QUEENSLAND

DEPARTMENT OF MINES

TORBANITE DEPOSIT-ALPHA
Central Queensland

by T. H. Connah

REPORT No. 3

GEOLOGICAL SURVEY OF QUEENSLAND

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Chief Government Geologist

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NOTE

The Geological Survey of Queensland Reports series has been introduced to record the results of special investigations of comparatively limited scope and interest, as distinct from more comprehensive or general studies, which will continue to be issued as Geological Survey of Queensland Publications.

FOREWORD

This compilation by Mr. T.H. Connah, Senior Geologist, summarising the results of a Departmental drilling campaign in the war years, was prepared from numerous records scattered through the Departmental files. There have been requests for information on this high-grade torbanite deposit from time to time which hitherto it has not been possible to satisfy.

Though dating back 20 years or so and notwithstanding the recent discovery of commercial oil in Queensland, it is felt that the results of this investigation will be of considerable public interest.

A.K. DENMEAD
Chief Government Geologist.

TORBANITE DEPOSIT—ALPHA

Central Queensland

By T. H. Connah, M. Sc.

ABSTRACT

A lens of rich torbanite (or kerosene shale) associated with coal in a composite seam in the Permian rocks of the Alpha district of Central Queensland, after initial prospecting by a local syndicate, was investigated by a Departmental diamond drilling campaign during the national emergency created by World War II. The results, which previously have been published only in summary form (Ball, 1945), are now recorded in detail for future reference.

INTRODUCTION

An outcrop of inflammable shale in a small tributary gully near the head of Native Companion Creek within Portion 4, Parish of Avonmore, County Drummond, was known to local residents for many years. The occurrence lies near the Drummond Range some 34 miles S. S. E. of Alpha station on the Central Railway (50 miles by road via Alpha Homestead) and some 300 miles inland from Rockhampton. Investigations in 1939-44 indicated that the "shale" is actually a composite coal-torbanite seam. Results of these investigations, which previously have been published only in summary form (Ball, 1945), are detailed below. The report is accompanied by two tables (A and B) of analytical data and by the following plans and sections :

1. Locality plan, and sketch plan showing positions of boreholes and shafts, some geological features, and extent of torbanite. (Figure 1).

2. Cross sections (Figure 2).

3. Generalised sections of boreholes (Figure 3).

GEOLOGY

The coal-torbanite seam occurs in a sequence of sediments, predominantly white and grey micaceous sandstone with intercalations of conglomerate, siltstone, mudstone and shale. Observed dips are very low (2^{o} to 5^{o}) and there appears to be a regional slight dip to the west-south-west (section 2, fig. 2). Bores 2 and 3 give a probable section of over 500 feet of these beds, but their full thickness is unknown. Impressions of Glossopteris and Gangamopteris ? and seed-like structures have been recognised in the torbanite and in some of the shale, and indicate a Permo-carboniferous age. Woolley (1941) placed these beds in his Colinlea Formation.

The torbanite occurrence appears identical with those of the Newnes-Capertee area of New South Wales - being of similar age, in common association with cannel and coal, and of comparable size and grade.

TITLES

The following titles under the Mining Acts were granted (see fig. 1). All were in the Clermont Warden's district.

M. O. P. A. 134	2 m. x 2 m.	H. Anderson	1939
M. O. P. A. 137	2 m. x 2 m.	H. Anderson and others	1940
M. L's. 90-95	1 m. x $\frac{1}{2}$ m. each	H. Anderson	1941
M. O. P. A. 140	2 m. x $1\frac{1}{4}$ m.	R. K. Dobbie	1941
M. O. P. A. 141	2 m. x 2 m.	A. N. Templeton	1941
M. O. P. A. 142	2 m. x $1\frac{1}{4}$ m.	J. J. C. Bradfield	1941
M. O. P. A. 143	2 m. x 2 m.	J. P. Templeton	1941
M. O. P. A. 144	1 m. x 1 m.	L. Ison	1941
M. O. P. A. 145	1 m. x 1 m.	A. E. Ison	1941

PRELIMINARY PROSPECTING

It was not until 1939 that any attempt was made to explore the extent of the deposit. In April of that year a local syndicate, headed by Mr. Hugh Anderson of Mantuan Downs and including Mr. T. Culman, took up M. O. P. A. 134 - later converted to M. L.'s 90-95 in March 1941 (see fig. 1). By the end of 1941, by means of shallow shafts and percussion drill holes, they had proved the seam, with from 2 feet to 4 feet of torbanite, over a south-easterly line of nearly 1 mile length and indicated its probable extension south-westerly at least as far as Native Companion Creek - a distance of 30 chains, though cutting out within a short distance to the north-east (Reid, 1940, 1941a). Geological examination by Reid revealed that the seam exposed in the shafts had a tripartite coal-torbanite-coal section, which the percussion bores did not distinguish.

In mid-1941 M. O. P. A.'s were applied for over surrounding areas. A percussion bore on M. O. P. A. 141 (A. Templeton) just outside the southern boundary of Anderson's leases met only a 9 inch thickness of seam but it is not recorded if this included torbanite. On M. O. P. A. 142 (Dr. J. J. C. Bradfield) a shaft sunk close to a previous borehole near the western boundary of M. L. 93 disclosed 4 ft. 6 in. of coal with no associated torbanite (Reid, 1941b; Ball, 1941).

The lenticular nature of the torbanite band was thus clearly established; but the almost planless work on but a small part of the Anderson leases was quite inadequate to delimit its full extent. Ball (1941) made tentative estimates of reserves at that time.

The Anderson Syndicate, having depleted its own resources, attempted to interest the Fuel Substitute Committee and other groups, including the National Liquid Fuel Society (led by a number of Brisbane business and professional men), in the possibility of production of liquid fuel under the prevailing exigencies. Erection of small plants on the field for production of vapouriser fuel was seriously considered, and experiments were made in retorting of the torbanite; but prospecting and development of the deposit were carried no further.

DEPARTMENTAL DIAMOND DRILLING

At this stage the Department of Mines decided to test by diamond drilling the possibilities of torbanite occurrence beyond the 3 sq. mile leased area, and drilling began on 26th October 1942. After three holes had been drilled unsuccessfully, and following forfeiture of all leases except M. L. 92, the campaign was redesigned to explore the extent of the known torbanite lens. An area of $63\frac{1}{2}$ square miles in the parishes of Avonmore, Glenmyra and Rainmore was reserved from mining occupation by proclamation dated 25th March 1943. By mid-1944 twelve further holes, making an aggregate footage of 2,017 in fifteen holes, had gone a long way to defining the limits of the torbanite lens. However, since interest in possible local production of liquid fuel had waned it was decided to suspend drilling operations on this field.

Bore sites were selected by L. C. Ball, then Chief Government Geologist, who also exercised geological supervision throughout. Drilling was carried out with a steam-driven Sullivan N plant under the general direction of J. Berry, with B. Shield in charge of field operations for the first eight holes and C. Bielenberg for subsequent work. Core from D.D.H. 2, selected cores from other bores and all coal and torbanite cores were logged by T.H. Connah, Assistant Geologist, in Brisbane. All other cores were logged by the driller but were not geologically inspected. Core recovery was reasonably good in the first nine holes, being mostly over 80%. In the remaining holes there were considerable losses, overall recovery falling as low as 37% in D.D.H. 11. Core recovery in the coal-torbanite sections exceeded 90% in D.D.H.'s 3, 4 and 5, but was generally less than 50% in other bores.

Positions of boreholes shown on the accompanying plan are approximate only as they were not fixed by survey; nor were surface levels at bore sites or elsewhere determined. The accompanying sections are based on limited aneroid measurements by Ball and on information supplied by driller Bielenberg.

RESULTS OF DRILLING

The boreholes were rather widely spaced and do not permit accurate delineation of the boundaries of the torbanite. They do, however, prove the general configuration of a roughly ovate lens with minimum length (north-west) $1\frac{3}{4}$ miles and maximum width (south-west) at least $\frac{3}{4}$ mile. The general structural picture is that of a slight regional dip of the strata to the west-south-west, with local reversals as suggested by observed attitudes in Anderson's Creek and by intersections in Shaft D and D.D.H.'s 10, 11 and 12. The boundary of the torbanite is reasonably well defined on the north-eastern and western sides; but on the east, south and north-west it remains indefinite without further exploration. In particular, its position between D.D.H. 4 and the southern boundary of former M.L.'s 91 and 92 - a distance of $\frac{1}{2}$ mile - is quite uncertain. Because of the vagaries of torbanite accumulation - well illustrated in the close-set group of shafts A, A1 and A2 - it is considered unwise to admit reserves far beyond points actually tested. The reserves calculated below may therefore be conservative, and show some variation from the figures published by Ball in 1945.

The associated coal extends beyond the limits of the torbanite for unknown distances to both south and west; its extension to the north-east is limited by the negative intersections in the prospectors' bores B and C.

D.D.H. 10 gave apparently anomalous results, the only carbonaceous section penetrated - at 100 feet - being much deeper than the predicted position of the coal-torbanite seam relative to shaft D. Subsequent study of the logs of D.D.H.'s 10, 11 and 12 and of shaft D has led to the interpretation now made that D.D.H. 10 is actually below the horizon of the seam, which in this vicinity has been eroded, over an unassessed area, from the apex of a minor anticlinal fold (see section 1, fig. 2). If this view is correct it can be anticipated that the seam will be found in sub-outcrop somewhere near bore 10.

D.D.H.'s 1 and 2 proved to be stratigraphically below the horizon of the seam, which presumably outcrops within a quarter-mile to the north-east of the torbanite-bearing area.

NATURE AND QUALITY OF TORBANITE AND COAL

The higher grade torbanite from this deposit is a massive unbanded rock of dark greenish grey colour, of noticeably light weight, and tough and rather leathery in texture. It breaks with a conchoidal fracture, often forming sharp-edged fragments. The streak is almost white. A second, dark greyish black variety, with dark brown or almost black streak, rather less tough, and showing slight banding, was noted in several bores. This variety gives an oil yield about half that of the greenish torbanite, and the proximate analyses indicate affinities with cannel coal. Very occasional small nests of marcasite have been observed in the torbanite. Specific gravities determined by the Government Analyst on material from D. D. H. 4 were :

Greenish torbanite	1.09	(118/43)
Black torbanite	1.23	(117/43)

The associated coal is sub-bituminous and in part canneloid, with ash content ranging from 10 to 17%.

Tables A and B set out proximate analyses and oil yields determined by the Government Analyst on samples of torbanite and coal from shafts and bores. Oil yields were measured by destructive distillation in a retort of standard U. S. Bureau of Mines pattern. The lower yields reported for earlier samples (Reid, 1940, 1941a), which were determined with a simpler and less efficient type of retort, are omitted.

Dr. Bradfield reported in 1941 that a sample equivalent to G. S. 899/41, separated into torbanite and coal fractions, and tested by Prof. F. A. Eastaugh, Department of Metallurgical Chemistry, University of Sydney, gave results as follows :

	Torbanite	Coal
Yield of oily matter	144 gals/ton	63 gals/ton
" " water	5 " "	20 " "
Residue - coke per ton	420 lb.	1050 lb.

NATURE OF DISTILLATE FROM TORBANITE

The Queensland Government Analyst also examined oils obtained by destructive distillation of Ball's torbanite samples from shafts A3 and D and from a demonstration run on Alpha torbanite (testing 80 gals/ton) in the National Liquid Fuel Society Ltd. plant in Brisbane in 1943. Results can be summarised thus :

	Shaft A3	Shaft D	NLFS Plant
G. S. Ref. No.	997/41	1002/41	133/43
Sp. gr. of oil	0.910 @ 25°C	0.898 @ 25°C	0.893 @ 22°C
Distillation Range -			
At 84°C	First drop	First drop	
100°C	2.5%	2.5%	
125°C	4.5%	4.0%	
150°C	6.0%	6.5%	
175°C	8.0%	11.0%	
200°C	13.0%	16.0%	22.5%
225°C	2.0%	22.0%	
250°C	25.0%	28.0%	
275°C	30.0%	34.0%	41.5%
285°C			43.0%

	Shaft A3	Shaft D	NLFS Plant
Gasoline and Naptha content - Sum of all fractions distilling at At. P. below 200°C.	13.0%	16.0%	22.5%
Kerosene content - Sum of all fractions distilling at At. P. between 200°-275°C	17.0%	18.0%	19.0%

Crude oil from Ball's shaft samples of the upper and lower coals was reported to have a specific gravity greater than 1.

RESERVES

The drilling proved the torbanite lens to have a minimum area of about 600 acres, as shown on the plan (fig. 1), with thickness up to 3 to 4 feet in the eastern part and 2 to 3 feet in the west. A minimum of about 2 million tons of torbanite is indicated to be available for exploitation, with average thickness a little under 3 feet, at depths ranging up to 80 feet or more. Average crude oil yield of the torbanite, based on sampling of shafts and bores, is of the order of 90 to 95 gallons per ton.

The overlying and underlying coal, with an average combined thickness of about 4 feet, is indicated to total about 3¼ million tons; but if the coal lying beyond the southern and western limits of the torbanite be included, this figure could be increased by at least 50%.

The proportion of the above reserves that might conceivably be extractable opencast appears to be negligible.

The few bores well beyond the limits of the torbanite lens failed to give any indication of other torbanite lenses at the same stratigraphic horizon or elsewhere in the 500 feet or so of sequence penetrated. On general grounds, the existence of further lenses seems not at all unlikely. Their positions, however, are geologically unpredictable; and because of generally poor outcrop and lack of any great topographic relief their location will require systematic exploration by vertical sinking. Reid (1941a) mentioned local records of oil shale in bores some miles to the west at depths of some hundreds of feet.

CONCLUSION

The indicated reserves of torbanite at Alpha, in a lenticular seam up to 4 feet thick but averaging probably less than 3 feet, have a potential crude oil yield of 150 million to 180 million gallons, with possibility of augmentation of reserves by further exploration. The associated coal may have some auxiliary value. The area is of reasonably easy access from railhead some 35 miles distant. However it is in a remote sparsely populated district, 300 miles from the nearest port, where both surface and underground water is in short supply.

There seems little likelihood of exploitation of the torbanite in the foreseeable future, especially in view of recent discoveries of commercial natural oil and gas fields in the State; but the available data are placed on record for possible future reference.

REFERENCES

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WOOLLEY, J.B., 1941 : Geological Report on Alpha Area. Shell (Qld) Development Pty Ltd, App. 1 to Rep. 5, Geol. Surv. Qld Library.

13th December, 1963.

TABLE A

ALPHA TORBANITE

OIL YIELDS AND PROXIMATE ANALYSES

by Government Analyst, Queensland

SHAFT SAMPLES

Shaft	Section Sampled	Thickness	OIL YIELD by d.d.	Proximate Analysis				Fusibility of Ash		Collected by/date	Sample Ref. No. G.S.
				Moist.	Vol. Matter	Fixed C.	Ash	Initial Deform	Fusion Complete		
			gals/ton	%	%	%	%	°C	°C		
A3	Top coal 18'0"-20'7"	2' 7"	8.4							LCB Oct. 41	996/41
	Torbanite 20'7"-23'11"	3' 4"	81	7.6	47.8	28.2	16.4	1580	>1580	" " "	999/41
	Bottom coal 23'11"-24'11"	1' 0"	20							" " "	998/41
	Torbanite paddock		60							JHR Oct. 41	1000/41
E	Top coal 10'0"-13'2"	3' 2"	26							LCB Oct. 41	1001/41
	Torbanite 13'2"-17'2"	4' 0"	103	3.4	53.7	27.8	15.1	1350	>1400	" " "	1002/41
	Bottom coal 17'2"-18'2"	1' 0"	31	7.7	35.4	34.3	22.6			" " "	994/41
	Torbanite and ? bottom coal (from spoil heap)	5' 0"?	120	1.0	71.4	18.7	8.9			JHR Aug. 41	899/41
D	Top coal 28'0"-30'8"	2' 8"	35.7							LCB Oct. 41	1005/41
	" " "	"		9.3	34.3	45.3	11.1			JHR Feb. 41	--
	Torbanite 30'8"-32'7"	1'11"	105	3.7	45.5	27.4	23.4			LCB Oct. 41	1006/41
	" " "	"		4.4	52.5	29.5	13.6			JHR Feb. 41	--
	Bottom coal 32'7"-34'4"	1' 9"	31.5							LCB Oct. 41	1007/41
	" " "	"		8.6	34.7	40.5	16.2			JHR Feb. 41	--
	Torbanite paddock		74.5							JHR Oct. 41	1003/41
Brad-field's	Coal-dump 34'0"-38'0"	4' 0"	22.0	9.7	32.0	44.4	13.9			JHR Oct. 41	995/41

TABLE B

ALPHA TORBANITE

OIL YIELDS AND PROXIMATE ANALYSES

by Government Analyst, Queensland

BORE SAMPLES

Bore	Strata	Depth	Thickness	Core Recovery	OIL YIELD by d.d.	Proximate Analysis Moist.	Vol. Matter	Fixed C.	Ash	S	Sample Ref. No. G.S.
						%	%	%	%	%	
1	No coal or torbanite										
2	No coal or torbanite										
3	Coal	between 259' 0"-264' 0"	?	3' 3"	31	6.8	32.6	49.6	11.0	#	284/43
	No torbanite										
4	Coal	82' 0"- 84' 6"	2' 6"	2' 0"	40	8.3	34.5	47.0	10.2	2.8	119/43
	Torbanite - greenish	(84' 6"- 84'10") (85' 3"- 86' 0")	1' 1"	1' 1"	132	1.4	75.1	18.4	5.1	0.4	118/43
	" - black	(84'10"- 85' 3") (86' 0"- 87' 6")	1'11"	1'11"	68	4.6	50.1	33.7	11.6	0.7	117/43
	Coal	87' 6"- 89' 0"	1' 6"	1' 0"	39	9.5	33.9	46.2	10.4	0.6	120/43
5	Coal - (normal type 85%)	179' 0"-183' 0"	4' 0"	3' 0" (	25	9.4	34.4	45.1	11.1	#	185/43
	(dull black 15%)			(	#	6.0	39.1	42.2	12.7	#	186/43
	No torbanite										
6	Coal - core and fines	74' 0"- 77' 1"	3' 1"	1' 0"	32	9.6	34.0	49.3	7.1	#	305/43
	Torbanite - greenish	(77' 1"- 77' 5") (78' 0"- 78' 8")	1' 0"	10"	133	1.7	69.0	20.6	8.7	#	306/43
	" - black	(77' 5"- 78' 0") (78' 8"- 80' 0")	1'11"	1'10"	57	6.2	42.9	38.1	12.8	#	307/43
	Coal	80' 0"- 80' 6"	6"	4"	#	7.3	28.4	46.8	17.5	#	308/43
	" - fines only	80' 6"- 81' 6"	1' 0"	--	#	6.5	38.4	41.9	13.2	#	309/43
7	Coal	53' 6"- 56' 4"	2'10"	1' 1"	31	7.0	33.4	48.4	11.2	#	340/43
	Torbanite (both types)	56' 4"- 57' 9"	1' 5"	10"	113	2.2	66.5	24.9	6.4	#	341/43
	" - broken core	57' 9"- 59' 3"	1' 6"	--	45	6.0	38.8	46.0	9.2	#	342/43
	" - fines	56' 4"- 59' 3"	2'11"	--	45	6.2	37.6	44.9	11.3	#	343/43
	Coal - fines	59' 3"- 60' 0"	9"	--	47	5.9	35.9	42.3	15.9	#	344/43
8	Coal - core	(98' 6"-102' 0"	3' 6"	9"	) 43	7.4	33.8	50.2	8.6	#	358/43
	" - fines	(			) 34	7.8	36.3	49.6	6.3	#	359/43
	No torbanite										
9	Coal - fines	77' 0"- 80' 0"	3' 0"	--	#	11.9	34.7	35.7	17.7	#	413/43
	No torbanite										
10	No coal or torbanite										
11	Torbanite	67' 6"- 67' 8"	2"	2"	#	2.6	77.8	15.5	4.1	#	29/44
	No coal										
12	Coal - fines	54' 4"- 57' 7"	3' 3"	--	37	11.1	33.0	43.7	12.2	#	73/44
	Torbanite - fines	57' 7"- 60' 4"	2' 9"	2"*	56	8.6	43.9	38.9	8.6	#	74/44
	Coal - fines	60' 4"- 61' 3"	11"	2"*	43	10.4	35.6	41.6	12.4	#	75/44
13	Coal - bituminous	76' 6"- 79' 6"	3' 0"	1'10"	9	5.0	31.3	46.3	17.4	#	85/44
	No torbanite										
14	Coal - core	46' 8"- 49' 4"	2' 8"	9"	39	6.5	36.1	47.6	9.8	#	109/44
	" - fines	46' 8"- 49' 4"			33	8.1	34.5	45.5	11.9	#	110/44
	Torbanite - core	49' 4"- 51' 4"	2' 0"	1' 1"	95	2.5	62.2	26.2	9.1	#	111/44
	" ? - fines	49' 4"- 51' 4"			52	6.3	43.7	40.5	9.5	#	112/44
	Coal - fines	51' 4"- 52' 2"	10"	2"*	40	6.2	43.9	40.3	9.6	#	113/44
15	No coal or torbanite										

* Not included in samples # No determination

FIG. I

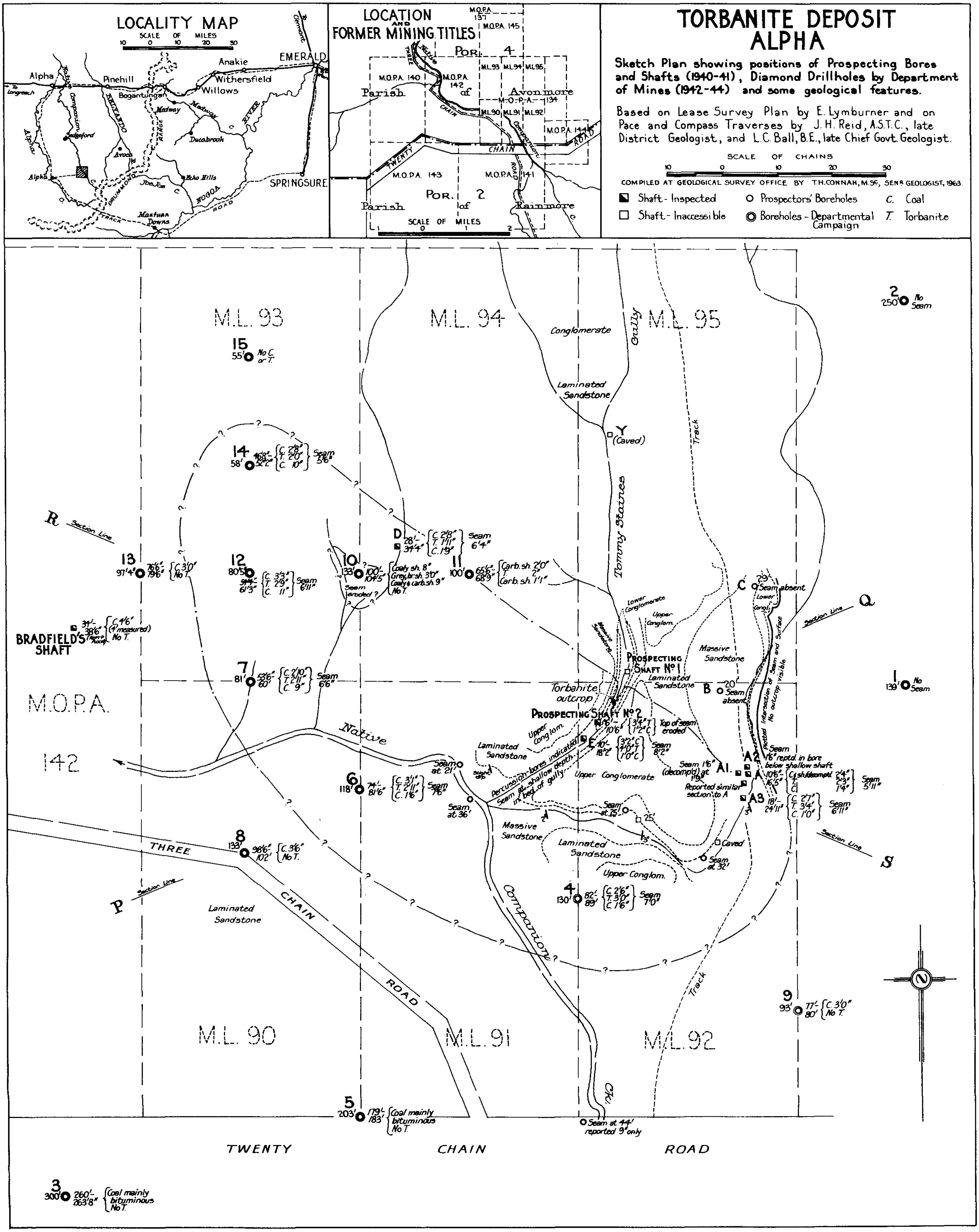
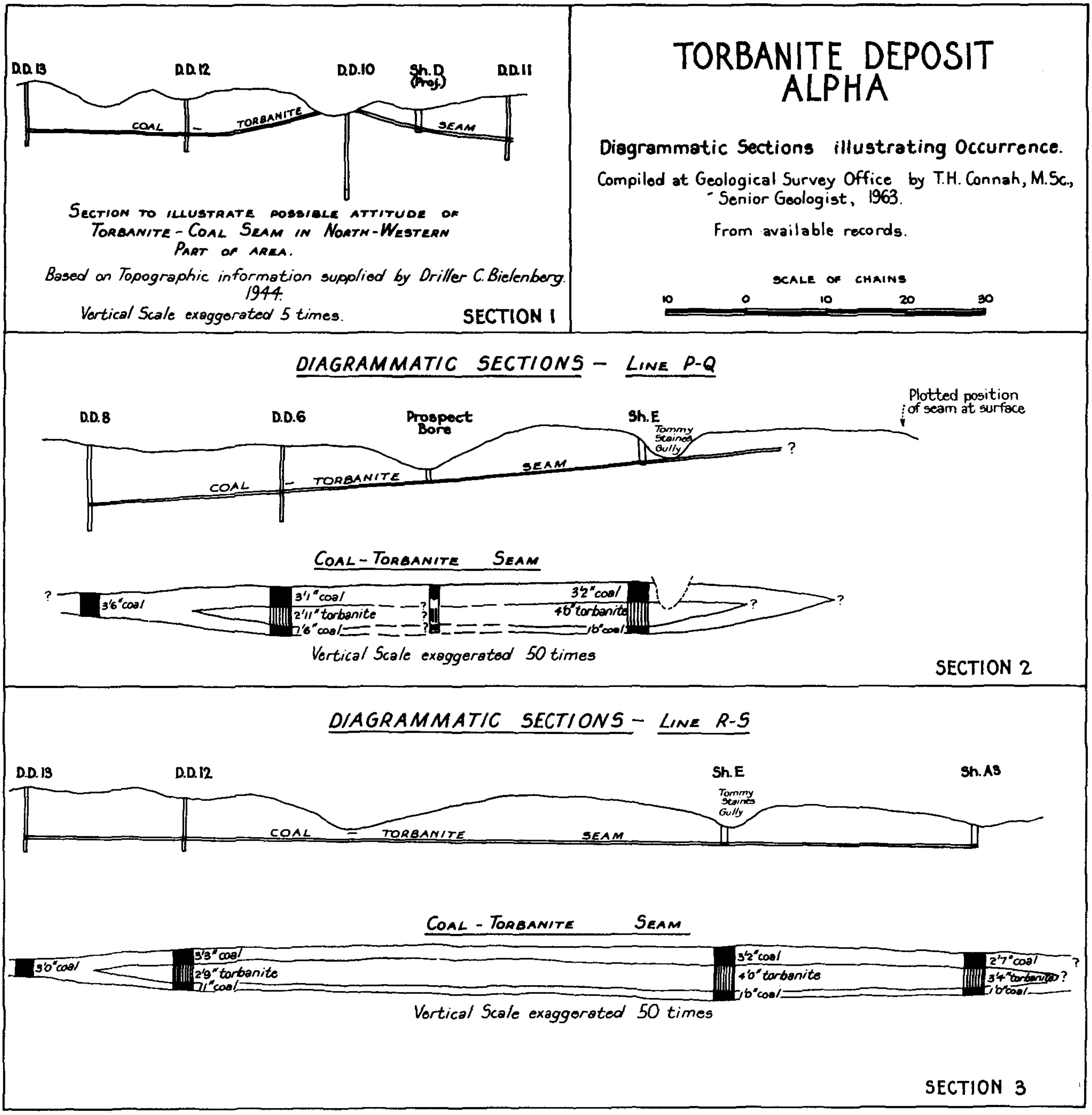
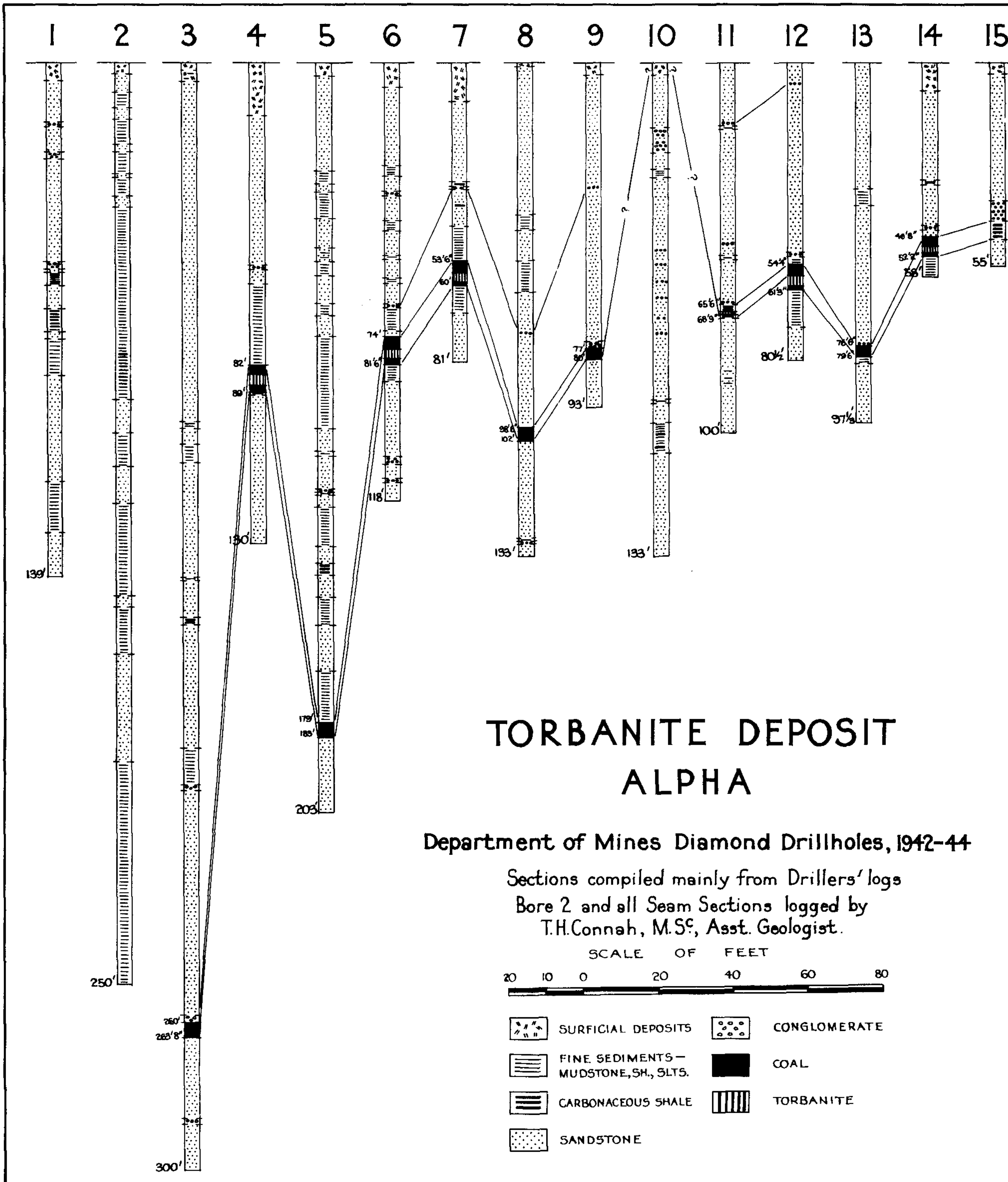

TORBANITE DEPOSIT
ALPHA
Sketch Plan showing positions of Prospecting Bores and Shafts (1940-41), Diamond Drillholes by Department of Mines (1942-44) and some geological features.
Based on Lease Survey Plan by E. Lymburner and on Pace and Compass Traverses by J. H. Reid, A.S.T.C., late District Geologist, and L. C. Ball, B.E., late Chief Govt. Geologist.
SCALE OF CHAINS
10 0 10 20 30
COMPILED AT GEOLOGICAL SURVEY OFFICE BY T.H. CONNAH, M.Sc, SENR GEOLOGIST, 1963.
Shaft - Inspected
Shaft - Inaccessible
Prospectors' Boreholes
Boreholes - Departmental Campaign
C. Coal
T. Torbanite
LOCALITY MAP
SCALE OF MILES
10 0 10 20 30
Alpha
Pinehill
Anakie
Withersfield
Willows
Bogantungan
Medway
Ducabrook
Avoca
Echo Hills
Springsure
EMERALD
Martham Downs
LOCATION AND FORMER MINING TITLES
M.O.P.A. 137
M.O.P.A. 145
POR. 4
M.O.P.A. 140
M.O.P.A. 142
ML 93
ML 94
ML 95
Parish of Avonmore
M.O.P.A. 134
ML 90
ML 91
ML 92
M.O.P.A. 144
TWENTY CHAIN ROAD
M.O.P.A. 143
M.O.P.A. 141
POR. 2
Parish of Rainmore
SCALE OF MILES
0 1 2
M.L. 93
M.L. 94
M.L. 95
M.L. 90
M.L. 91
M.L. 92
M.O.P.A. 142
Conglomerate
Laminated Sandstone
Massive Sandstone
Upper Conglom.
Upper Conglomerate
Lower Conglomerate
Gully
Tommy Staines
Track
Y (Caved)
PROSPECTING SHAFT No 1
PROSPECTING SHAFT No 2
Torbanite outcrop
Percussion-bores indicated Seam at shallow depth in bed of gully.
Native
Companion
Ck.
THREE TWENTY CHAIN ROAD
TWENTY CHAIN ROAD
BRADFIELD'S SHAFT
Section Line
R
Q
P
S
15 55' No C. or T.
14 58' Seam 3'6"
13 97'4" 76'6"- 79'6" C. 3'0" No T.
12 80'5" Seam 6'11"
10 133' Coaly sh. 8" Grey br. sh. 3'0" Coaly & carb. sh. 9" No T. Seam eroded?
11 100' 65'6"- 68'9" Carb. sh. 2'0" T. 2" Carb. sh. 1'1"
D 28'- 34'4" C. 2'8" T. 1'11" C. 1'9" Seam 6'4"
7 81' 53'6"- 60' C. 2'10" T. 2'11" C. 9" Seam 6'6"
6 118' 74'- 81'6" C. 3'1" T. 2'11" C. 1'6" Seam 7'6"
8 133' 98'6"- 102' C. 3'6" No T.
4 130' 82'- 89' C. 2'6" T. 3'0" C. 1'6" Seam 7'0"
5 203' 179'- 183' Coal mainly bituminous No T.
3 300' 260'- 263'8" Coal mainly bituminous No T.
9 93' 77'- 80' C. 3'0" No T.
2 250' No Seam
1 139' No Seam
C 29' Seam absent
B 20' Seam absent
E 10'- 18'2" Seam 8'2"
Top of seam eroded
A1
A2
A
A3
18'- 24'11" C. 2'7" T. 3'4" C. 1'0" Seam 6'11"
Reported similar section to A
Seam at 21'
Seam at 36'
Seam at 25'
Seam at 32'
Caved
Seam at 44' reported 9" only
Rotated intersection of Seam and Surface No outcrop visible
N

FIG. 2



TORBANITE DEPOSIT ALPHA
Diagrammatic Sections illustrating Occurrence.
Compiled at Geological Survey Office by T.H. Connah, M.Sc., Senior Geologist, 1963.
From available records.
SCALE OF CHAINS
10 0 10 20 30
D.D.13
D.D.12
D.D.10
Sh.D (Proj.)
D.D.11
COAL - TORBANITE SEAM
Section to illustrate possible attitude of Torbanite - Coal Seam in North-Western Part of area.
Based on Topographic information supplied by Driller C. Bielenberg. 1944.
Vertical Scale exaggerated 5 times.
SECTION 1
DIAGRAMMATIC SECTIONS - LINE P-Q
D.D.8
D.D.6
Prospect Bore
Sh.E
Tommy Staines Gully
Plotted position of seam at surface
COAL - TORBANITE SEAM
Coal - Torbanite Seam
3'6" coal
3'1" coal
2'11" torbanite
1'6" coal
3'2" coal
4'0" torbanite
1'0" coal
Vertical Scale exaggerated 50 times
SECTION 2
DIAGRAMMATIC SECTIONS - LINE R-S
D.D.13
D.D.12
Sh.E
Tommy Staines Gully
Sh.A3
COAL - TORBANITE SEAM
Coal - Torbanite Seam
3'0" coal
3'3" coal
2'9" torbanite
1'1" coal
3'2" coal
4'0" torbanite
1'0" coal
2'7" coal
3'4" torbanite
1'0" coal
Vertical Scale exaggerated 50 times
SECTION 3

FIG. 3


TORBANITE DEPOSIT
ALPHA
Department of Mines Diamond Drillholes, 1942-44
Sections compiled mainly from Drillers' logs
Bore 2 and all Seam Sections logged by
T.H.Connah, M.Sc, Asst. Geologist.
SCALE OF FEET
20 10 0 20 40 60 80
SURFICIAL DEPOSITS
FINE SEDIMENTS — MUDSTONE, SH., SLTS.
CARBONACEOUS SHALE
SANDSTONE
CONGLOMERATE
COAL
TORBANITE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15