments	6″
		Black shale	4″
		Green shale with carbonaceous fragments	1′ 7½″
		Green shale with siltstone laminae	1′ 4″
		Green sandstone with carbonaceous layers	2′ 8″—6′ 5½″

Footage.	Lithology.	Recovery.
228′ —234′	Green sandstone with mud pellets and carbonaceous laminae	1′ 11″
	Black shale	6″
	Green sandstone with mud pellets and carbonaceous laminae	2′ 0″—4′ 5″
234′ —244′	Green shale	11″
	Black shale	2″
	Green shale with carbonaceous fragments	5′ 4½″
	Green sandstone	2′ 10″—8′ 5½″
244′ —246′	Green shale	9½″
	Green siltstone with carbonaceous fragments	8″—1′ 5½″
246′ —257′	Green shale with siltstone laminae	8″
	Green shale	7″
	Interbedded green siltstone and shale	5½″
	Brown shale with carbonaceous fragments	9″
	Green shale with carbonaceous fragments	3′ 2½″
	Green siltstone	2′ 10½″
	Green sandstone with carbonaceous laminae	1′ 11″—10′ 5½″
257′ —270′	Laminated green siltstone	3′ 1″
	Green sandstone with mud pellets and carbonaceous laminae	7′ 0″
	Green shale	7½″—10′ 8½″

APPENDIX II.

MT. LLOYD COAL ANALYSES

Supplementary to the Report on Coal Exploration Mt. Lloyd (3.2.58) the following analyses are now to hand (details of East 1 supplied by A.N.M. following further development work):—

Seam	Thickness	Portion Sampled	Moisture	Volatiles	Fixed Carbon	Ash	Sulphur	Calorific Value	Laboratory Date
East 1	3′ 3″	3′ 3″?	3.1	15.0	58.2	23.7	0.39	10,790	10.3.58
West 1	3′ 9″	Top 6½″	2.4	10.1	23.3	64.2	..	..	24.1.58
West 1	3′ 9″	Bottom 3′ 3″	3.1	15.0	52.4	29.5	0.27	9,900	24.1.58
West 2	1′ 8″	1′ 8″	8.0	29.9	39.1	23.0	0.34	8,920	24.1.58