

Report 74-3
COAL RESOURCES,
TABER-MANYBERRIES AREA, ALBERTA

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COAL RESOURCES, TABER-MANYBERRIES AREA, ALBERTA

Abstract

The Taber-Manyberries area occupies the southernmost Alberta Plains between longitudes 110° and 113° west, and latitudes 49° and 50° 15' north. It consists of a gently rolling, till-covered plain between two flat-topped unglaciated uplands, the Cypress Hills on the east and the Del Bonita Upland on the west, cut by numerous erosional channels, some drift-buried, others containing existing drainage systems. The area is underlain by Upper Cretaceous strata which dip gently east and west from the central Sweetgrass Arch axis. Much of the exposed bedrock belongs to the continental Foremost, Oldman, St. Mary River, Eastend and Edmonton Formations, and contains coal seams and coaly sediments. Although coal deposits in all formations (but especially Foremost and Oldman) have been exploited in the past, no deposit is believed suitable for large-scale strip mining. Two deposits — lignitic coal in the Eastend Formation at Thelma and Elkwater, and High Volatile "C" Bituminous coal in the Oldman Formation at Lethbridge — contain enough reserves to support extensive underground mining; only the latter is likely to be an economic proposition.

INTRODUCTION

The Taber-Manyberries area (Figs. 1, 4) occupies the southernmost part of Alberta, bounded by longitudes 110° and 113° west, and by latitudes 49° and 50° 15' north. Within this area lie a number of minor coal fields together with the Lethbridge field, the first to be commercially exploited in Alberta and one of the most productive. In the past, all major production within the area has come from relatively costly underground operations; only in two smaller pits, one at Taber, the other at Grassy Lake, has any appreciable amount of strip mining taken place. In view of the expanding demands for electrical power in the southern part of the province, Alberta Research¹ directed its coal survey activities during the field seasons of 1963 and 1964 towards the Taber-Manyberries area in a search for near-surface coal deposits suitable for strip mining and large enough to support power plants.

As in previous years (Campbell and Almadi, 1964; Pearson, 1959), field investigations were aimed at detecting exploitable coal deposits lying within approximately 100 feet of the surface. Coal outcrops are largely restricted to the few river valleys where active erosion is going on so that chief reliance had to be placed on a program of shallow (approximately 100-150 foot) testholes drilled at approximately 2-mile intervals mostly on a staggered grid pattern (Fig. 4 and

¹ Formerly Research Council of Alberta

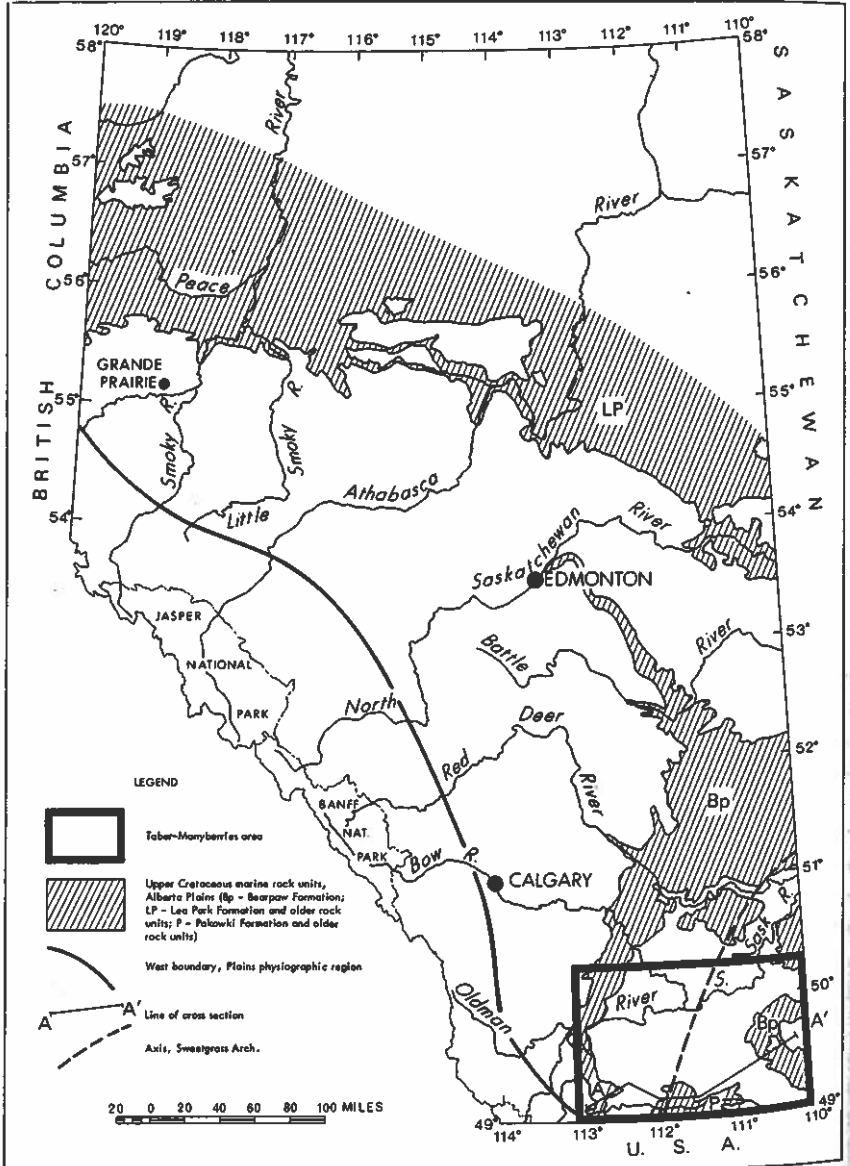


FIGURE 1. Location of Taber-Manyberries area.

Appendix A). All holes were drilled with a conventional truck-mounted mud-rotary seismic shothole drill rig, using broad-bladed insert drag bits; lithologies were determined from cutting samples caught at 5-foot intervals while drilling, and depths and thicknesses determined by means of single-point resistance and spontaneous potential electric logging. Testhole sites were determined by studying air photographs, topography, seismic drill records, local information, coal mine locations, and outcrops. In all 643 testholes were drilled, totalling over 100,000 feet of drilling.

Time did not permit complete field examination of the coal deposits underlying the summit of the Cypress Hills, but logs of 46 testholes in this region (Fig. 4 and Appendix B) have been kindly supplied by Manalta Coal Ltd. (formerly Alberta Coal Ltd.).

It was at Lethbridge, about Sec. 25, Tp. 8, R. 22² that Nick Sheran, about 1873, established the first recorded commercial coal mine in Alberta, and from it hauled coal by ox team to markets as far away as central Montana. Subsequently, coal was mined in fields throughout the Taber-Manyberries area, especially at Taber, Grassy Lake, and Medicine Hat (Campbell, 1964), but the Lethbridge field remained by far the most productive. Here, however, no coal lies close enough to the surface to be recoverable by strip mining (Crawford, 1947); in view of the extensive information available on the Lethbridge field and its confirmed unsuitability for stripping, it was not studied in the field and is only considered in this report by reference.

A small portion of the Alberta Research coal survey information has been published in a short paper delivered to the Alberta Society of Petroleum Geologists Cypress Hills Field Conference (Campbell, 1965).

Geography

The Taber-Manyberries area is a rolling plain rising perceptibly southward, with the major streams and a number of postglacial spillways incised into it to depths of 100 to 150 feet. Two major uplands, both relict erosional surfaces and in part unglaciated, rise above this plain to elevations in excess of 4,000 feet: (1) the Del Bonita Upland - Milk River Ridge in the southwest; (2) the Cypress Hills on the Saskatchewan boundary in the east. Besides these, the Sweetgrass Hills, a prominent cluster of eroded volcanic necks, lie immediately south of the Taber-Manyberries area in the state of Montana.

The highest point in the area, at more than 4,700 feet, is West Butte in the Cypress Hills while the lowest point, about 2,040 feet, is on the South Saskatchewan River, north of Medicine Hat.

² All locations given in this report are west of the fourth meridian.

Two major stream systems drain the area: the South Saskatchewan River in the north and the Milk River, a tributary of the Mississippi River system, in the south. Between these, about 50 townships constitute the watershed of Etzikom Coulee and Pakowki Lake, the largest area of internal drainage in Canada.

The short-grass prairie vegetation that dominates most of the Taber-Manyberries area reflects the aridity of the climate; however, relatively warm average temperatures permit a number of plant and animal species not found elsewhere in Alberta (e.g., *Yucca*, lance-leaf cottonwood, catfish, painted turtle, rattlesnake and sage hen) to occupy favored localities here (Lewin, 1963; Halladay, 1965 and McCorquedale, 1965); in contrast, the crests of the Cypress Hills are capped with isolated forests of aspen poplar, spruce and lodgepole pine, vegetation indicative of a distinctly cooler climate.

Agriculture is the largest single factor in the local economy of the Taber-Manyberries area. In general, uplands and rough moraine areas are given over to grazing on some of the largest ranches in Alberta, while flat or gently rolling plains support dry-farming of grain. About 30 townships in flat lowlands, around Vauxhall and Lethbridge, and in a narrow band eastward to Medicine Hat, are watered by irrigation ditches.

The mineral industry within the area began with, and for many years was dominated by, coal mining, chiefly centered at Lethbridge but also at Taber, Grassy Lake, and Medicine Hat. There is abundant natural gas in the Medicine Hat area and crude oil is produced from the Taber, Taber South, and other fields.

Villages in the dry-farming and ranching regions of the Taber-Manyberries area are relatively small, but in the irrigated regions, several towns—Taber, Raymond, Magrath, and Vauxhall—have grown with the establishment of agriculture-based secondary food-processing plants. The two cities of the area, Lethbridge and Medicine Hat, however, are prosperous on a diversity of trade and small manufacturing industry.

Although the population of the area is very irregularly distributed, a network of highways and secondary roads provides good access throughout. The main transcontinental line of the CPR passes through Medicine Hat, while main and secondary branch lines of the same system serve the rest of the area (Fig. 4).

Acknowledgments

Exploration for coal resources in southern Alberta was carried on as part of Alberta Research strip coal assessment survey which received most of its financial support from Calgary Power Limited and Canadian Pacific Railway's Natural Resources Division (now Canpac Minerals Ltd.). In 1963, field drilling and logging operations were supervised by I. S. Almadi and M. A. Roed, and in 1964 by

A. Bosman, Mrs. E. Nimmon, A. Bosman and B. Untergasser assembled the data tables. Numerous local informants provided leads regarding the occurrence of coal, especially Mr. V. Campbell of Taber, and Mr. Ralph Thrall of Lethbridge and the McIntyre Ranch. Officials of the Taber Irrigation District allowed access to several testhole locations. Finally Manalta Coal Ltd. (formerly Alberta Coal Ltd.) of Calgary through Mr. E. J. Panchysyn, general manager of operations, made available logs of 46 testholes drilled for coal in the Cypress Hills.

GEOLOGIC SETTING

Bedrock Geology

G. M. Dawson of the Geological Survey of Canada made the first geological study of the Taber-Manyberries area in connection with the International Boundary surveys of the 1870's (Dawson, 1875).

Subsequently, expansion of coal mining about the beginning of this century and of the oil and gas industry in the 1920's and 1930's gave impetus to renewed studies of the area so that it became, geologically, one of the best known regions of the Canadian Plains (Crockford, 1949, 1951; Crockford and Clow, 1965; Dawson, 1875; Furnival, 1950; Irish, 1968a,b,c,d; Lerbekmo, 1961; Link and Childerhose, 1931; McLean, 1971; Meyboom, 1960; Powers, 1931; Russell and Landes, 1940; Williams and Dyer, 1930).

Figure 3 shows the succession of strata exposed at surface within the Taber-Manyberries area; figure 2 is a structure cross section, while figure 1 and figure 4 indicate local geology in the context of the general geology of the Alberta Plains.

Most of the Taber-Manyberries area is underlain by relatively flat-lying Upper Cretaceous strata except for lower Tertiary bedrock on the summits of the Cypress Hills. The oldest strata, the Milk River and Pakowki Formation, are exposed in the Milk River valley; both are essentially marine in origin. Above the Pakowki Formation only the Bearpaw Formation is marine; all other units are dominantly nonmarine and contain coaly strata (Fig. 3).

Coal occurrences are most numerous within the Foremost Formation. However, important coal deposits do occur within younger formations: (1) in the uppermost Oldman Formation on the southwest flank of the Cypress Hills, on the Milk River Ridge, and along the St. Mary and Oldman Rivers near Lethbridge; (2) in the St. Mary River Formation on the Milk River Ridge south of Magrath; (3) in the Lower Edmonton Formation along Travers Reservoir (Campbell and Almadi, 1964); (4) in the Eastend Formation on the summit of the Cypress Hills (Fig. 3).

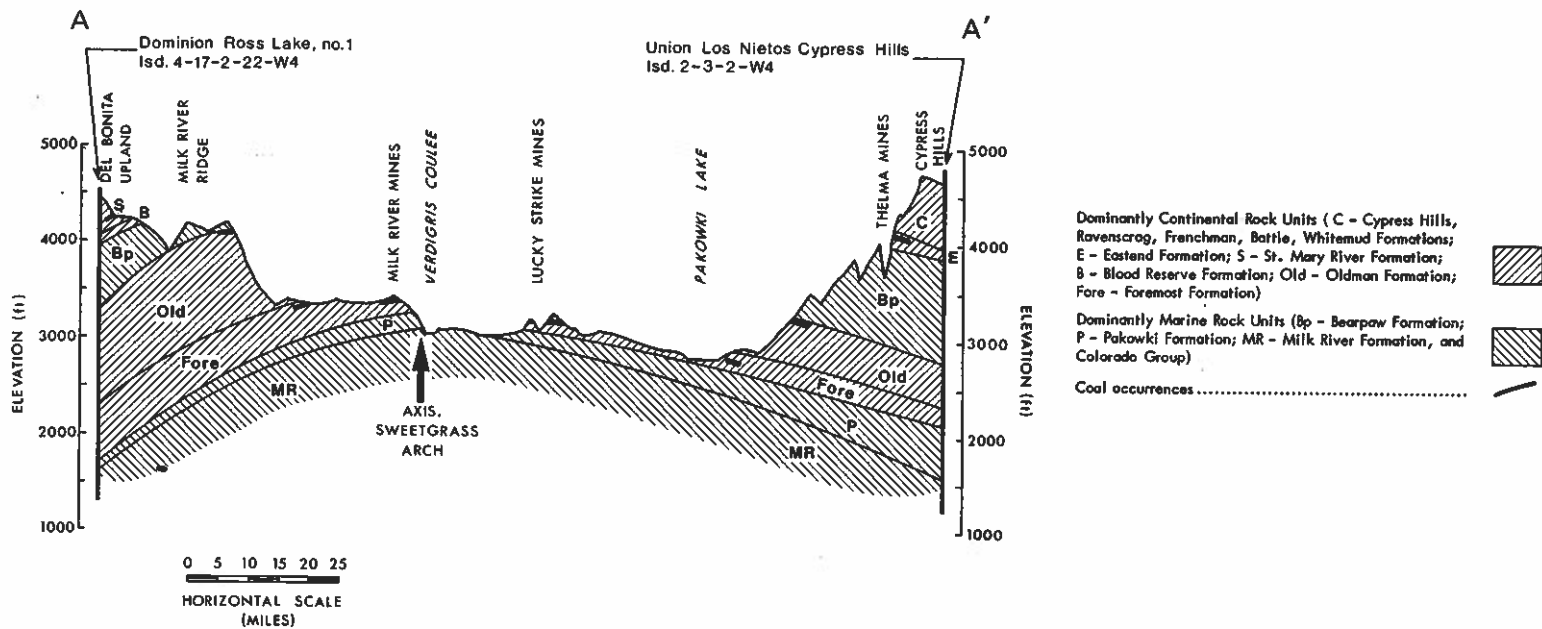


FIGURE 2. Cross section A-A, Milk River Ridge to Cypress Hills.

	MILK RIVER RIDGE	TRAVERS RESERVOIR	CYPRESS HILLS
TERTIARY	/	/	CYPRESS HILLS FM.
			RAVENSCRAG FM.
			FRENCHMAN FM.
			BATTLE AND WHITEMUD FMS.
			EASTEND FM.*
UPPER CRETACEOUS	ST. MARY RIVER FM.*	L. EDMONTON FM.*	
	BLOOD RESERVE FM.		
	BEARPAW FORMATION †		
	LETHBRIDGE MEMBER*		
	OLDMAN FORMATION		
	FOREMOST FORMATION*		
	PAKOWKI FORMATION †		
	MILK RIVER FORMATION		

*COAL - BEARING FORMATION IN TABER - MANYBERRIES AREA

† MARINE FORMATION

FIGURE 3. Succession of strata, Taber-Manyberries area.

The Battle and Whitemud Formations, which outcrop on the flanks of the Cypress Hills, overlie the Eastend Formation; these clay-rich units carry no coal, but are of significance in that slumping of these and younger rock units obscure coal seams in the Eastend Formation.

The structure of the Taber-Manyberries area is dominated by the Sweetgrass Arch, a broad gentle anticline whose axis trends north-northeast (Fig. 1); over the axis of the Arch, strata are flat lying, but eastward they dip toward the Williston Basin of North Dakota and Saskatchewan, and westward they dip toward the Alberta Syncline (Fig. 2). Minor faults exist in the coal mines at Lethbridge (Crawford, 1947; Irish 1968b; Russell and Landes, 1940) and along the Oldman River northeast of Taber (Westgate, 1965a). An area of disturbed strata, 30 to 40 square miles in extent, in the headwaters of Bullshead Creek about Tps. 8-9, Rs. 4-5, (Fig. 4) is interpreted as an upthrust fault block (Westgate, 1968; Irish, 1968d) while a larger area of slightly disturbed bedrock along the international boundary in Tp. 1, Rs. 8-13 is related to igneous intrusion, probably Tertiary, which formed the Sweetgrass Hills.

Quaternary Geology

Recent studies (Broscoe, 1965; Geiger, 1965, 1967; Stalker, 1962, 1965; Westgate, 1965a,b, 1968;) have clarified the Quaternary geology of the Taber-Manyberries area. Two Quaternary phenomena, drift thickness and buried valleys, are of particular relevance to any program of shallow coal exploration or exploitation.

The whole area, except for the summits of the Cypress Hills and the Del Bonita Upland, is covered by glacial drift, mostly till and glacial lake deposits. In the southernmost three townships, from Del Bonita to the Saskatchewan boundary, the drift is generally less than 100 feet thick, but elsewhere drift is thick enough (Fig. 4; Westgate, 1968) to prohibit economic strip mining over large areas, even if coal deposits were present.

A complex series of bedrock drainage channels exists in the area, Late Tertiary to subrecent in age (Geiger, 1965, 1967; Stalker, 1962; Westgate, 1968). Most, particularly the older ones, are buried under the drift mantle. From Taber to Bow Island, the thick drift areas essentially indicate the buried channel pattern. In places, for example north of Taber in Tp. 12, R. 15, and south of Bow Island about Tp. 8, R. 10, the buried preglacial lateral valleys apparently have steep gullied slopes; in the same region some small coal fields (e.g., Lucky Strike in Tp. 2, R. 12, and Grassy Lake in Tp. 9, R. 13), have lateral erosional limits, and appear to be on relatively isolated buried buttes or mesas.

Bedrock deformation by glacial ice action³ and postglacial slumping appear to be less extensive than in central and northern Alberta. There is evidence, however, of glacial bedrock deformation on the north slope of the Del Bonita Upland (testhole in Sec. 26, Tp. 2, R. 22), in the Lucky Strike coal field in Tp. 2, R. 11, and in the Taber coal field in Tp. 10, R. 16, (Fig. 4), while Westgate (1968) described extensive displacement of bedrock by ice pressure along the north bank of the Oldman River northeast of Taber. Major postglacial slumping exists around the upper slopes of the Cypress Hills, where rock masses from the Frenchman and Ravenscrag Formations have slid on the underlying argillaceous Battle and Whitemud Formations, obscuring the coal deposits in the underlying Eastend Formation.

COAL OCCURRENCES

Coal in mineable thickness exists in the Foremost, Oldman, St. Mary River, Edmonton, and Eastend Formations (Fig. 3).⁴ Although numerous mines have existed previously (Campbell, 1964), only one of these, the Taber Ajax mine in Lds. 4 and 10, Sec. 11, Tp. 10, R. 17, is currently operating.

Available information on coal occurrences within the Taber-Manyberries area is assembled in figure 4, including locations of all registered mines, 1963-1964 Alberta Research coal testholes, Manalta Coal Ltd. testholes in the Cypress Hills, selected water wells intersecting coal (Geiger *et al.*, 1965 and Geiger *et al.*, 1966) and a few coal outcrops. The coal elevation contours are mostly structure contours drawn on identifiable seams or coaly zones, from which are inferred the lines of coal outcrop or subcrop.

In this report, "coal field" is applied to an area where one or more coal seams over 4 feet thick lies under less than 120 feet of overburden, or where coal has been mined; 15 such fields are recognizable in the Taber-Manyberries area, although few contain appreciable tonnages of economically recoverable coal. Concentrations of coal occurrences are known in other regions but seams are too thin to warrant further consideration. Following is an annotated list of the 15 fields grouped according to formation.

Foremost Formation Coals

The Foremost Formation contains coaly stringers throughout its thickness in all parts of the Taber-Manyberries area. Outcrops along the South Saskatchewan

³ Although ice-disturbed bedrock falls within many, if not most, definitions of till, it is included with undisturbed bedrock for convenience in this report.

⁴ A few streaks of carbonaceous shale exist in the upper part of the Milk River Formation, and one mine in Sec. 2, Tp. 1, R. 16 was registered with the intention of exploiting a very thin seam of Milk River coal, but the formation is not considered further in this report.

River are distinctly more coaly than along the Milk River in the southeast, while from Pakowki Lake about Tp. 4, R. 8 to Chin Lake about Tp. 7, R. 18 very little coal is noted. In this region bedrock is masked by thick till (Westgate, 1968), but numerous water well records (Geiger *et al.*, 1965; Geiger *et al.*, 1968) verify that coal seams are thin and rare. In most places the coaly stringers of the formation split and rejoin or lens out in a complex manner, best seen in the South Saskatchewan River canyon between Grassy Lake and Redcliff (Crockford, 1949, Fig. 3).

The following nine regions are classed as fields of Foremost Formation coal, although probably none contains sufficient strippable tonnages to be economic at present.⁵

Comrey (Tps. 2-3, Rs. 6-7)

Nine coal mines were registered in this field, one of which, in Sec. 9, Tp. 2, R. 6, operated for 16 years. All coal occurrences are believed to belong to a single thin seam or coal zone up to 6 feet thick, characterized by a 1- to 2.5-foot parting. The seam appears to be persistent, extending northward toward Manyberries, and southward across the Milk River to Pinhorn (Tp. 1, R. 8); it dips gently to the north-northwest. The Comrey field is bounded on the south by the Milk River canyon and on the east by thick overburden. The west and north field limits are set by complex drift-mantled preglacial topography, including several buried valleys with bedrock floors below the level of the present Milk River. Terrain is rolling and thus overburden thicknesses vary irregularly, generally increasing from less than 100 feet in the western part of the field to several hundred feet in the east.

Thus, although the coal appears to be relatively continuous and flat-lying, its thinness and the thick overburden render this field unattractive; no estimate of recoverable tonnages has been made.

Lucky Strike (Tps. 2-3, Rs. 11-12)

In this, the most productive coal field in the southern part of the area, 18 small mines operated over a period of 43 years. The field occupies the crest of a range of probably glacially-disturbed hills. Probably only one main seam was exploited, up to 5.5 feet thick, with a parting 0.2 to 2.0 feet thick. A number of thin coaly stringers lie above this seam (e.g., coal testholes at northeast corner Sec. 7, Tp. 3, R. 11) as well as below it (e.g., in coal testhole at northeast corner of Sec. 20, Tp. 3, R. 12) but none contains coal in economic quantities. The southern boundary of the coal field is the outcrop and subcrop in the gentle north slope of

⁵ Minor concentrations of coal occurrences at Pinhorn (Tps. 1-2, Rs. 8-9); Tp. 1, R. 17; Manyberries (Tps. 4-5, Rs. 6-7); New Dayton (Tp. 5, Rs. 15-18); Purple Springs (Tps. 9-10, R. 15); Cairn Hill (Tp. 11, Rs. 12-13) and Vauxhall (Tp. 12, Rs. 15-17) are not considered.

the Milk River valley, and the north is bounded by rapidly increasing overburden thickness. Both eastern and western limits are believed to be formed by series of irregular faults including an apparent wrench fault east of Sec. 16, Tp. 3, R. 12 and a normal fault in Sec. 1, Tp. 3, R. 12 with a throw in excess of 100 feet. Since this field lies in a relatively stable tectonic setting, the faults and other bedrock distortions are believed to have been caused by glacial deformation. It is estimated that less than three land sections contain coal resources within 100 or 120 feet of the surface (an estimate subject to a wide margin of error because of distorted bedrock); total coal thickness, excluding partings, nowhere exceeds 4 feet so that the field is not considered to be an economic stripping proposition, and no assessment of tonnages has been made.

Milk River (Tps. 2-4, Rs. 15-17)

A number of coal occurrences are known in the vicinity of Milk River town and Warner, including coal testhole intersects and nine small coal mines that operated for short periods between 1900 and 1930. It is believed that the main occurrences, including all the coal mines, are related to a single continuous coal zone (Fig. 4). The seams are thin (nowhere exceeding 3 feet of recoverable coal), badly split and dirty, and dip about 40 feet per mile northward. A number of minor coal intersects, notably along the ridge at the northeast corner of Tp. 2, R. 17 are believed to represent scattered, impersistent coaly streaks lying as much as 200 feet above the main zone. Glacial disturbance is not evident and is assumed to be unimportant in the stratigraphic interpretation. Field limits are set on the northeast and southeast by the seam outcrops, and in the west and northwest by increasing overburden under the east end of the Milk River Ridge. Terrain is rolling so that little is topographically suitable for strip mining. Commercial exploitation appears to be impossible within the foreseeable future.

Seven Persons Coulee (Tp. 6, Rs. 8-9; Tps. 7-8, R. 8)

Eleven small coal mines operated along the floor of Seven Persons Coulee for short time periods, although one, in Sec. 5, Tp. 8, R. 8, existed for nearly 30 years. Probably all exploited a single, relatively continuous zone divided by a persistent parting, 2 to 3 feet thick, into top and bottom seams, each seam 0.5 to 3 feet thick, and usually divided by thin partings. Drift cover is thick (Westgate, 1968) and the coulee walls steep so that stripping is probably only feasible in small areas. Thin dirty seams and difficult stripping render the Seven Persons Coulee field economically unattractive.

Bow Island (Tps. 7-13, Rs. 10-11)

Numerous outcrops, mines, and coal testhole intersects indicate that Foremost Formation coal occurs in appreciable quantity along the west flank of a gentle upland for 30 miles from Forty Mile Coulee in Tp. 7, R. 10 northward past Bow Island to the South Saskatchewan canyon in Tp. 13, R. 10. Coal seams in the

canyon and adjacent coulees are relatively well known (Crockford, 1949), having been exploited by some 26 small mines operating for various periods during a half century. South of Bow Island, six mines have operated at various times, one (in Sec. 6, Tp. 8, R. 10) for nearly 20 years, and a number of coal testholes intersected coal, but no outcrops were seen. Coal probably occurs as impersistent or anastomosing streaks as in the canyon outcrops, but within three relatively well-defined coaly zones. The main zone extends the full length of the field and probably southeastward into the Seven Persons Coulee field; another zone lies about 80 feet below the main zone southwest of Bow Island and also along the canyon wall in Tp. 11, R. 11, while the third is about 50 to 60 feet above the main zone near the canyon in Tp. 12, R. 10. The main zone appears to be flat-lying in Tp. 8, R. 11, but north of there it dips northward gently between townships 9 and R. 11, and up to 30 feet per mile in township 12.

Coal in a few mines in the canyon is reported as 5 feet thick, under thick overburden, but in other mines and in the testholes, no single coal seam thicker than 4 feet is known. Terrain is relatively smooth, but the ground rises eastward so that within a very short distance from the outcrop the overburden is thick. In two areas the cover is thin enough for strip mining to be considered: (1) about 7 sections around coal testholes at northeast corner of Sec. 19, Tp. 8, R. 10 and northeast corner of Sec. 23, Tp. 8, R. 11 and the coal mines in Sec. 6, Tp. 8, R. 10; (2) about 6 sections around coal testholes at northeast corner of Sec. 7, Tp. 9, R. 10, northeast corner of Sec. 11, Tp. 9, R. 11, and northeast corner of Sec. 9, Tp. 9, R. 11. However, the best seams are only 2 to 4 feet thick so that economic exploitation is impossible at present.

Grassy Lake (Tps. 9-11, Rs. 13-14)

Two clusters of coal mines lie south of Grassy Lake village, one in Sec. 9, Tp. 10, R. 13 consisting of four short-lived operations before the First World War, and a larger cluster around Sec. 26, Tp. 9, R. 13, which produced coal for nearly 50 years from about ten small, mostly short-lived mines and the large strip operation of the Continental Coal Corporation. Outcrops are few and poor and the general distribution of coal is known largely from testhole intersects (Fig. 4). Because the field is situated on the axis of the Sweetgrass Arch, strata lie quite flat or dip imperceptibly east and northeast. Coals exploited at both mine clusters belong to the upper of two distinct coal zones separated by 60 to 80 feet of bedrock. This upper zone is more extensive than the lower and is cut into at least four discrete islands (partly reflected in topography) by sharply incised, drift-filled preglacial valleys.

Seams are thin except at the major mine cluster, where two distinct coal benches, each 1 to 2.2 feet thick, are separated by a parting varying from about 1 foot thick in section 25 to 5 feet in a coal testhole at the northeast corner of section 22. Registered mines here occupy almost all of a small island of coal so that further exploration could not be expected to extend resources. Originally, under

one half section of land, about 4 feet of coal (i.e., about 2 million tons) lay in two benches beneath less than 50 feet of overburden; about one half of the most accessible coal has been extracted. Thus, while the Grassy Lake field has in the past been a relatively attractive economic proposition, its value by now has deteriorated.

Taber (Tps. 9-11, Rs. 16-17)

The Taber field was, following Lethbridge, the most important field in the southern Alberta Plains. From some 57 mines, many quite small and ephemeral, a few large and well founded, very large tonnages of coal were extracted over a period of 65 years. The Taber Ajax mine is the only coal mine operating in the southern Alberta Plains at present. Coal testholes indicate only one mined seam, with a few coaly streaks 30 to 100 feet below it. South of Taber the mined seam is believed to dip northward at about 20 feet per mile, but north of town it dips northward more steeply at about 40 feet per mile into a basin about the southeast corner of Tp. 11, R. 17 (where it lies at or below river level); it then rises about 3 miles to subcrop (Fig. 4). Such structure may be tectonic, or could have been caused by massive ice deformation of the bedrock related to the ice-induced horizontal bedrock translocation observed by Westgate (1968) along the Oldman River immediately to the east in Tp. 11, R. 15. The Taber field is limited by marked thinning of the coal on all sides except the southeast near Horsefly Lake where a thick parting prevents economic mining. The thickest coal in the main seam appears to lie in the southeast of Tp. 10, R. 17, where over 4 feet are known. Since intense exploitation has taken place in this region, it is believed that the best coal has already been extracted and that little future development of mining can be expected.

Redcliff (Tps. 12-13, Rs. 6-8)

Recorded coal production began in 1898 west of the City of Medicine Hat from a coal seam outcropping in the South Saskatchewan River canyon, and continued without interruption for 70 years. Some 14 mines were registered, all underground except for a small strip pit in a badlands area (Sec. 1, Tp. 13, R. 7) which operated for 2 years after the Second World War. The seam is generally 3 to 5 feet thick, in places with a parting thick enough to divide the coal into upper and lower seams. Overburden, except immediately at the outcrop, is 200 to 250 feet thick so that, except in special circumstances such as the badlands mentioned above, no strip mining can be envisaged; however, should underground mining become economically practical, the Redcliff area, with its relatively clean seams and large tonnages may once again prove attractive. Crockford (1949) has described the geology of this region and the relationship of the coal seams here to those exposed in the Bow Island field.

Rolling Hills (Tp. 14, R. 13)

For a number of years a single strip mine exploited a 7-foot coal seam at river level in Sec. 3, Tp. 14, R. 13, under 30 to 40 feet of overburden. However, only a

small river flat has thin overburden; north of the river cover increases sharply to more than 100 feet, and south of it to 200 feet. In the coal testhole at northeast corner of Sec. 9, Tp. 14, R. 13 (Fig. 4) drift extends to more than 75 feet below the elevation of the seam; thus the coal deposit north of the Bow River is probably a small erosional island, little more than 1 mile in diameter. The small area of low overburden makes extensive strip mining uneconomic, but should underground mining become feasible, the thick seam might warrant further exploration, especially under the hills south of the river.

Upper Oldman Formation Coals

The upper part of the Oldman Formation, termed the Lethbridge Member, constitutes a relatively continuous coaly zone south of township 18 in the Alberta Plains. While the member is thin, seldom exceeding 100 feet, the one or two contained seams are much more continuous and uniform than those in the Foremost Formation, so that the potential for coal production is considerably greater.

The testhole program encountered Lethbridge Member coal in two areas: along the southwest flank of the Cypress Hills, especially near the railway siding of Cressday, and along the northeast rim of the Milk River Ridge. Coal occurrences in the latter region (two testhole intersects and one short-lived mine in Tp. 4, Rs. 19-20; Fig. 4) are believed to be negligible, but the former merits consideration as a coal field. Two other fields of Lethbridge Member coal lie within the Taber-Manyberries area, the small Pothole field and the large Lethbridge field, but since neither includes any appreciable tonnages of strippable coal, neither was examined in the testhole program; they are included below for the sake of completeness.

Cressday (Tp. 3, Rs. 2-3)

Along the Cypress Hills flank, some 22 coal testholes intersected a relatively continuous coal zone from Tp. 2, R. 1 to Tp. 6, R. 6; seams here were probably exploited by local ranchers in the depression years. The zone consists of an upper continuously coaly portion and one or more impersistent seams lying within 50 to 70 feet below it (McLean, 1971). The upper portion is everywhere split and dirty and mostly thin, but in four Alberta Research testholes (northeast corner of Sec. 7, Tp. 3, R. 2, northeast corner of Sec. 22, Tp. 3, R. 3, northeast corner of Sec. 29, Tp. 3, R. 3, and northeast corner of Sec. 33, Tp. 3, R. 3) and in an adjacent stratigraphic testhole (Lsd. 9, Sec. 7, Tp. 3, R. 2) (McLean, 1971), the seams reach 7 feet in aggregate thickness. However the coals are dirty and low in rank, and they dip eastward under the Cypress Hills so that economic exploitation seems unlikely.

Pothole (Tp. 7, Rs. 21-22)

Thirteen coal mines operated for various times over a period of 60 years in the sharply incised valley of the St. Mary River just upstream from the mouth of

Pothole Creek. One was a strip mine, operated for a few years on a small river bench; elsewhere overburden is 125 to 150 feet. Two recognizable seams are separated by a barren zone 6 to 10 feet thick (Link and Childerhose, 1931); both the upper seam with several partings and the lower solid seam are usually 2.4 to 3.5 feet thick. The structure of the Pothole field appears to be a basin centered on Sec. 7, Tp. 7, R. 21 with dips exceeding 50 feet per mile; it is believed to be the result of glacial ice deformation. The field is so closely limited on the north and east by preglacial valley erosion that no coal is found in the valley of the Pothole Creek, while its southern limits are set by depth of overburden. The coal extends westward across the St. Mary River into the Blood Indian Reserve; further exploration in that direction is warranted although, since overburden is probably thick, coal deposits in this region will not be attractive until economic conditions favor underground mining.

Lethbridge (Tps. 8-10, Rs. 21-22)

The Lethbridge field, first worked in the early 1870's, is probably the oldest commercially operated coal field in the prairie provinces, as well as one of the larger ones: it is the only major coal field in the southern Alberta Plains. Between 1895 and 1964, about 48 registered coal mines operated here, many of them major producers, and large reserves still remain. All the coal probably was mined from a single seam, the "Galt," which outcrops along the Oldman River for a north-south distance of 17 miles, and is known to extend down-dip westward more than 8 miles from the outcrop. In its central part, in township 9, it is 4.5 to 5.5 feet thick with a single thin parting in the middle; southward, it thins markedly in the southern part of township 8, but northward in township 10 it becomes slightly thicker with more and thicker partings, while northeastward beyond Picture Butte in the southeast part of Tp. 11, R. 21, it appears to shale out.

Figure 4 shows structure contours derived from mines and mine exploration records by Crawford (1947; see also Russell and Landes, 1940). The seam dips increasingly steeply westward so that cover exceeds 1,200 feet at the west map boundary. At the east limit of the field, cover is also heavy since the coal is cut off by a series of deeply buried preglacial valleys (Geiger, 1965); the only outcrop is in the deep valley of the Oldman River. Only one small strip mine operated at the southern limit of the field in the bottom of the river valley; all other mines were underground, operating under 200 to 600 feet of cover. Coal reserves remaining in the ground and recoverable by underground mining methods are known to be enormous, but none is considered to be strippable under any economic conditions.

St. Mary River Formation Coals

The St. Mary River Formation, which is coal-bearing in places, occupies a narrow band across the uplands in the southwest corner of the Taber-Manyberries area. Two small mines have been opened to exploit thick basal St. Mary River seams, one in Tp. 1, R. 22, the other in Tp. 3, R. 22, but both soon failed because

of extreme seam irregularities and contained dirt. Coal testholes were drilled in the vicinity of both mines but only one, roughly midway between the two, found any coal. Badland outcrops in Sec. 23, Tp. 3, R. 22, immediately west of the northern mine show extensive distortion of strata, indicating the presence of glacial ice disturbance on the northeast flank of the Del Bonita Upland.

In spite of the thickness of the known seams (6-12 feet), it is very unlikely that any coal deposits suitable for strip mining will be found in this region; the possibility of good seams recoverable by underground methods lying at depths great enough to escape glacial action cannot be discounted.

Eastend Formation Coals

Thelma-Elkwater (Tps. 7-8, Rs. 1-3)

The Eastend Formation, restricted in Alberta to the upper levels of the Cypress Hills, is less than 200 feet thick, but it contains a compact, quite continuous coal zone that constitutes one of the larger coal reserves of the southern Alberta Plains. Six small mines, three of them strip pits, exploited this deposit over a period of nearly 40 years at two locations: Thelma, near Sec. 12, Tp. 7, R. 3, and Elkwater, in Sec. 23, Tp. 8, R. 3.⁶

Alberta Research was not able to explore this deposit in the time available, but Manalta Coal Ltd. (formerly Alberta Coal Ltd.) made available their logs of 46 testholes drilled in search of marketable coal (Fig. 4 and Appendix B). The logs of two oil wells drilled on the Cypress Hills (Los Nietos Cypress Hills No. 1, in Lsd. 14, Sec. 2, Tp. 8, R. 2 and Dome Provo Elkwater 7-34-7-1) also show the position of the Eastend Formation coals, so that approximate structure contours can be drawn on the deposit. Thicknesses of seams intersected in the Manalta testholes vary erratically, and also several holes record no coal; it is believed that this irregularity is evidence of slumping on the flanks of the Cypress Hills, slumping of higher strata being facilitated by the argillaceous Battle and Whitemud Formations that overlie the Eastend Formation.

Manalta Coal Ltd. concluded that Eastend Formation coals underlying the Cypress Hills would not be economically recoverable by strip mining within the foreseeable future since they are badly disturbed to considerable depths by slumping and, except at the outcrop, they lie under thick cover; in addition, they are low in rank and hence low in calorific value. Because of their low rank, it is questionable whether they could be profitably mined by underground methods under any foreseeable economic conditions.

⁶ Thick seams, of possible Eastend age, exploited by five small underground mines in Tps. 8-9, Rs. 4-5, are of no economic interest since they are part of the complex Bullshead fault structure.

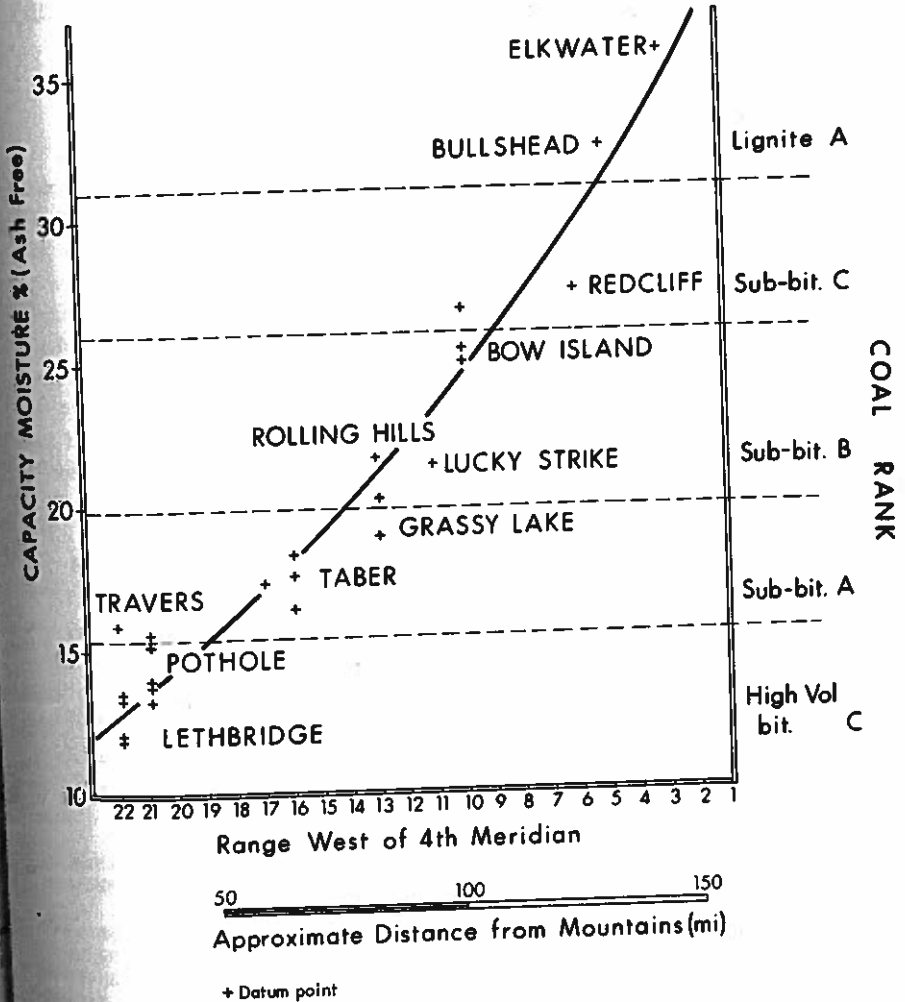


FIGURE 5. Relationship between coal rank and distance from mountains.

Table 1. Proximate Analyses, Coals of Taber-Manyberries Area

Location (W4th Mer)			AFCM Basis				CM Basis	ASTM Classification
Sec	Tp	R	H ₂ O	VM	FC	G. BTU	A	
Thelma-Elkwater Field								
23	8	3	35.7	32.1	32.3	7770	8.0	Lignite A
Mine at Bullshead Butte								
2	9	5	32.3	32.7	34.9	8130	9.0	Lignite A
Redcliff Field								
6	13	6	27.4	29.1	43.6	9180	6.4	Subbituminous C
Bow Island Field								
22	12	10	25.3	30.4	44.3	9750	8.3	Subbituminous B
27	12	10	26.8	30.0	43.3	9310	9.6	Subbituminous C
28	12	10	24.9	29.2	45.9	9850	9.2	Subbituminous B
Lucky Strike Field								
10	3	11	21.3	31.1	47.6	10150	11.7	Subbituminous B
Grassy Lake Field								
25	9	13	19.0	35.2	46.2	10700	5.7	Subbituminous A
26	9	13	20.2	33.3	46.5	10540	9.5	Subbituminous A
Rolling Hills Field								
3	14	13	21.8	30.5	47.8	10220	7.1	Subbituminous B
Taber Field								
18	10	16	16.6	34.6	48.8	11290	7.6	Subbituminous A
19	10	16	18.2	33.0	48.8	10850	11.0	Subbituminous A
30	10	16	17.5	33.4	49.0	11060	9.4	Subbituminous A
12	10	17	13.3	34.9	47.8	11120	14.3	Subbituminous A
Pothole-Lethbridge Fields								
7	7	21	14.0	35.7	50.3	11830	17.7	High Volatile C Bituminous
7	7	21	13.9	38.3	47.9	11750	20.0	High Volatile C Bituminous
7	7	21	15.5	36.6	47.8	11460	24.1	Subbituminous A
18	7	21	15.1	37.0	48.0	11630	17.0	High Volatile C Bituminous
2	8	22	13.6	35.2	51.2	11790	11.3	High Volatile C Bituminous
11	8	22	13.2	36.0	50.6	11940	13.1	High Volatile C Bituminous
2	9	22	12.0	36.0	51.9	12090	12.0	High Volatile C Bituminous
24	9	22	11.9	36.9	51.3	12160	9.8	High Volatile C Bituminous
29	10	21	13.2	36.1	50.7	11770	9.2	High Volatile C Bituminous
Travers Field								
8	15	22	15.9	33.7	50.4	11000	9.4	Subbituminous A

Abbreviations: AFCM - ash-free capacity moisture basis; CM - capacity moisture only basis; H₂O - capacity moisture percentage; VM - volatile matter percentage; FC - fixed carbon percentage; G. BTU - gross calorific value in BTU/lb; A - ash percentage.

Edmonton Formation Coals

The northwestern corner of the Taber-Manyberries area contains some coal deposits in the Edmonton Formation; around Travers Reservoir in Tps. 14-15, Rs. 21-22, a number of small mines exploited these deposits for many years. This region forms part of the Vulcan-Gleichen area studied by Campbell and Alamdi (1964).

Coal Rank and Analysis

Coal rank does not vary significantly from north to south across the Taber-Manyberries area, but does decrease markedly and regularly from west to east. Coals of the Lethbridge field in the west are high volatile "C" bituminous in rank, while those of the Thelma-Elkwater field are lignite "A." The regularity of the west-east variation shows clearly in figure 5 in which "capacity moisture," a convenient quantification of coal rank, is plotted against survey range west of the fourth meridian. Cretaceous coals of three different ages are plotted, and the effect of age on rank is apparently insignificant. Similarly, local tectonic effects (the Sweetgrass volcanic disturbance and the Bullshead fault disturbance) are negligible, since both the Lucky Strike coals and the Bullshead coals fit the general trend. It is believed that the dominant factor controlling the distribution of coal ranks within the area has been the tectonic forces involved in building the Rocky Mountains.

Proximate analyses and calorific values, on a capacity-moisture, ash-free basis, of 24 coals from the Taber-Manyberries area are presented in table 1; complete analyses of 13 other coals typical of the area have been published by Stansfield and Lang (1944). As expected, calorific value — in the long run the most useful criterion for judging commercial value of thermal coals — decreases from west to east in the same manner as capacity moisture. Thus coals in the eastern part of the area must be mineable at an extremely low cost in order to be economically competitive with the intrinsically more valuable coals of the Lethbridge field in the west.

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APPENDIX A.
ALBERTA RESEARCH COAL TESTHOLES,
TABER-MANYBERRIES AREA

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 7-1-3 2890; Sept. 27/64		NE cor. 24-1-4 2810; Sept. 26/64
0-5	Sandy brown clay	0-10	Sandy clay; pebbles
5-15	Buff siltstone ¹	10-20	Buff siltstone ¹
15-25	Buff ss	20-130	Blue grey siltstone; few hard ledges
25-50	Blue grey shale		
50-105	Blue grey siltstone & ss		
	NE cor. 20-1-3 2935; Sept. 27/64		NE cor. 31-1-4 2980; Aug. 24/64
0-40	Clay; sand & gravel	0-5	Sandy clay
40-45	Brown siltstone ¹	5-10	Green grey weathered siltstone
45-55	Brown ss	10-35	Green brown weathered siltstone
55-105	Blue grey siltstone	35-50	Green brown weathered ss
	NE cor. 11-1-4 2927; Sept. 27/64	50-75	Blue grey fine ss
0-10	Brown sandy clay; pebbles	75-95	Blue grey coarse siltstone
10-90	Brown, buff green & blue grey siltstone ¹	95-105	Blue grey medium ss
90-95	Grey siltstone		NE cor. 33-1-4 2950; Aug. 24/64
95-105	Blue grey fine ss	0-2	Soil
	NE cor. 22-1-4 2960; Sept. 26/64	2-6	Gravel; sand
0-45	Brown clay; gravel	6-30	Yellow brown fine ss ¹
45-80	Buff & blue grey siltstone	30-70	Grey blue siltstone
80-85	Blue grey s & p ² ss	70-85	Grey blue fine ss
85-120	Green, blue & grey siltstone	85-90	Coarse grey siltstone
		90-105	Grey blue siltstone

¹top of bedrock
²salt and pepper

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 35-1-4 2990; Aug. 24/64		SW cor. 15-1-6 3260; Sept. 14/64
0-35	Sand; gravel	0-5	Grey green
35-45	Brown weathered fine ss ¹		weathered siltstone ¹
45-75	Grey fine ss	5-10	Grey green weathered ss
75-105	Grey coarse siltstone	10-40	Grey green, brown & brown grey weathered siltstone; little ss
	NW cor. 8-1-5 3080; Aug. 23/64	40-75	Grey blue ss
0-30	Brown weathered siltstone	75-85	Hard grey blue ss
30-40	Grey blue siltstone ¹	85-100	Grey blue ss
40-50	Grey s & p ss	100-105	Chocolate brown & grey siltstone
50-85	Grey siltstone	105-120	Blue grey siltstone
85-103	Grey s & p ss		SW cor. 20-1-6 3315; Sept. 13/64
	NE cor. 31-1-5 3195; Aug. 23/64	0-35	Buff grey weathered siltstone ¹
0-30	Green weathered siltstone ¹	35-60	Buff grey & grey ss
30-40	Grey siltstone	60-70	Fine grey siltstone
40-115	Blue green coarse siltstone	70-110	Grey to dark grey shale
115-120	Blue green fine ss	110-120	Grey siltstone
120-135	Blue green siltstone	120-135	Grey shale
	NW cor. 12-1-6 3255; Sept. 14/64		NE cor. 25-1-6 3225; Aug. 23/64
0-5	Grey green weathered siltstone ¹	0-15	Grey brown weathered ss ¹
5-10	Grey weathered ss	15-35	Coarse grey brown weathered siltstone
10-35	Buff coarse weathered siltstone	35-50	Grey brown ss
35-55	Buff weathered ss	50-105	Medium to very coarse blue grey siltstone
55-65	Grey brown weathered siltstone		
65-85	Grey blue coarse siltstone		
85-100	Coarse s & p ss		
100-120	Grey siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 35-1-6 3250; Aug. 23/64		SE cor. 30-1-7 3325; Sept. 13/64
0-10	Brown sandy clay	0-10	Brown sandy clay;
10-30	Brown green siltstone ¹		few pebbles
30-55	Green blue siltstone	10-35	Brown & grey
55-85	Green blue ss		siltstone ¹
85-95	Grey siltstone	35-40	Grey s & p ss
95-110	Fine grey blue ss	40-70	Grey siltstone
110-120	Grey blue siltstone	70-75	Hard fine grey ss
		75-80	Fine grey ss
		80-110	Grey shale; grey
			siltstone
	NW cor. 24-1-7 3310; Sept. 13/64	110-120	Grey s & p ss - ledges
0-3	Sandy soil		
3-10	Buff weathered ss ¹		
10-30	Ironstone; buff green coarse ss		SE cor. 36-1-7 3275; Sept. 14/64
30-40	Grey siltstone		
40-45	Grey fine ss	0-10	Grey brown
45-95	Grey siltstone		weathered siltstone ¹
95-105	Fine grey ss	10-15	Grey brown
105-120	Grey silty shale		weathered ss
		15-40	Buff & grey
			weathered ss
	SE cor. 28-1-7 3335; Sept. 13/64	40-105	Brown grey fine weathered ss - ledges
0-10	Sandy clay; small pebbles		
10-25	Ironstone; red brown ss ¹		NE cor. 15-1-8 3450; Sept. 15/64
25-75	Blue grey & dark grey siltstone	0-20	Brown grey clay;
75-85	Grey ss		few pebbles
85-90	Coarse dark grey siltstone	20-50	Grey & little red brown ss ¹
90-105	Fine blue grey siltstone	50-70	Brown, grey to dark grey siltstone
		70-90	Grey to dark grey shale
		90-145	Grey blue siltstone
		145-150	Grey blue shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 17-1-8 3430; Sept. 12/64		NE cor. 30-1-8 3350; Sept. 11/64
0-20	Brown silty clay	0-5	Brown silty clay
20-80	Brown, light grey to dark grey siltstone ¹	5-35	Light buff siltstone ¹
80-85	Fine grey ss	35-40	Fine grey blue ss
85-94	Dark grey & brown shale	40-90	Grey blue & grey siltstone
94-94.8	Poor coal	90-128.5	Dark grey & chocolate brown siltstone; few shell fragments
94.8-100	Grey siltstone	128.5-130.1	Coal
100-105	Dark grey shale & brown carbonaceous shale	130.1-135	Dark grey siltstone
105-120	Grey siltstone; few shell fragments @ 120 feet	135-140	Dark grey & brown shale
		140-150	Grey siltstone
	NE cor. 26-1-8 3280; Sept. 12/64		NE cor. 13-1-9 3440; Sept. 11/64
0-12	Brown sandy clay	0-20	Brown clay
12-15	Gravel	20-55	Brown & grey siltstone ¹
15-95	Grey & blue grey siltstone ¹	55-100	Grey to dark grey siltstone
95-115	Grey & brown shale; some grey siltstone	100-105	Grey siltstone
115-130	Fine grey ss		SE cor. 22-1-9 3465; Sept. 15/64
130-135	Grey & brown to chocolate brown carbonaceous siltstone	0-35	Brown & chocolate brown siltstone & shale ¹
135-150	Grey & dark grey siltstone; few brown specks	35-100	Grey shale & siltstone
		100-115	Brown & dark grey shale
	NE cor. 28-1-8 3280; Sept. 12/64	115-130	Grey & dark grey shale
0-5	Brown sandy clay	130-145	Light grey siltstone; shell fragments
5-15	Buff brown weathered ss ¹	145-165	Dark grey & chocolate brown shale; some grey siltstone
15-105	Light grey to dark grey & blue grey siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 26-1-9 3370; Sept. 11/64		NE cor. 8-1-10 3480; Sept. 6/64
0-8	Sandy grey brown clay; some pebbles	0-50	Brown clay; small pebbles
8-55	Buff, dark brown, brown grey & blue grey siltstone ¹	50-90	Grey silty clay - slightly bentonitic
55-115	Grey & dark grey shale	90-110	Soft grey brown siltstone ¹
115-120	Light grey siltstone	110-140	Yellow to light brown siltstone; some ironstone
	NE cor. 28-1-9 3415; Sept. 11/64		NE cor. 21-1-10 3325; Sept. 6/64
0-10	Brown silty clay	0-75	Brown grey sandy clay; many boulders; some thin seams of gravel
10-80	Buff & grey siltstone; some dark brown shale ¹	75-170	Blue grey silty clay; thin seams of gravel
80-85	Fine light grey ss		
85-114	Grey & dark grey siltstone		
114-114.6	Poor soft coal		
114.6-120	Light grey ss; some black shale		
120-130	Grey siltstone		NE cor. 23-1-10 3340; Sept. 10/64
130-135	Light grey s & p ss	0-55	Brown & grey brown silty clay
	SW cor. 29-1-9 3345; Sept. 11/64	55-80	Blue grey bentonitic clay
0-25	Grey brown sandy clay	80-90	Grey shale ¹
25-30	Fine sand; little fine gravel	90-112	Fine grey siltstone
30-50	Grey brown clay	112-114	Very hard siltstone
50-120	Grey blue & grey brown siltstone ¹	114-120	Fine grey s & p ss
120-130	Hard fine s & p ss		
130-150	Grey blue shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 1-1-11 3625; Sept. 15/64		NE cor. 7-1-15 3470; June 20/64
0-25	Brown grey clay; few pebbles	0-45	Sandy clay; few boulders & pebbles
25-30	Silty clay	45-55	Sandy clay; fine gravel
30-65	Buff brown & grey siltstone ¹	55-85	Fine buff to yellow ss ¹
65-70	Light grey fine ss; ledges	85-90	Blue grey siltstone
70-80	Dark grey siltstone	90-105	Light grey siltstone
80-90	Fine grey ss		
90-100	Grey siltstone; shell fragments		
100-105	Grey s & p ss		SW cor. 2-1-16 3520; June 20/64
	Lsd. 3-4-1-15 3450; June 20/64	0-1	Sandy soil
0-10	Buff sandy clay	1-20	Buff green siltstone ¹
10-13	Siltstone ¹	20-40	Buff & creamy ss
13-60	Buff & grey shale	40-60	Light grey siltstone
60-65	Grey siltstone	60-75	Grey shale
65-80	Fine grey ss	75-105	Grey siltstone
80-180	Grey shale		
	Lsd. 3-6-1-15 3450; June 19th	0-15	Sand & gravel
0-35	Brown sandy clay; few pebbles & boulders	15-40	Sandy clay
35-60	Buff siltstone ¹	40-45	Gravel
60-105	Grey shale		
105-130	Dark grey shale		NE cor. 11-1-16 3475; June 19/64
130-165	Blue grey siltstone	0-20	Brown grey sandy clay
		20-25	Buff siltstone ¹
		25-50	Shale
		50-135	Various-coloured ss

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 20-1-16 3515; June 19/64		NE cor. 9-1-17 3905; June 21/64
0-45	Brown till; sandy clay; few pebbles	0-55	Clay; some sand & gravel
45-80	Grey clay	55-65	Brown shale; ironstone ¹
80-99	Fine sand	65-70	Blue grey siltstone; ledges
99-100	Gravel	70-95	Blue grey shale; ledges
	NE cor. 31-1-16 3600; June 19/64	95-105	Blue grey siltstone; ledge @ 99 feet
0-55	Brown clay; pebbles		NE cor. 20-1-17 4060; June 21/64
55-60	Brown soft ss ¹		
60-95	Brown & grey shale	0-55	Brown sandy clay; thin gravel
95-105	Grey blue siltstone	55-135	Grey sandy clay; few small pebbles
105-115	Dark grey shale	135-139.5	Dark grey to black shale ¹
115-120	Blue grey hard fine ss	139.5-140.4	Coal
	SW cor. 4-1-17 3860; June 21/64	140.4-165	Grey siltstone
0-30	Brown clay		NE cor. 22-1-17 3860; June 20/64
30-50	Buff shale ¹	0-60	Clay; few pebbles
50-52	Light yellow siltstone	60-65	Pea gravel; some clay
52-75	Grey shale	65-75	Buff fine ss ¹
75-85	Fine light grey to blue ss	75-80	Light grey siltstone
85-105	Grey shale	80-115	Grey shale
	NE cor. 7-1-17 4125; June 21/64	115-135	Grey shale; some ledges
0-70	Brown clay; many boulders and pebbles		NE cor. 24-1-17 3675; June 20/64
70-85	Grey shale ¹	0-40	Brown till; some pebbles
85-90	Grey siltstone	40-65	Buff shale ¹
90-95	Chocolate brown & blue shale	65-80	Grey shale
95-110	Grey shale	80-85	Dark grey shale
110-120	Grey blue siltstone	85-115	Grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 31-1-17 3900; June 22/64		NE cor. 35-1-17 3629; June 12/64
0-10	Brown clay	0-15	Sticky clay
10-25	Brown & buff shale; bands of ironstone ¹	15-40	Sand & gravel
25-30	Chocolate brown & blue shale - coaly	40-45	Buff shale ¹
30-40	Blue grey siltstone	45-60	Due to gravel no samples
40-50	Light grey ss	60-90	Blue grey shale
50-80	Blue grey shale	90-120	Blue grey siltstone; ledges
80-85	Blue grey shale; trace of coal		
85-105	Blue grey shale		NE cor 7-1-18
105-130	Light grey fine ss		4020; June 24/64
130-135	Dark grey to blue shale	0-30	Brown sandy clay; few small pebbles
	NE cor. 33-1-17 3880; June 18/64	30-115	Grey sandy clay; few small pebbles
		115-130	Grey silty shale ¹
0-25	Brown till; little gravel	130-	Light blue shale
25-40	Shale ¹	145-150	Light blue siltstone
40-50	Grey siltstone; ledges		NE cor. 9-1-18
50-55	Chocolate brown shale		4048; June 24/64
55-60	Grey siltstone	0-25	Brown sandy clay
60-65	Dark grey shale	25-90	Grey blue sandy clay; few boulders
65-90	Blue grey siltstone	90-100	Light blue siltstone ¹
90-90.7	Poor coal	100-110	Light blue shale
90.7-98	Blue grey siltstone	110-120	Light blue s & p fine ss
98-100	Coal with parting		
100-105	Blue grey shale		NE cor. 20-1-18
105-110	Chocolate brown & dark grey shale		3847; June 24/64
110-135	Grey uniform siltstone - ledges	0-45	Brown clay; some small pebbles
		45-75	Blue grey sandy clay
		75-100	Grey to dark grey shale; few brown flakes ¹
		100-105	Grey silty shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-1-18 3995; June 22/64		NE cor. 35-1-18 3820; June 22/64
0-45	Brown sandy clay; boulders	0-35	Brown clay; small pebbles
45-85	Grey blue clay	35-40	Blue shale; some badly weathered coal ¹
85-105	Light buff shale ¹	40-50	Dark grey shale
105-115	Grey blue siltstone	50-55	Grey siltstone
115-135	Grey blue silty shale	55-60	Grey shale
	NE cor. 24-1-18 4250; June 22/64	60-95	Grey silty shale
0-10	Sand & gravel	95-105	Black shale - coaly
10-30	Brown sandy clay; pebbles	105-110	Creamy white shale
30-50	Light buff silty shale ¹	110-120	Fine s & p ss
50-150	Light grey siltstone - very uniform		NE cor. 24-1-19 3815; June 24/64
	NE cor. 31-1-18 3710; June 23/64	0-58	Brown clay; few boulders
0-60	Brown sandy clay; many boulders	58-60	Hard siltstone ¹
60-65	Blue & chocolate brown shale ¹	60-75	Buff & dark grey siltstone
65-90	Dark grey siltstone	75-80	Fine s & p ss
90-110	S & p ss	80-87	Blue grey ss
110-120	Dark grey siltstone	87-105	Blue grey siltstone
	NE cor. 33-1-18 3757; June 22/64	0-40	Brown clay; many boulders
0-35	Brown sandy clay	40-55	Buff shale ¹
35-40	Buff siltstone ¹	55-75	Green soft shale
40-45	Narrow band of weathered coal in buff siltstone		NE cor. 35-1-19 3725; June 24/64
45-105	Grey brown & dark grey siltstone - many ledges	0-60	Brown & blue grey clay; few boulders
		60-85	Buff & blue grey shale ¹
		85-95	Blue grey siltstone
		95-100	Blue dry siltstone
		100-115	Dark grey to chocolate brown shale
		115-120	Blue grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 7-1-20 4053; June 25/64		NE cor. 24-1-20 3866; June 25/64
0-55	Sandy clay; small pebbles	0-45	Sandy clay Lost circulation
55-115	Buff, green & blue grey shale ¹		
115-120	Dark grey hard siltstone		NE cor. 11-1-21 4080; June 26/64
120-127	Chocolate brown shale	0-15	Brown grey clay
127-130	Hard grey siltstone	15-30	Gravel, sand & little brown clay
		30-75	Buff & blue grey shale ¹
	NE cor. 9-1-20 3925; June 25/64	75-105	Blue grey, dark grey & brown siltstone - hard ledges
0-30	Fine gravel		
30-100	Soft blue clay		Lsd. 15-24-1-21 4230; June 26/64
100-105	Gravel; little clay		
105-115	Coarse gravel		
	NE cor. 20-1-20 4075; June 25/64	0-20	Red mountain gravel
		20-100	Buff & grey shale ¹
		100-110	Grey to brown siltstone
0-55	Brown & grey green clay	110-135	Dark grey & brown shale
55-60	Gravel	135-145	Light grey s & p ss
60-65	Grey clay	145-160	Grey & blue grey siltstone ledges
65-70	Grey green siltstone ¹	160-165	Light grey s & p ss
70-105	Lost circulation	165-190	Grey silty shale
		190-195	Light grey siltstone - hard
	NE cor. 22-1-20 3900; June 25/64		NE cor. 35-1-21 4100; June 27/64
0-25	Brown sandy clay; boulders	0-25	Brown grey very sandy clay
25-75	Blue grey clay		
75-120	Coarse sand	25-105	Grey blue very sandy clay; many boulders
120-130	Gravel		
130-135	Blue grey clay	105-110	Solid red mountain gravel

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 7-1-22 4450; June 27/64		NE cor. 20-1-22 4260; June 27/64
0-5	Sandy soil; little clay	0-3	Soil
5-15	Greenish shale ¹	3-70	Green grey siltstone - hard ledges ¹
15-25	Green grey hard siltstone	70-85	Blue grey shale
25-50	Blue grey ss	85-115	Blue siltstone - hard @ 95 feet
50-60	Blue grey siltstone	115-125	Blue shale
60-75	Blue grey shale	125-150	Blue grey siltstone
75-95	Blue grey hard siltstone		
95-105	Light grey hard siltstone		NE cor. 14-2-1 2950; Sept. 24/64
	NE cor. 9-1-22 4370; June 27/64	0-40	Brown clay; some narrow gravel seams
0-2	Sandy soil	40-125	Shale - Bearpaw ¹
2-12	Red mountain gravel	125-135	Dark grey shale; trace of coal
12-20	Green & creamy coloured shale ¹	135-165	Grey to dark grey shale
20-55	Green grey to brown siltstone		
55-60	Blue grey s & p ss		NE cor. 16-2-1 2902; Sept. 29/64
60-100	Blue grey siltstone - ledges	0-35	Brown & grey brown sandy clay; boulders & pebbles
100-105	Blue grey fine ss	35-40	Grey shale ¹
	NE cor. 11-1-22 4300; June 27/64	40-40.9	Weathered coal
0-10	Red mountain gravel - coarse	40.9-60	Grey siltstone
10-20	Yellow bentonitic clay	60-65	Dark grey shale; little coal
20-35	Red mountain gravel - fine	65-69.5	Dark grey shale
35-75	Dark grey & blue grey shale ¹	69.5-71.5	Hard coal
75-135	Dark grey shale, very uniform	71.5-78	Light grey shale
		78-79.2	Soft coal
		79.2-135	Grey, brown grey & blue grey siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 19-2-1 2950; Sept. 25/64		Lsd. 9-36-2-1 3002; Sept. 24/64
0-15	Sandy clay- few pebbles	0-35	Brown clay; many boulders
15-45	Brown shale; coaly material @ 25-30 feet ¹	35-100	Grey clay; some sand; many boulders; little gravel
45-70	Grey to dark grey shale	100-130	Dark grey shale - Bearpaw ¹
70-72	Dark grey & black shale		
72-73.9	Poor coal		
73.9-105	Grey to dark grey shale		NW cor. 33-2-2 3000; Sept. 21/64
105-120	Grey siltstone	0-30	Dark brown clay; some pebbles
	NE cor. 27-2-1 3000; Sept. 24/64	30-33	Dark brown shale ¹
0-61	Brown grey clay; many boulders	33-34	Very poor coal
61-63	Gravel - fine	34-60	Dark brown & grey siltstone
63-65	Clay	60-85	Dark grey & green grey shale
65-135	Shale - Bearpaw ¹	85-90	Light grey siltstone
135-145	Dark grey & chocolate brown shale	90-105	Light grey fine ss
145-150	Grey siltstone		
150-210	Grey, dark grey & green grey shale		NE cor. 34-2-2 3020; Sept. 21/64
	NE cor. 32-2-1 3080; Sept. 28/64	0-30	Brown clay; many boulders
0-35	Brown clay	30-40	Brown weathered shale ¹
35-115	Brown grey & dark grey shale - Bearpaw, some bentonite ¹	40-41.3	Poor coal
		41.3-45	Brown shale
115-135	Dark grey shale - Bearpaw	45-55	Grey shale
135-140	Dark grey shale - Bearpaw; many shell fragments	55-60	Black & chocolate brown shale
140-160	Dark grey shale - Bearpaw	60-65	Grey shale
160-170	Bentonitic shale	65-66.2	Soft coal
170-210	Dark grey shale - Bearpaw	66.2-70	Black shale
		70-115	Grey to dark grey shale
		115-120	Green grey siltstone
		120-135	Grey siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 36-2-2 3050; Sept. 25/64		NE cor. 10-2-4 3025; Aug. 24/64
0-55	Brown sandy clay; many boulders	0-2	Sandy soil
55-135	Grey bentonitic clay	2-30	Buff to green grey siltstone ¹
135-155	Shale — Bearpaw ¹	30-68	Grey siltstone
155-158.3	Dark grey & chocolate brown shale	68-80	Grey s & p ss
158.3-159	Poor coal	80-120	Coarse grey siltstone
159-205	Dark grey shale	120-165	Grey ss; some coarse siltstone
205-210	Grey siltstone		
	NE cor. 36-2-3 2980; Sept. 21/64		NE cor. 14-2-4 3080; Sept. 27/64
0-25	Brown sandy clay; pebbles	0-5	Brown sandy clay; few pebbles
25-80	Buff, brown & grey siltstone ¹	5-40	Green grey & green brown weathered siltstone ¹
80-85	Fine grey s & p ss	40-75	Grey blue siltstone
85-105	Green blue & grey siltstone	75-80	Lost circulation
105-120	Grey to dark grey shale	80-120	Grey blue siltstone
	NE cor. 8-2-4 3020; Aug. 24/64		Lsd. 12-27-2-4 3200; Sept. 27/64
0-3	Grey brown sand	0-10	Buff siltstone; some ironstone ¹
3-10	Buff brown ss ¹	10-25	Grey & grey brown ss
10-40	Coarse buff brown siltstone	25-30	Brown shale
40-70	Grey & blue grey siltstone	30-60	Grey & blue grey siltstone
70-75	Fine blue grey siltstone	60-70	Dark grey shale
75-105	Grey & blue grey siltstone	70-115	Grey blue siltstone
		115-120	Grey blue ss

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	Lsd. 2-35-2-4 3235; Sept. 27/64		NE cor. 32-2-5 3015; Aug. 25/64
0-5	Silty grey clay	0-20	Sand; fine gravel
5-15	Chocolate brown shale ¹	20-65	Mostly hard sand; little clay
15-18	Buff & creamy brown shale	65-90	Gravel - pebble to medium size
18-19.5	Soft weathered coal		
19.5-25	Black shale		
25-135	Green grey & grey shale; siltstone; some ss		NE cor. 34-2-5 3065; Aug. 25/64
		0-20	Very sandy hard clay
	NE cor. 12-2-5 3065; Aug. 24/64	20-25	Very sandy; little clay; some gravel
0-2	Brown soil	25-60	Dark buff siltstone & ss ¹
2-15	Grey brown siltstone ¹	60-95	Blue grey s & p ss
15-30	Grey brown fine ss	95-115	Blue grey, green grey & dark grey siltstone
30-80	Blue grey siltstone; some shale		
80-95	Grey coarse siltstone	115-130	Grey s & p ss
95-105	Fine light grey ss - hard ledge @ 99 feet	130-135	Grey blue siltstone
	NE cor. 23-2-5 3100; Aug. 24/64		NE cor. 36-2-5 3141; Aug. 25/64
0-2	Sandy soil	0-5	Sandy soil; clay
2-10	Grey weathered siltstone ¹	5-30	Green grey weathered siltstone ¹
10-35	Green grey weathered siltstone	30-85	Blue grey siltstone
35-55	Green, brown & grey weathered ss	85-90	Blue grey coarse siltstone
55-100	Blue grey siltstone	90-105	Blue grey siltstone
100-105	Fine grey ss		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 8-2-6 3235; Aug.7/64		
0-25	Green buff weathered siltstone ¹	35-52	Buff & brown yellow ss; hard ledge @ 41 feet
25-35	Buff brown weathered ss	52-65	Green grey siltstone
35-60	Grey siltstone	65-75	Grey ss
60-115	Grey silty shale	75-95	Coarse grey siltstone
115-150	Grey siltstone-few hard ledges	95-120	Blue grey ss
	NE cor. 10-2-6 3250; Aug. 7/64		NE cor. 21-2-6 3270; Aug. 7/64
0-10	Sandy brown clay	0-5	Sandy soil
10-25	Buff siltstone ¹	5-35	Buff green & blue grey siltstone ¹
25-30	Blue grey ss	35-45	Grey brown ss
30-65	Blue grey siltstone	45-130	Grey blue siltstone; fine ss; interbedded
65-70	Dark grey to brown silty shale	130-135	Very coarse ss
70-105	Grey blue shale	135-150	Blue grey ss
	NE cor. 12-2-6 3255; Aug. 23/64		NE cor. 19-2-7 3045; Aug. 9/64
0-3	Sandy soil	0-10	Brown sandy clay; many boulders
3-35	Buff weathered shale ¹	10-20	Grey siltstone; ss ¹
35-85	Grey & blue grey siltstone	20-25	Brown siltstone; with trace of coal
85-90	Dark grey siltstone	25-95	Grey & dark grey shale; siltstone
90-100	Grey s & p ss	95-110	Grey siltstone-shell beds
100-105	Coarse grey siltstone	110-150	Brown & grey siltstone
	NE cor. 19-2-6 3265; Aug. 7/64	150-160	Blue grey ss
0-2	Sandy soil	160-170	Grey ss
2-35	Green & buff siltstone; some ironstone ¹	170-180	Grey, dark grey & some brown siltstone; few shell beds
		180-210	Grey, dark grey & some brown siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	Lsd. 15-21-2-7 3040; Aug. 10/64		NE cor. 21-2-8 3010; Aug. 9/64
0-2	Sandy soil	0-3	Brown sandy soil; boulders
2-9	Buff weathered siltstone ¹	3-40	Buff, brown & blue grey siltstone ¹
9-10	Badly weathered coal	40-50	Blue grey siltstone; some chocolate brown shale
10-22	Buff weathered siltstone	50-85	Grey & chocolate brown shale
22-23	Badly weathered coal	85-90	Blue grey fine ss
23-30	Fine grey ss		Lsd. 15-23-2-8 3045; Aug. 9/64
30-45	Coarse grey siltstone		
45-135	Grey siltstone, uniform in colour & texture		
	NE cor. 23-2-7 3260; Aug. 10/64		
0-2	Sandy soil	0-15	Brown clay; some fine gravel
2-35	Green & blue grey weathered siltstone ¹	15-20	Buff siltstone ¹
35-60	Brown grey ss	20-60	Blue grey ss
60-100	Grey blue siltstone	60-80	Grey & dark grey siltstone; some chocolate brown shale
100-110	Grey blue ss	80-90	Grey siltstone; some shell fragments
110-120	Grey shale	90-135	Grey uniform shale
120-135	Blue grey siltstone		
	Lsd. 14-36-2-7 3210; Aug. 7/64		NE cor. 1-2-9 3280; Sept. 15/64
0-5	Sandy brown clay	0-5	Sandy soil; clay; few pebbles
5-10	Brown weathered shale ¹	5-30	Buff to brown shale; siltstone ¹
10-35	Green buff weathered siltstone	30-35	Weathered coal in grey & brown shale
35-50	Green buff & brown ss	35-55	Dark grey shale
50-90	Dark grey & blue green siltstone	55-70	Coarse grey siltstone
90-105	Coarse blue ss	70-80	Grey fine ss
105-112	Blue siltstone	80-120	Grey siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 3-2-9 3290; Sept. 15/64		NE cor. 22-2-12 3125; Aug. 3/64
0-20	Buff weathered siltstone ¹	0-45	Brown grey sandy clay; few pebbles
20-40	Dark brown, dark grey & some black shale	45-60	Buff weathered shale ¹
40-41.8	Dark grey shale		NE cor. 33-2-12
41.8-44	Coal		3122; Aug. 2/64
44-85	Grey & dark grey siltstone	0-35	Brown & blue grey clay; little gravel @ 18 feet
85-100	Grey fine s & p ss	35-60	Grey siltstone ¹
100-120	Coarse grey siltstone	60-65	Grey shale
	Lsd. 15-31-2-11 3125; Aug. 2/64	65-105	Grey siltstone
		105-120	Grey shale
0-40	Brown very sandy clay; streaks of gravel		Lsd. 15-35-2-12
40-70	Grey blue clay; shield gravel		3220; Aug. 2/64
70-105	Grey very silty shale - uniform ¹	0-1	Sandy soil
		1-26.5	Buff weathered shale ¹
		26.5-29.3	Coal
	NE cor. 33-2-11	29.3-60	Grey shale
	3105; Aug. 2/64	60-65	Grey siltstone
0-5	Sand; fine gravel ¹	65-75	Grey s & p ss
5-10	Sandy clay	75-90	Grey siltstone
10-35	Dark buff weathered shale ¹	90-115	Fine light grey ss
35-105	Grey siltstone; very uniform in colour and texture	115-120	Grey siltstone
			NE cor. 7-2-15
			3440; June 17/64
		0-75	Sticky clay
	NE cor. 20-2-12	75-77	Fine gravel
	3205; Aug. 2/64	77-99	Sticky grey clay
		99-106	Gravel
0-10	Brown till; sandy clay	106-130	Creamy yellow shale ¹
10-40	Dark buff weathered shale ¹	130-150	Blue grey siltstone; few hard ledges
40-95	Grey shale		
95-105	Grey silty shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 9-2-15 3395; June 17/64		
0-55	Buff brown till	85-155	Grey shale
55-75	Grey sticky clay	155-165	S & p ss
75-80	Fine gravel	165-195	Grey to dark grey & blue shale
80-85	Grey clay	195-210	S & p ss
85-89	Coarse gravel		
89-105	Soft buff shale ¹		
	NE cor. 11-2-15 3285; June 17/64		NE cor. 24-2-15 3230; June 4/64
0-50	Buff & grey till; pebbles	0-25	Buff till; sandy clay; few pebbles
50-105	Fine to medium ss ¹	25-50	Buff & grey shale ¹
105-125	Green grey siltstone	50-65	S & p ss
125-145	Lost circulation	65-95	Grey siltstone
145-204	Grey shale	95-105	Dark grey, blue & chocolate brown shale
204-205	Very hard siltstone ledge	105-135	Grey siltstone
	NE cor. 20-2-15 3465; June 2/64	135-160	S & p ss
		160-165	Dark grey siltstone
		165-168	S & p ss
		168-170	Very hard ledge
0-15	Brown till; clay; few gravel ledges		NE cor. 31-2-15 3440; June 2/64
15-30	Yellow brown shale ¹		
30-50	Grey shale	0-15	Till clay; little gravel; pebbles
50-60	Fine grey ss	15-35	Shale; some ironstone ¹
60-95	Grey shale; ss ledges	35-50	Dark grey shale
	NE cor. 22-2-15 3320; June 2/64	50-52	Dark brown & blue shale
		52-52.8	Poor coal
0-25	Sandy clay; some fine gravel	52.8-70	Light grey to grey shale
25-45	S & p ss ¹	70-105	Grey ss
45-55	Dark grey shale		
55-85	S & p ss		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 8-2-16 3489; June 18/64		
0-30	Sand & gravel	15-20	Chocolate brown shale; little weathered coal
	NE cor. 22-2-16 3470; June 1/64	20-35	Brown & grey shale
		35-55	Grey ss
0-10	Fine sand & gravel	55-60	Grey shale
10-45	S & p & yellow weathered ss ¹	60-65	Lost circulation
45-80	Grey shale	65-75	Grey ss
80-85	Grey shale; shell fragments	75-105	Lost circulation
85-110	Dark grey shale; siltstone		NE cor. 33-2-16 3510; June 2/64
110-130	Grey siltstone	0-15	Brown clay; pebbles
130-150	Fine ss	15-30	Brown shale; iron ss ¹
	NE cor. 24-2-16 3525; June 2/64	30-55	Grey ss
		55-57	Dark grey shale
0-10	Clay; little fine gravel	57-57.9	Poor coal
10-15	Brown & coaly black weathered shale ¹	57.9-65	Dark grey shale
15-25	Brown buff silty shale	65-100	Grey shale; some siltstone
25-30	Coal traces; dark shale; ironstone	100-105	Dark grey shale; little bright coal
30-45	Grey shale	105-110	Dry white dense shale
45-50	Coal stringers	110-120	Dark brown shale; some soft coal stringers
50-60	Dark grey shale	120-135	Dry blue grey s & p ss
60-100	S & p ss		NE cor. 35-2-16 3450; June 2/64
100-105	Blue grey ss		
	NE cor. 31-2-16 3550; June 3/64	0-20	Brown clay; few pebbles
0-10	Weathered coal in brown shale ¹	20-25	Thin weathered coal seam in dark brown shale ¹
10-15	Brown silty shale	25-30	Dark brown shale; little coal
		30-34	S & p ss

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 8-2-17 3635; June 23/64		
0-40	Light brown sandy clay	105-115	Dark grey hard ss
40-55	Grey sandy clay	115-125	Grey shale
55-110	Blue grey siltstone; few hard dry ledges ¹	125-130	Grey shale & chocolate brown shale; few coaly fragments
110-120	Blue grey shale	130-135	Dark grey silty shale
	NE cor. 10-2-17 3569; June 18/64		NE cor. 35-2-17 3623; June 3/64
0-30	Brown clay; few small pebbles	0-10	Clay; few pebbles
30-55	Grey soft clay	10-20	Brown shale; ironstone
55-65	Grey soft shale ¹	20-25	Chocolate brown shale; very poor coal
65-105	Blue grey siltstone; few hard ledges	25-35	Grey shale
	NE cor. 12-2-17 3550; June 18/64	35-55	Ss
0-5	Soil; sandy clay	55-105	Grey shale; some siltstone
5-40	Brown & dark grey shale ¹		NE cor. 8-2-18 3695; July 2/64
40-65	Blue grey siltstone; ledges	0-15	Dark brown lake deposit
65-85	Dark grey shale	15-90	Brown & blue clay
85-135	Grey siltstone - fairly hard	90-143	Grey to dark grey shale ¹
	NE cor. 33-2-17 3698; June 3/64	143-145	Chocolate brown to black shale
0-5	Brown grey clay; few pebbles	145-150	Blue grey shale
5-100	Grey to dark grey shale ¹		NE cor. 10-2-18 3680; June 23/64
100-105	Dark brown to chocolate brown shale	0-55	Brown sandy clay; few pebbles
		55-105	Blue grey clay; few boulders

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 12-2-18 3650; June 23/64		Lsd. 9-19-2-21 4215; July 19/64
0-15	Buff till; some blue quicksand	0-15	Brown sandy clay; many pebbles
15-70	Blue grey sandy clay; boulders	15-32	Red gravel
70-80	Blue grey sandy clay; fine gravel	32-65	Buff to dark brown shale ¹
80-100	Buff & grey shale ¹	65-150	Dark grey silty shale - very uniform
100-120	Green blue & grey siltstone - hard @ 105 feet		Lsd. 9-14-2-22 4195; July 19/64
	Lsd. 3-19-2-18 3580; July 2/64	0-36	Brown clay
0-20	Quicksand; gravel	36-38	Red medium sized gravel
20-80	Grey shale ¹	38-60	Light buff siltstone ¹
	Lsd. 10-24-2-19 3660; July 7/64	60-65	Grey shale
0-5	Boulders; gravel	65-120	Grey, dark grey & blue grey siltstone
5-45	Brown sandy clay		Lsd. 12-25-2-22 4200; July 18/64
45-58	Grey sandy clay; few pebbles	0-20	Light brown sandy clay; pebbles
58-63	Gravel	20-25	Buff weathered siltstone ¹
63-70	Grey soft shale ¹	25-26	Bentonitic brown shale
70-75	Dark grey siltstone	26-28	Coal
	Lsd. 15-27-2-19 3765; July 7/64	28-31	Parting
0-20	Dark brown & dark grey sandy clay	31-33.4	Coal
20-45	Light brown bentonitic clay	33.4-35.4	Parting
45-76	Blue grey plastic clay; many boulders	35.4-36	Coal
76-87	Red mountain solid pebble gravel	36-45	Fine s & p ss
87-90	Shale? Lost circulation	45-105	S & p ss

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 7-3-2 3125; Sept. 21/64		NW cor. 23-3-3 3165; Sept. 20/64
0-50	Weathered brown grey shale - Bearpaw ¹	0-15	Grey brown clay; many boulders
50-55	Creamy white shale	15-30	Grey brown shale; some shells ¹
55-111	Brown grey shale - Bearpaw	30-75	Dark grey shale - Bearpaw
111-116.4	Coal with 1 foot parting	75-76.2	Coal
116.4-119	Dark grey to black shale	76.2-80	Chocolate brown to black shale
119-121.2	Coal	80-81.2	Coal
121.2-130	Dark grey shale	81.2-83	Chocolate brown to black shale
130-150	Grey siltstone	83-87.5	Coal
150-165	Grey silty shale	87.5-90	Chocolate brown to black shale
	SW cor. 13-3-3 3105; Sept. 21/64	90-92.4	Coal
0-35	Brown grey sandy clay; few pebbles	92.4-98	Chocolate brown to black shale
35-50	Grey & dark brown siltstone ¹	98-115	Dark grey shale
50-70	Grey, dark grey & black shale	115-135	Grey & dark grey shale
70-95	Grey siltstone		Lsd. 9-29-3-3 3175; Sept. 20/64
95-105	Grey shale	0-37	Brown clay; few pebbles
	SW cor. 15-3-3 2985; Sept. 21/64	37-45	Brown & black shale ¹
0-10	Brown clay; many boulders	45-47	Poor coal
10-45	Brown clay	47-53	Brown & black shale
45-95	Grey silty clay	53-54	Soft coal
95-120	Solid fine to medium gravel	54-55	Brown & black shale
		55-75	Dark grey siltstone
		75-95	Grey siltstone
		95-105	Fine grey ss
		105-110	Grey siltstone
		110-120	Grey silty shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NW cor. 23-3-4 3240; Sept. 20/64		
0-10	Brown grey clay	135-165	Coarse grey siltstone
10-35	Grey brown & yellow brown weathered shale ¹	165-170	Coarse grey siltstone; some creamy white shale
35-64	Grey siltstone	170-180	Grey siltstone
64-65.0	Soft coal		
65.6-70	Black shale		
70-105	Grey shale; siltstone		
			NE cor. 9-3-5 3220; Aug. 25/64
	NE cor. 24-3-4 3230; Sept. 20/64	0-3	Sandy soil
		3-10	Chocolate brown weathered shale ¹
0-20	Brown clay	10-45	Green grey weathered siltstone
20-40	Brown weathered siltstone ¹	45-60	Grey siltstone
40-50	Dark brown & black shale; little coaly material	60-75	Grey blue siltstone
50-83	Grey siltstone	75-95	Grey blue siltstone - very coarse
83-84.1	Coal	95-105	Grey blue siltstone
84.1-90	Black shale		
90-95	Dark grey shale		
95-100	Grey blue siltstone		
100-110	Dark grey & little black shale		
110-120	Grey to creamy grey shale	0-10	Hard sand; little gravel
		10-30	Buff & blue grey ss ¹
		30-55	Blue grey siltstone
		55-75	Blue grey siltstone; shell fragments
	NE cor. 34-3-4 3325; Sept. 19/64	75-85	Blue grey fine ss
0-5	Brown sandy clay	85-120	Grey & blue grey siltstone
5-80	Dark grey shale - Bearpaw ¹		
80-87	Fine grey ss		
87-87.8	Coal		
87.8-95	Dark grey to black shale		
95-100	Dark grey shale		
100-130	Grey siltstone		
130-135	Grey siltstone; some coaly material		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 20-3-5 3245; Aug. 26/64		NE cor. 33-3-5 3180; Aug. 27/64
0-2	Sandy soil	0-40	Brown very sandy clay
2-15	Buff & chocolate brown weathered siltstone ¹	40-55	Sand; fine gravel; little clay
15-35	Grey siltstone	55-65	Blue grey coarse siltstone ¹
35-45	Fine grey ss	65-70	Blue grey fine ss
45-55	Grey & dark grey siltstone	70-95	Blue grey siltstone
55-70	Grey ss	95-100	Fine grey ss
70-150	Fine to coarse grey siltstone	100-120	Blue grey siltstone
	NE cor. 22-3-5 3275; Aug. 26/64		NE cor. 7-3-6 3030; Aug. 5/64
0-20	Brown sandy clay	0-10	Brown till; silty clay
20-25	Sand; fine gravel	10-25	Green to buff weathered siltstone ¹
25-30	Brown sandy clay	25-40	Brown carbonaceous shale
30-45	Grey siltstone - coarse ¹	40-90	Light grey ss; some siltstone
45-55	Fine grey ss	90-105	Grey, blue & chocolate brown shale
55-60	Grey siltstone	105-115	Grey siltstone
60-65	Dark grey & black shale - almost coaly	115-135	Blue grey fine ss
65-75	Dark grey silty shale		
75-95	Fine grey siltstone		
95-110	Very coarse grey siltstone		
110-120	Grey white s & p ss		
	NE cor. 31-3-5 3050; Aug. 27/64		NE cor. 20-3-6 2870; Aug. 8/64
0-15	Brown very sandy clay	0-45	Brown very sandy clay
15-20	Sand; fine gravel	45-178	Brown bentonitic clay; sand layers
20-35	Grey sandy clay	178-196	Gravel
35-80	Grey & dark grey siltstone ¹	196-210	Blue grey siltstone ¹
80-110	Fine grey s & p ss		
110-130	Grey siltstone; some dark brown shale		
130-145	Fine grey ss		
145-150	Grey siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-3-6 2880; Aug. 8/64		NE cor. 35-3-6 2978; Aug. 26/64
0-95	Grey very sandy clay; many pebbles	0-25	Brown grey hard sand; little clay; few pebbles
95-210	Grey bentonitic clay	25-35	Fine yellow buff weathered ss ¹
	NE cor. 24-3-6 3170; Aug. 26/64	35-120	Grey, dark grey & blue grey siltstone
0-10	Sandy soil; clay; few pebbles	120-125	Light grey fine ss
10-20	Coarse buff weathered ss ¹	125-135	Grey siltstone
20-35	Buff & brown weathered siltstone		SW cor. 2-3-7 3040; Aug. 6/64
35-40	Fine grey ss	0-5	Brown sandy clay
40-84	Grey siltstone	5-20	Buff weathered siltstone ¹
84-105	Grey s & p ss	20-40	Chocolate brown & dark grey weathered shale
105-120	Bright green grey siltstone	40-79.5	Grey siltstone
	NE cor. 31-3-6 2850; Aug. 10/64	79.5-80	Coal
		80-82.5	Grey siltstone
0-55	Brown sandy clay; sand; pebbles	82.5-83.2	Coal
55-75	Blue grey clay; pebbles; some coal fragments	83.2-85.5	Grey siltstone
		85.5-88.5	Coal
75-120	Grey silty shale - very uniform ¹	88.5-90	Grey siltstone
		90-100	Grey & chocolate brown shale
		100-110	Grey s & p ss
		110-120	Grey coarse siltstone
	NE cor. 33-3-6 2997; Aug. 10/64		
0-25	Brown clay; few boulders		
25-35	Dark buff & dark grey siltstone ¹		
35-105	Grey & blue grey siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	SW cor. 4-3-7 2970; Aug. 6/64		NE cor. 9-3-7 2945; Aug. 5/64
0-15	Brown sandy clay; small pebbles	0-25	Brown sandy clay
15-35	Buff brown silty shale ¹	25-30	Buff weathered siltstone ¹
35-75	Fine grey siltstone; ledges	30-35	Dark grey to black shale
75-80	Fine grey ss	35-36.5	Blue shale
80-85	Grey siltstone; some chocolate brown shale	36.5-37.6	Coal
85-105	Uniform grey siltstone	37.6-38.5	Parting
		38.5-39.5	Coal
		39.5-45	Blue shale
		45-75	Grey siltstone
		75-105	Grey shale
	SW cor. 6-3-7 2975; Aug. 6/64		NE cor. 11-3-7 3005; Aug. 5/64
0-15	Brown sandy clay	0-10	Sandy brown clay
15-45	Buff to brown weathered siltstone ¹	10-95	Green white, chocolate brown & grey siltstone ¹
45-95	Grey siltstone	95-100	Traces of soft coal in grey shale
95-105	Fine grey s & p ss	100-112	Brown carbonaceous shale; little soft coal
105-125	Brown grey silty shale	112-125	Grey shale; shell beds
125-135	Grey siltstone	125-130	Blue grey ss
	NE cor. 7-3-7 2947; Aug. 5/64	130-140	Blue, brown & grey shale
0-20	Brown very sandy clay	140-165	Grey siltstone
20-25	Brown silty weathered shale ¹		
25-40	Dark buff weathered siltstone		
40-115	Grey uniform siltstone		
115-135	Grey blue fine soft ss, hard @ 60 & 115 feet		

Depth
(feet) Location W 4th Mer.
Top elevation (feet); Date

NE cor. 20-3-7
2920; Aug. 20/64

0-41 Brown sandy clay;
some pebbles
41-55 Dark buff to brown
weathered siltstone¹
55-70 Grey shale
70-80 Fine s & p ss
80-120 Coarse grey siltstone

NE cor. 22-3-7
2960; Aug. 7/64

0-10 Brown sandy clay
10-30 Buff weathered
siltstone¹
30-35 Buff weathered
siltstone; very
thin coal
35-55 Dark grey &
black shale
55-65 Dark grey siltstone;
little ss
65-76 Coarse dark grey
siltstone
76-80.1 Poor coal with
parting
81-85 Dark grey siltstone
85-142 Grey shale
142-150 Blue grey ss -
hard @ 142 feet

NE cor. 24-3-7
2850; Aug. 8/64

0-65 Brown sandy clay;
some boulders
65-172 Grey sandy clay;
some sand
172-180 Gravel

Depth Location W 4th Mer.
(feet) Top elevation (feet); Date

NE cor. 35-3-7
2822; Aug. 22/64

0-10 Sandy brown clay
10-55 Brown clay - lake
deposit
55-146 Grey clay -
lake deposit
146-148 Gravel seam, fine
to pea gravel
148-180 Grey siltstone -
uniform¹

SW cor. 2-3-8
2970; Aug. 6/64

0-35 Brown bentonitic
clay; few pebbles
35-45 Buff weathered
siltstone¹
45-50 Grey siltstone;
shell beds
50-60 Grey shale
60-65 Dark grey siltstone
65-120 Grey siltstone -
uniform

SW cor. 4-3-8
3000; Aug. 6/64

0-45 Brown sandy clay;
many pebbles
45-98 Blue grey bentonitic
clay; pebbles
98-100 Fine gravel
100-101 Clay
101-103 Coarse gravel
103-115 Grey siltstone¹
115-135 Grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 7-3-8 2995; Aug. 4/64		
0-35	Brown sandy clay; many boulders	45-60	Brown grey bentonitic clay
35-80	Grey till; sandy clay; boulders; gravel	60-70	Grey shale ¹
80-90	Solid gravel	70-95	Grey siltstone
		95-105	Coarse grey siltstone hard ledge @ 100 feet
	NE cor. 9-3-8 2990; Aug. 5/64		
0-60	Brown till; clay; few pebbles		NE cor. 9-3-9 2970; Aug. 4/64
60-75	Brown bentonitic clay; little fine gravel	0-10	Brown sandy clay
75-85	Dark grey to black shale ¹	10-128	Blue grey very bentonitic clay
85-100	Very coarse grey siltstone	128-140	Very coarse gravel
100-120	Grey shale	140-150	Blue grey silty shale ¹
			Lsd. 8-14-3-9 2970; Aug. 4/64
	NE cor. 11-3-8 2970; Aug. 5/64	0-25	Brown sandy clay; small pebbles
0-40	Brown & grey sandy clay; some pebbles	25-45	Grey sandy clay
40-85	Grey siltstone ¹	45-55	Grey sandy clay - few bands of gravel
85-90	Dark grey & dark brown shale	55-120	Grey, slightly sandy bentonitic clay
90-110	Fine grey blue ss		
110-115	Grey siltstone		NE cor. 20-3-9 3020; Aug. 4/64
115-120	Dark grey & dark brown shale		
120-130	Blue grey siltstone	0-25	Brown very sandy clay many large pebbles
130-135	Fine grey ss	25-178	Grey blue very bentonitic clay
	NE cor. 24-3-8 2920; Aug. 10/64	178-179	Gravel
0-45	Brown sandy clay; pebbles; gravel	179-210	Grey blue very bentonitic clay

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 7-3-10 3125; Aug. 3/64		NE cor. 24-3-10 3050; Aug. 4/64
0-25	Brown very sandy clay; some gravel	0-15	Grey brown sandy clay; few pebbles;
25-30	Dark brown siltstone ¹		boulders
30-35	Chocolate brown & little black shale	15-25	Buff & chocolate brown shale; parting of white bone ¹
35-50	Green grey to blue s & p ss	25-35	Grey siltstone
50-95	Grey siltstone; few hard ledges	35-40	Blue grey ss
95-120	Blue grey s & p fine ss	40-55	Coarse grey siltstone
		55-95	Grey & brown grey shale; parting of white bone
		95-105	Fairly coarse grey siltstone
	NE cor. 9-3-10 3048; Aug. 3/64		
0-43	Grey brown & grey blue clay; few boulders		NE cor. 7-3-11 3330; Aug. 1/64
43-50	Dark buff to brown weathered siltstone ¹	0-15	Brown sandy clay; few pebbles
50-70	Grey siltstone	15-25	Weathered red brown & grey green shale ¹
70-75	Fine grey ss	25-35	Grey & black shale
75-85	Grey siltstone	35-40	Fine grey ss
85-105	Light grey fine ss	40-55	Grey shale; siltstone
		55-60	Dark grey & black shale; little very poor coal
	NE cor. 22-3-10 3047; Aug. 3/64	60-100	Grey shale
0-15	Light brown sandy clay; few pebbles	100-105	Dark grey shale; little poor coal
15-28	Yellow brown very bentonitic clay	105-125	Grey shale; little white bone
28-45	Dark grey sandy clay	125-135	Grey brown carbonaceous shale
45-75	Grey, dark grey & dark brown siltstone ¹		
75-105	Silty grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 9-3-11 3245; Aug. 3/64		
0-20	Very sandy brown clay; few pebbles	95-100	Dark grey to black shale
20-25	Buff weathered shale; ironstone ¹	100-135	Uniform grey blue siltstone
25-40	Coarse weathered s & p ss		
40-45	Buff weathered shale		NE cor. 9-3-12
45-50	Weathered s & p ss		3180; Aug. 1/64
50-120	Grey, dark grey & chocolate brown shale; siltstone	0-20	Buff & reddish brown shale ¹
	NE cor. 11-3-11 3170; Aug. 3/64	20-25	Buff shale; narrow seam of weathered coal
0-10	Sand; fine shield gravel	25-35	Dark grey, black & brown shale
10-15	Buff weathered siltstone ¹	35-50	Fine grey green ss
15-25	Buff weathered ss	50-72	Grey siltstone
25-45	Coarse grey siltstone	72-75	Coal with parting
45-50	Black & chocolate brown shale	75-79	Grey siltstone
50-60	Dark grey siltstone; bands of white bone	79-81	Coal
60-75	Fine grey ss	81-95	Grey siltstone
75-105	Grey & dark grey siltstone	95-105	Coarse blue grey ss
105-115	Fine grey ss	105-120	Grey to dark grey siltstone
115-135	Grey silty shale		
	NE cor. 20-3-11 3205; July 27/64		NE cor. 11-3-12 3280; Aug. 1/64
0-15	Fine shield gravel; some coarse sand	0-33	Brown clay; many pebbles
15-35	Buff brown weathered shale; ironstone ¹	33-40	Buff weathered shale ¹
35-45	Buff brown weathered ss	40-105	Dark grey, black & chocolate brown shale
45-95	Grey blue siltstone	105-120	Blue grey to green ss; white bone partings
		120-135	Grey siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 20-3-12 3185; Aug. 1/64		NE cor. 24-3-12 3200; July 27/64
0-10	Grey brown clay; few pebbles	0-50	Brown & blue grey clay; fine shield gravel
10-23	Buff siltstone; ironstone ¹	50-105	Dark grey, brown & blue grey shale ¹
23-35	Buff & black shale; thin bands of soft coal	105-107	Blue grey shale
35-95	Dark grey & black shale	107-109.2	Coal
95-100	Grey shale; thin seam of soft coal; white bone	109.2-125	Grey & black shale
100-135	Grey shale	125-165	Grey ss; siltstone
135-136.2	Coal		NE cor. 31-3-12 3198; July 26/64
136.2-140	Grey shale	0-30	Brown sandy clay
140-141.4	Coal	30-50	Brown & grey siltstone ¹
141.4-150	Grey shale	50-100	Chocolate brown & dark grey shale
150-150.9	Coal	100-110	Grey siltstone
150.9-165	Grey shale; many narrow bands of coaly material; white bone	110-125	Chocolate brown to black shale
165-185	Blue grey s & p ss	125-130	Grey siltstone
	NE cor. 22-3-12 3295; July 27/64	130-150	Grey & dark grey shale
0-10	Light brown clay		NE cor. 33-3-12 3195; July 26/64
10-35	Brown, black & grey shale ¹	0-5	Brown grey sandy clay
35-60	Grey & dark grey siltstone; band of black shale	5-40	Dark brown, grey & black shale ¹
60-75	Grey shale	40-79.5	Grey siltstone
75-95	Grey siltstone	79.5-80.4	Coal
95-120	Black, chocolate brown & grey shale	80.4-85	Chocolate brown & black shale
		85-120	Grey siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 35-3-12 3202; July 27/64		NE cor. 31-3-14 3097; July 17/63
0-20	Brown grey sandy clay; few boulders	0-35	Sandy brown clay; some yellow brown clay
20-45	Buff & brown to chocolate brown shale ¹		Lost circulation
45-80	Grey & dark grey shale		
80-90	Dark grey & black to chocolate brown shale		NE cor. 7-3-15 3300; June 4/64
90-105	Grey & black to brown shale	0-20	Buff till; few small pebbles
105-150	Grey siltstone; few ledges	20-30	Brown shale - very bentonitic ¹
	NE cor. 24-3-13 3070; Aug. 1/64	30-105	Brown grey & grey siltstone; hard ledges
0-45	Brown very sandy clay; small pebbles		NE cor. 11-3-15 3115; June 4/64
45-55	Brown weathered siltstone ¹	0-15	Buff till; few pebbles
55-105	Grey silty shale - very uniform - Pakowki	15-25	Buff ss ¹
	NE cor. 35-3-13 3050; July 26/64	25-30	Light grey to white ss; little very poor weathered coal
0-40	Grey & brown sandy clay; some fine gravel	30-40	Cream-coloured siltstone
40-55	Dark buff & grey siltstone ¹	40-50	Grey & light brown siltstone
55-60	Dark grey shale	50-75	Grey & white ss
60-120	Grey shale - very uniform	75-105	Uniform grey shale
			NE cor. 20-3-15 3150; June 5/64
		0-45	Brown grey clay; gravel; pebbles
		45-95	Grey & dark grey shale ¹
		95-105	Light brown to grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-3-15 3180; June 5/64		NE cor. 35-3-15 3070; June 5/64
0-15	Buff till	0-45	Brown till; few pebbles
15-20	Gravel; buff till		
20-25	Buff till; some large pebbles	45-50	Gravel; grey brown till; coal fragments
25-60	Buff & grey shale ¹	50-85	Grey blue till; clay
60-65	Fine grey ss	85-90	Grey siltstone ¹
65-70	Grey siltstone; hard ledge @ 68 feet	90-120	Blue grey ss - few hard ledges
70-105	Grey & blue grey shale		
	NE cor. 24-3-15 3090; June 4/64		NE cor. 7-3-16 3400; June 4/64
0-25	Light brown sandy clay; few pebbles	0-15	Sandy clay; few pebbles
25-120	Blue grey sandy clay; few large pebbles	15-20	Gravel; little clay
		20-25	Dark grey shale; weathered coal; ironstone ¹
		25-40	Grey shale
		40-41	Coal
		41-43	Grey shale
		43-43.7	Coal
		43.7-45	Grey shale
		45-55	White siltstone
		55-74	Lost circulation
		74-100	Grey ss
		100-105	Dark grey soft ss
	NE cor. 31-3-15 3170; June 5/64		
0-112	Brown & grey clay; some boulders		
112-125	Buff silty shale ¹		
125-135	Grey silty shale		
	NE cor. 33-3-15 3095; June 5/64		
0-70	Brown to buff till; bentonitic clay		
70-80	Grey blue clay		
80-105	Grey blue hard siltstone ¹		
105-135	Dark grey silty shale - uniform		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
NE cor. 9-3-16 3370; June 4/64		NE cor. 22-3-16 3280; June 16/64	
0-16	Buff clay; pebbles	66.5-70	Grey shale
16-17	Weathered coal ¹	70-85	Light grey hard siltstone
17-30	Grey ss	85-90	Three very thin coal seams in chocolate brown & black shale
30-41	Grey siltstone	90-95	Chocolate brown & black shale
41-41.7	Coal	95-105	Dark grey shale
41.7-43.5	Brown & black shale	105-115	Grey siltstone
43.5-45.7	Coal with parting	115-120	S & p ss
45.7-55	White bentonitic shale		
55-60	Dark grey shale		
60-85	S & p ss; ledges		
85-95	Grey shale		
95-105	S & p ss		
NE cor. 11-3-16 3315; June 4/64		0-45	Brown grey till; sandy clay
0-20	Buff till; few large pebbles	45-60	Brown grey & buff siltstone; some ironstone ¹
20-85	Buff & grey shale ¹	60-75	Brown & light grey to buff ss
85-90	Grey shale; some white bentonitic shale	75-95	Soft grey shale
90-105	Hard grey siltstone	95-105	Dark grey shale
NE cor. 20-3-16 3330; June 12/64		NE cor. 24-3-16 3225; June 16/64	
0-25	Till; little gravel; large boulders	0-50	Buff till; narrow gravel bands
25-35	Grey shale ¹	50-115	Grey sticky sandy clay
35-40	Hard grey siltstone	115-135	Grey silty shale ¹
40-60	Grey shale		
60-60.7	Coal		
60.7-62.5	Grey shale		
62.5-63.1	Coal		
63.1-65.5	Grey shale		
65.5-66.5	Coal		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 31-3-16 3352; June 12/64		NE cor. 9-3-17 3675; June 3/64
0-25	Brown grey till; few pebbles	0-40	Brown clay; pebbles
25-45	Fine light brown ss ¹	40-60	Grey hard fine ss ¹
45-50	Thin seam of coal in grey shale	60-90	Grey shale
50-60	Grey shale	90-95	S & p ss
60-65	Grey shale; few coaly fragments	95-115	Grey & brown shale; few ss ledges
65-90	Grey siltstone	115-120	Blue & brown shale
90-91	Coal	120-131	Grey shale
91-95	Dark grey & blue shale	131-132	Hard ss ledge
95-100	Thin coal seam; blue & brown shale	132-135	Grey siltstone
100-120	Uniform dark grey siltstone		NE cor. 11-3-17 3475; June 4/64
	NE cor. 33-3-16 3250; June 12/64	0-25	Brown clay; fine gravel
0-40	Light brown till; few large boulders	25-30	Grey shale ¹
40-120	Grey bentonitic clay; some fine gravel seams	30-40	Brown & grey ss
	NE cor. 35-3-16 3235; June 6/64	40-55	Grey & brown shale
0-130	Buff grey till; some gravel ledges; some boulders	55-60	Soft grey ss
130-140	Silty grey shale ¹	60-100	Dark grey & grey shale
140-150	Blue grey fine ss	100-105	Dark grey & brown shale
		105-106	Coal
		106-135	Grey & dark grey shale & siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
NE cor. 20-3-17 3495; June 3/64		NE cor. 31-3-17 3453; June 7/64	
0-30	Brown clay; pebbles	0-30	Brown till; few pebbles
30-50	Brown weathered shale ¹	30-55	Buff till
50-75	Grey, dark grey & brown shale	55-60	Soft buff shale ¹
75-85	Hard grey silty shale	60-115	Soft grey shale
85-90	Coaly & chocolate brown shale	115-120	Soft dark grey shale
90-100	Grey silty shale		
100-105	Dark chocolate brown shale		
105-120	Shale; many ss ledges		
NE cor. 22-3-17 3445; June 3/64			
0-25	Yellow brown clay; pebbles; few boulders		
25-40	Grey shale with brown specks ¹		
40-41	Hard ss		
41-60	Dark grey & brown grey shale; coaly fragments		
60-85	Uniform grey shale		
85-105	Soft s & p ss; hard ledges		
NE cor. 24-3-17 3375; June 3/64			
0-10	Brown clay		
10-25	Yellow brown shale; ironstone ¹		
25-30	Brown grey shale		
30-33	Dark brown shale		
33-35	Coal		

Depth (feet)	Location W 4th Mer . Top elevation (feet); Date	Depth (feet)	Location W 4th Mer . Top elevation (feet); Date
	NE cor. 33-3-17 3380; July 3/64		NE cor. 20-3-18 4145; June 10/64
0-40	Brown & grey clay; boulders	0-70	Clay; pebbles
40-45	Blue & grey blue shale ¹	70-85	Fine gravel; sand
45-46	Weathered coal	85-90	Coarse gravel
46-85	Blue & grey blue shale	90-110	Grey shale ¹
85-90	Very dry dark grey siltstone	110-130	S & p ss
90-105	Dark grey & brown shale	130-140	Hard grey shale
105-115	Grey blue siltstone	140-150	S & p ss
115-120	Dark grey shale; few coaly fragments		NE cor. 22-3-18 3950; June 7/64
120-130	Dark grey carbonaceous shale	0-15	Sandy buff clay; few pebbles
130-135	Dark grey shale; band of ss	15-45	Blue grey clay
	NE cor. 35-3-17 3355; June 11/64	45-65	Gravel in sandy clay
		65-70	Light buff shale ¹
		70-138	Light blue grey siltstone
		138-140	Lost circulation
			NE cor. 35-3-18 3515; June 7/64
0-20	Grey brown till; few small pebbles		
20-30	Brown shale ¹	0-20	Buff till; few pebbles
30-50	Grey shale; hard ledges	20-30	Grey siltstone ¹
30-55	Grey shale	30-55	Light grey shale
55-56.4	Weathered coal	55-80	Soft grey shale
56.4-70	Dark grey shale	80-90	Hard grey shale
70-74	Brown shale	90-100	Dark grey shale
74-75	Coal	100-120	Blue grey soft shale
75-85	Grey shale		
85-93	Chocolate brown to grey shale		
93-94	Coal		
94-105	Chocolate brown to grey shale; coal trace @ 96 feet		
105-130	Light grey to white ss		
130-145	S & p ss		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	Lsd. 6-3-3-19 3870; July 7/64		NE cor. 24-3-19 4125; June 8/64
0-30	Blue grey lake deposit	0-65	Grey clay; fine gravel ledge
30-85	Blue grey silty clay; few small pebbles	65-70	S & p ss ¹
85-185	Grey sandy clay; many small pebbles	70-85	Grey soft shale
185-190	Coarse gravel	85-95	S & p ss
		95-105	Silty grey shale; hard ledges
	NE cor. 16-3-19 3987; July 7/64		Lsd. 11-32-3-19 4180; July 8/64
0-50	Brown & grey sandy clay; pebbles	0-5	Sandy soil
50-85	Soft blue grey lake deposit	5-25	Grey brown sandy clay
85-90	Fine gravel; little clay	25-35	Fine gravel in blue grey sand
90-100	Grey sandy clay	35-55	Pebble size to very coarse gravel
100-125	Green grey & blue grey siltstone ¹		
125-130	Siltstone? Lost circulation		NE cor. 35-3-19 4175; June 10/64
	Lsd. 11-20-3-19 3950; July 8/64		
0-1	Sandy loam	0-45	Buff till; few small pebbles
1-15	Sand; fine mountain gravel	45-60	Buff grey & brown shale ¹
15-35	Dull grey sandy clay	60-64	Dark brown shale
35-60	Dull grey silty plastic clay	64-65.3	Coal
60-65	Narrow band of gravel	65.3-70	Dark brown shale
65-80	Lost circulation	70-85	S & p ss
80-90	Creamy yellow shale ¹	85-100	Grey shale
90-95	Light brown & grey siltstone	100-105	Dark grey ss
95-110	Grey blue shale		
110-120	Grey blue coarse siltstone		

Depth
(feet)

Location W 4th Mer.
Top elevation (feet); Date

NE cor. 1-3-22
4125; July 18/64

0-77 Silty grey clay;
few pebbles
77-83 Reddish pebble gravel
83-100 Yellow creamy
siltstone¹
100-105 Light grey shale
105-120 Grey siltstone; band
of coarse s & p ss
120-135 Grey silty shale

NE cor. 14-3-22
4180; July 19/64

0-10 Silty clay; few
pebbles
10-50 Buff weathered
siltstone; hard ledges¹
50-55 Dark grey to
black shale
55-150 Blue grey & grey
siltstone; several
hard ledges
50-195 Grey siltstone; narrow
bands of brown &
chocolate brown shale

NE cor. 16-3-22
4375; July 17/64

0-5 Silty clay
5-75 Green grey siltstone;
band of chocolate
brown shale¹
75-85 Greenish ss
85-130 Grey siltstone
130-135 S & p ss
135-190 Grey siltstone
190-195 Grey siltstone; band
of black shale

Depth
(feet)

Location W 4th Mer.
Top elevation (feet); Date

NE cor. 27-3-22
3820; July 18/64

0-65 Brown grey clay;
many small pebbles
65-120 Grey green & blue
grey weathered ss¹
120-160 Blue grey &
grey siltstone
160-195 Very dark silty shale

SW cor. 3-4-3
3205; Sept. 19/64

0-15 Brown grey clay;
few pebbles
15-130 Dark grey shale —
Bearpaw¹
130-140 Dark grey & some
brown siltstone
140-145 Dark grey & chocolate
brown shale; little
coaly material
145-151 Grey & creamy
white shale
151-153 Coal
153-160 Black & chocolate
brown shale
160-180 Fine grey siltstone

NW cor. 5-4-3
3215; Sept. 19/64

0-50 Brown grey till;
small pebbles
50-115 Dark grey shale —
Bearpaw¹
115-119.5 Dark grey, chocolate
brown & black shale
119.5-120 Very poor coal
120-140 Blue grey siltstone
140-150 Fine grey ss —
hard @ 146 feet

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 18-4-3 3355; Sept. 20/64		Lsd. 15-14-4-4 3175; Sept. 17/64
0-5	Silty clay; many boulders	0-116	Brown bentonitic clay
5-35	Brown grey weathered shale — Bearpaw ¹	116-119	Fine gravel
35-140	Grey very uniform shale — Bearpaw	119-131	Very silty bentonitic clay
		131-135	Fine gravel
	NW cor. 1-4-4 3177; Sept. 19/64		SE cor. 27-4-4 3225; Sept. 17/64
0-30	Brown sandy clay; few pebbles	0-15	Till
30-40	Grey sandy clay; few small seams of gravel	15-50	Brown clay; some gravel
40-110	Grey bentonitic clay	50-55	Brown weathered siltstone ¹
110-148	Grey sand; little clay	55-75	Grey siltstone
148-160	Coarse gravel	75-105	Grey to dark green silty shale
	SE cor. 5-4-4 3290; Sept. 11/64		SW cor. 30-4-4 3295; Sept. 17/64
0-5	Grey silty clay	0-15	Brown sandy clay; pebbles; few boulders
5-25	Buff & brown buff weathered siltstone ¹	15-30	Dark brown uniform weathered shale ¹
25-50	Brown grey & blue grey ss	30-40	Fine grey weathered s & p ss
50-55	Grey siltstone	40-45	Green blue siltstone
55-90	Grey ss	45-80	Grey siltstone
90-100	Coarse grey siltstone	80-90	Fine grey s & p ss; band of chocolate brown to black shale
100-105	Dark grey & chocolate brown shale; trace of coal	90-95	Green blue siltstone
105-115	Grey siltstone	95-120	Grey siltstone; ledge @ 117 feet
115-135	Fine grey ss		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	SW cor. 1-4-5 3320; Sept. 18/64		SW cor. 27-4-5 3248; Sept. 18/64
0-13	Brown sandy clay; many pebbles	0-15	Brown sandy clay
18-23	Brown silty weathered shale ¹	15-20	Grey & chocolate brown weathered shale ¹
23-25	Brown weathered shale	20-25	Chocolate brown & black shale; some weathered coal
25-27.2	Weathered coal	25-30	Dark brown siltstone
27.2-35	Dark brown weathered shale	30-90	Grey blue & grey shale
35-105	Grey & dark grey siltstone; ss	90-105	Blue grey siltstone
	NW cor. 9-4-5 3105; Sept. 18/64		NE cor. 29-4-5 3250; Sept. 18/64
0-25	Brown clay; few pebbles	0-15	Brown silty clay
25-45	Grey buff & grey siltstone ¹	15-60	Blue grey, grey to dark grey siltstone ¹
45-50	Fine grey ss	60-75	Grey shale
50-70	Blue grey siltstone	75-100	Grey blue siltstone
70-80	Fine blue grey ss	100-105	Fine grey ss
80-105	Blue grey & grey siltstone	105-110	Dark grey shale
	SE cor. 14-4-5 3221; Sept. 18/64	110-120	Blue grey siltstone
			NE cor. 8-4-6 2910; Aug. 11/64
0-10	Brown grey sandy clay; little fine gravel	0-25	Brown clay; many boulders
10-35	Dark buff weathered siltstone ¹	25-40	Coarse brown grey weathered siltstone ¹
35-45	Dark grey to black shale	40-45	Dark grey & chocolate brown shale
45-55	Blue grey siltstone	45-55	Grey siltstone
55-135	Grey shale	55-80	Grey & dark brown shale
135-140	Green blue siltstone	80-86	Grey shale
140-150	Fine grey s & p ss	86-87.2	Coal
		87.2-120	Grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 10-4-6 2920; Aug. 21/64		NE cor. 21-4-6 2890; Aug. 27/64
0-15	Brown clay	0-15	Grey sandy clay
15-20	Sand & gravel in clay	15-20	Sand
20-55	Bentonitic brown & grey clay	20-50	Brown grey sandy clay
55-60	Dark grey & chocolate brown siltstone ¹	50-70	Grey, chocolate brown & little black shale ¹
60-80	Light grey s & p ss	70-90	Grey siltstone; band of chocolate brown shale
80-105	Grey & dark grey siltstone	90-95	Trace of coal in grey siltstone
	NE cor. 12-4-6 2985; Aug. 27/64	95-130	Grey, brown & some black shale; hard ledge @ 100 feet
0-15	Brown sandy clay	130-140	Grey siltstone
15-60	Grey blue sandy clay	140-145	Dark brown to black siltstone
60-85	Fine grey ss ¹	145-165	Fine bright s & p ss; hard ledge @ 159 feet
85-90	Coarse grey siltstone		NE cor. 23-4-6 3053; Aug. 27/64
90-105	Grey & dark grey siltstone	0-15	Brown very sandy clay; few pebbles
	NE cor. 19-4-6 2870; Aug. 21/64	15-45	Green buff, brown buff & grey brown coarse weathered siltstone ¹
0-45	Grey brown sandy clay; little gravel @ 35 & 45 feet	45-55	Brown weathered ss
45-55	Fine dark buff ss ¹	55-85	Grey ss
55-69	Grey siltstone	85-90	Light grey fine ss
69-71	Poor coal	90-135	Grey blue siltstone
71-80	Grey siltstone		
80-105	Fine blue grey ss		
105-120	Grey siltstone		
120-125	Blue grey fine ss		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 32-4-6 2880; Aug. 20/64		
0-30	Brown sandy clay; few pebbles	55-100	Blue grey & dark grey siltstone ¹
30-50	Chocolate brown, dark grey & black shale ¹	100-105	Fine grey ss
50-70	Grey siltstone	105-120	Coarse grey siltstone; few shell fragments @ 115 feet
70-85	Fine grey ss		
85-90	Dark grey siltstone		
90-95	Dark grey shale; trace of coal		
95-114	Grey siltstone		NE cor. 12-4-7 2853; Aug. 27/64
114-116.5	Coal seam		
116.5-120	Grey siltstone	0-19	Brown clay; many small pebbles
120-130	Creamy grey siltstone	19-20.9	Coal
130-135	Dark grey siltstone; coal trace	20.9-25	Brown weathered siltstone
135-165	Fine blue grey ss - very dry	25-35	Grey blue siltstone
		35-45	Fine grey blue ss
		45-50	Grey blue siltstone; shell bed
	NE cor. 34-4-6 2975; Aug. 21/64	50-55	Dark grey siltstone
		55-105	Dark grey, dark brown & some black shale
0-30	Dark brown sandy clay		
30-40	Brown buff weathered shale ¹		
40-75	Green buff & blue grey siltstone		
75-80	Blue grey ss		NE cor. 23-4-7 2890; Aug. 25/64
80-95	Coarse blue grey siltstone	0-20	Brown sandy clay
95-115	Fine blue grey ss	20-25	Brown weathered siltstone, trace of weathered coal ¹
115-135	Blue grey siltstone	25-30	Brown weathered siltstone
	NE cor. 10-4-7 2816; Aug. 22/64	30-55	Chocolate brown, grey & black shale
0-5	Sandy brown clay	55-60	Thin coal seam in grey siltstone
5-25	Brown bentonitic clay - lake deposit	60-85	Grey shale
25-55	Sandy brown clay	85-90	Some coal in grey shale
		90-100	Grey blue very fine ss
		100-120	Grey siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
NE cor. 34-4-7 2825; Aug. 22/64			
0-40	Grey silty clay	40-47	Blue grey sandy clay
40-60	Soft buff shale ¹	47-50	Seam of coal in dark grey shale ¹
60-80	Soft grey siltstone	50-70	Dark grey shale
80-105	Grey siltstone	70-90	Light grey fine ss
NE cor. 36-4-7 2845; Aug. 17/64		90-105	Grey siltstone
		Lsd. 9-12-4-13 3200; July 26/64	
0-10	Sandy brown grey clay	0-22	Brown silty clay
10-55	Brown clay - lake deposit	22-24	Brown grey hard weathered siltstone ¹
55-71	Grey sandy clay; few coaly fragments	24-30	Brown grey shale; band of soft weathered coal
71-105	Blue grey siltstone; little chocolate brown shale ¹	30-55	Brown, grey & black shale
105-120	Dark grey to brown shale; shell fragments @ 110 to 115 feet	55-60	Thin seam of soft coal in shale
NE cor. 8-4-12 3100; July 26/64		60-195	Grey, dark grey & some brown shale & siltstone
0-45	Brown sandy clay; few boulders	NE cor. 19-4-13 3030; July 25/64	
45-95	Blue grey bentonitic clay; few boulders	0-30	Brown silty clay; many boulders
95-110	Buff weathered shale ¹	30-195	Grey silty clay; few boulders
110-120	Grey siltstone		
120-155	Fine s & p ss		
155-165	Grey blue siltstone		
NE cor. 10-4-13 3065; July 27/64			
0-10	Brown sandy clay; few pebbles		
10-40	Fine shield pea gravel; little sand		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 21-4-13 3048; July 25/64		NE cor. 21-4-14 3070; July 27/64
0-30	Brown sandy clay; few boulders	0-40	Brown sandy clay; few pebbles
30-57	Grey blue clay	40-167	Blue grey bentonitic clay; some sand
57-61	Black shale ¹	167-170	Very hard boulder in till
61-75	Grey s & p ss		
75-95	Grey siltstone		
95-105	Grey shale		
	NE cor. 8-4-14 3070; July 17/63		NE cor. 23-4-14 3048; July 24/64
0-55	Sandy yellow brown & brown clay; some coal fragments; some pebbles	0-25	Brown sandy clay; many boulders
55-80	Grey sandy clay; some coal fragments; pebbles; gravel	25-133	Blue grey bentonitic clay; few boulders
80-85	Gravel	133-140	Blue grey bentonitic clay; fine gravel
85-105	Grey sandy clay; some coal fragments; pebbles; gravel	140-195	Blue grey bentonitic clay
	NE cor. 19-4-14 3080; July 17/63		NE cor. 34-4-14 3043; July 27/64
0-41	Yellow brown & brown sandy clay; few pebbles; coal fragments	0-60	Brown sandy clay
41-46	Gravel	60-170	Blue grey bentonitic clay
46-95	Brown sandy clay; gravel lenses & pebbles	170-195	Blue grey bentonitic clay; shield pea gravel
95-105	Grey sandy clay; some pebbles & rare gravel stringers		NE cor. 32-4-15 3125; July 24/64
		0-35	Brown sandy clay
		35-60	Brown sandy clay; many gravel bands - shield
		60-75	Brown sandy clay; some pebbles
		75-195	Blue grey sandy clay; some gravel ledges

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 34-4-15 3090; July 17/63		
0-15	Brown sandy clay; gravel lenses	13-14.8	Weathered seam of coal
15-40	Sandy brown clay; some coal fragments	14.8-29	Dark grey shale
40-105	Sandy grey clay; some pebbles; coal fragments; gravel lense @ 57-58 feet	29-30	Coal seam
		30-41.5	Dark grey silty shale
		41.5-44	Coal seam with parting
		44-50	White bentonitic silty shale
	NE cor. 36-4-15 3086; July 17/63	50-60	Dark grey to black siltstone
0-30	Yellow brown & brown sandy clay; some pebbles; some coal fragments	60-75	S & p ss
30-105	Sandy grey clay; coal fragments; rare gravel stringers	75-105	Grey siltstone; few hard ledges
			NE cor. 19-4-16 3355; July 12/64
	NE cor. 10-4-16 3255; June 6/64	0-5	Sandy soil
0-40	Buff till; large boulders	5-9	Hard creamy siltstone ¹
40-165	Grey blue soapy clay - till	9-50	Buff & blue grey siltstone
165-175	Fine gravel in grey sandy clay	50-75	Blue grey siltstone; band of blue shale
175-210	Blue silty shale ¹	75-145	Grey, dark grey & chocolate brown shale; some black shale
		145-150	Light grey coarse siltstone
	Lsd. 3-16-4-16 3150; June 6/64		
0-5	Brown clay; few pebbles		
5-13	Brown siltstone & dark grey weathered shale ¹		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 21-4-16 3325; July 12/64		NE cor. 36-4-16 3125; July 27/64
0-80	Brown sandy clay; many boulders; some pebbles	0-40	Brown till; few pebbles; boulders
80-85	Grey silty shale ¹	40-180	Blue grey very bentonitic clay; few boulders
85-90	Light grey coarse siltstone		
90-125	Grey, chocolate brown & black shale		NE cor. 8-4-17 3350; June 7/64
	NE cor. 23-4-16 3240; July 24/64	0-30	Buff till; few pebbles
0-95	Brown till; sandy clay; many boulders	30-65	Grey till; sandy clay
95-100	Fine s & p ss ¹	65-68	Shale; siltstone ¹
100-110	Grey siltstone & black shale; little soft coal	68-85	Coarse red brown ss; some blue & brown shale
110-120	Grey siltstone; little very poor coal	85-115	Brown to yellow brown coarse ss
120-150	Very coarse grey siltstone		NE cor. 10-4-17 3315; June 6/64
	NE cor. 32-4-16 3218; July 12/64	0-20	Sandy till; few pebbles
0-5	Brown sandy clay	20-45	Brown shale; traces of coal ¹
5-10	Sand; fine gravel	45-55	Grey bentonitic shale
10-25	Brown silty clay	55-75	Light to dark grey & brown shale
25-30	Brown weathered siltstone ¹	75-90	Grey silty shale; trace of coal
30-40	Grey, brown & black shale	90-100	Soft grey shale
40-45	Grey, brown & black shale with trace of coal	100-105	Grey & white ss
45-85	Grey, brown & black shale		
85-100	Grey siltstone		
100-105	Dark grey siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet);
	NE cor. 12-4-17 3320; June 6/64		NE cor. 23-4-17 3300; July 20/64
0-5	Sandy buff clay; small pebbles	0-49	Sandy clay; narrow gravel ledges; brown
5-20	Weathered buff & brown shale; some weathered soft coal ¹	49-65	Grey & dark grey shale ¹
20-40	Grey shale	65-70	Black & chocolate brown shale; traces of soft coal
40-60	S & p ss; hard ledges	70-75	Light grey fine ss
60-105	Grey shale; ss ledge	75-105	Grey siltstone
	NE cor. 19-4-17 3197; July 3/64		NE cor. 32-4-17 3215; July 11/64
0-55	Brown & blue grey sandy clay; boulders	0-55	Brown grey silty clay
55-60	Blue grey sandy clay; seam of fine gravel	55-70	Yellow brown shale some ironstone ¹
60-120	Blue grey very bentonitic clay; boulders; narrow gravel seams	70-80	Blue grey siltstone
	NE cor. 21-4-17 3195; July 20/64	80-85	Chocolate brown dark grey shale
0-35	Sandy clay	85-90	Fine grey siltstone
35-55	Sand; little clay	90-110	Grey, dark grey & dark brown shale
55-144	Grey bentonitic clay	110-135	Dark blue & light grey siltstone
144-148	Fine gravel		NE cor. 34-4-17 3170; July 12/64
148-155	Grey clay	0-2	Sandy soil
155-165	Grey shale ¹	2-13	Fine red mountain gravel
165-170	Black shale; some soft coal	13-25	Buff siltstone ¹
170-191	Grey shale	25-105	Dark grey, green grey & chocolate brown shale
191-192	Very hard grey siltstone.	105-110	Fine s & p ss
		110-120	Grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 36-4-17 3240; July 12/64		NE cor. 12-4-18 3405; June 11/64
0-20	Brown clay; few pebbles	0-40	Buff & brown till; pebbles
20-35	Brown siltstone; ironstone ¹	40-55	Grey & grey green shale ¹
35-85	Grey, dark grey, chocolate brown & black shale	55-75	Grey siltstone
85-90	Hard grey siltstone	75-85	Dark grey & brown siltstone
90-105	Light grey, dark grey, brown & black shale	85-95	Grey shale
105-115	Grey siltstone	95-100	Light grey to white ss
115-120	Fine s & p ss	100-105	Soft grey shale
	NE cor. 8-4-18 3520; June 11/64		NE cor. 19-4-18 3428; July 3/64
0-10	Buff till	0-13	Light brown sandy clay
10-35	Buff shale; some ironstone ¹	13-20	Hard greenish siltstone
35-105	Grey shale	20-55	Buff, light grey & chocolate brown shale
105-110	Fine grey ss	55-60	Dark grey, chocolate brown & blue shale; coaly fragments
110-120	Dark grey shale	60-70	Light grey blue siltstone
	NE cor. 10-4-18 3448; June 11/64	70-80	Light grey ss
0-25	Buff till; fine gravel; few large boulders	80-105	Uniform blue grey siltstone - hard @ 82 feet
25-65	Grey shale ¹		NE cor. 21-4-18 3427; July 3/64
65-70	Dark grey & brown shale	0-15	Brown clay; some boulders
70-85	Fine dry light grey ss	15-20	Brown shale ¹
85-90	Chocolate brown dry siltstone	20-35	Fine grey & brown ss
90-105	Light grey shale	35-40	Dark grey siltstone; some chocolate brown shale; some coaly material
		40-80	Light grey dry siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 23-4-18 3370; July 3/64		NE cor. 36-4-18 3210; July 11/64
0-15	Buff sandy clay; large pebbles	0-20	Sandy brown clay; many boulders
15-55	Buff & grey shale ¹	20-35	Buff weathered siltstone ¹
55-60	Light grey blue dry siltstone	35-55	Grey, blue grey & chocolate brown shale; little weathered coaly material
60-65	Chocolate brown & blue shale	55-60	Dark grey shale
65-105	Grey & blue grey shale	60-75	Blue grey siltstone; ledge @ 75 feet
	NE cor. 32-4-18 3355; July 11/64	75-105	Blue grey uniform shale
0-20	Brown sandy clay; coal fragments		NE cor. 7-4-19 4010; July 9/64
20-80	Buff, grey & black to chocolate brown shale ¹	0-15	Brown sandy clay
80-85	Fine grey ss	15-60	Blue grey quicksand
85-125	Grey siltstone; ledges	60-102	Very sandy clay with sand & gravel layers
125-135	Dark grey & dark brown shale	102-130	Grey, dark grey & blue grey dry siltstone ¹
135-150	Dark grey dry siltstone	130-133	Fairly hard fine grey ss
	NE cor. 34-4-18 3348; July 11/64	133-135	Very hard grey ss
			NE cor. 12-4-19 3685; June 11/64
0-55	Brown grey clay; many boulders	0-10	Buff till; many large boulders
55-65	Fine light brown ss ¹	10-35	Blue grey shale ¹
65-90	Light brown & brown grey siltstone	35-40	Chocolate brown shale
90-95	Light brown shale	40-45	Blue grey shale
95-120	Coarse grey blue siltstone	45-55	S & p ss
		55-105	Blue grey siltstone; ledges

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 21-4-19 3570; July 4/64		NE cor. 34-4-19 3401; July 4/64
0-20	Brown sandy clay	0-5	Sandy clay
20-25	Fine gravel in brown sandy clay	5-10	Fine green to brown weathered ss ¹
25-85	Grey shale ¹	10-55	Green buff & brown siltstone
85-90	Blue grey siltstone	55-70	Fine blue grey s & p ss
90-105	Blue grey shale	70-80	Blue grey siltstone
	NE cor. 23-4-19 3450; July 4/64	80-85	Dark grey & chocolate brown shale
0-5	Brown grey sandy clay	85-90	Grey siltstone
5-50	Brown & grey sandy clay; some fine gravel	90-105	Blue grey fine ss
50-75	Fine s & p ss ¹		NE cor. 36-4-19 3389; July 10/64
75-80	Light grey shale	0-15	Dark brown clay; few pebbles
80-90	S & p ss	15-35	Brown & chocolate brown shale ¹
90-120	Light grey very dry shale	35-60	Blue grey siltstone
	SE cor. 30-4-19 3685; July 4/64	60-70	Dark grey shale
0-15	Sand; very little brown clay	70-75	Fine s & p ss
15-25	Fine brown sand	75-90	Dry blue grey siltstone
25-40	Very sandy brown clay	90-95	Fine s & p ss
40-60	Soft brown ss ¹	95-105	Grey soft shale
60-100	Buff & grey shale with hard ledges		NE cor. 8-4-20 4265; July 6/64
100-135	Uniform blue grey siltstone	0-25	Brown sandy clay
		25-45	Brown sand; fine gravel
		45	Lost circulation
		100	Dark grey shale ¹
		100-120	Very little return

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
NE cor. 19-4-20 3880; July 6/64		NE cor. 34-4-20 3480; July 4/64	
0-35	Brown sandy clay; small pebbles	35-65	Green grey siltstone; ledges
35-158.5	Blue grey clay; few pebbles; boulders	65-75	Blue grey dry shale
158.5-161.5	Coal ¹	75-80	S & p ss ledge
161.5-165	Lost circulation	80-107	Blue grey dry shale
165-180	Blue grey shale	107-120	Hard blue grey siltstone
NE cor. 23-4-20 3620; July 6/64		NE cor. 36-4-20 3427; July 4/64	
0-35	Brown sandy clay; few pebbles	0-70	Brown sandy clay; pebbles & gravel @ 55 feet
35-120	Blue grey clay; few pebbles	70-110	Bentonitic grey clay
120-140	Grey siltstone ¹	110-130	Blue grey siltstone ¹
140-150	Grey blue fine ss	130-140	Dark grey to chocolate brown shale
Lsd. 8-28-4-20 3775; July 5/64		140-160	Blue grey shale
0-45	Brown sandy clay; many boulders; pebbles	NE cor. 32-4-20 3655; July 4/64	
45-65	Blue grey clay; few pebbles	0-20	Brown sandy clay; pebbles
65-90	Green grey & grey siltstone ¹	20-50	Green grey & grey siltstone ¹
90-100	Blue grey shale	50-85	Dark grey & blue grey shale
100-120	Blue grey dry siltstone	85-90	Fine blue grey ss
		90-105	Blue grey siltstone
0-10	Buff sandy clay		
10-35	Light buff siltstone; ironstone ¹		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 36-4-21 3695; July 6/64		NW cor. 14-5-5 3365; Sept. 16/64
0-40	Brown sandy clay; few pebbles	0-20	Very dark brown silty shale ¹
40-65	Blue grey sandy clay	20-105	Dark grey very uniform silty shale - Bearpaw
65-78	Red mountain gravel		
78-101	Blue grey clay		
101-105	Gravel		
	SW cor. 1-5-5 3150; Sept. 17/64		NW cor. 16-5-5 3150; Sept. 17/64
0-10	Brown clay; boulders	0-20	Brown sandy clay; little fine gravel @ 18 feet
10-20	Fine grey brown weathered ss ¹	20-35	Buff grey siltstone ¹
20-35	Grey blue & grey siltstone	35-45	Grey siltstone
35-60	Dark grey shale	45-120	Blue grey uniform siltstone
60-65	Fine light grey ss		
65-95	Dark grey shale		
95-110	Blue grey siltstone		
110-120	Blue green siltstone - Oldman		NE cor. 28-5-5 3270; Sept. 16/64
	NW cor. 3-5-5 3160; Sept. 17/64	0-20	Brown sandy clay; small pebbles
0-10	Sandy clay; few pebbles	20-25	Brown weathered siltstone ¹
10-30	Green grey, buff & blue grey siltstone ¹	25-26.5	Very poor weathered coal
30-50	Fine s & p ss	26.5-40	Black shale
60-80	Dark grey & blue grey siltstone	40-70	Green grey siltstone
80-85	Grey fine ss	70-105	Blue grey siltstone
85-105	Dark grey & blue grey siltstone		
105-115	Grey shale		
115-120	Blue siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	SW cor. 29-5-5 3127; Sept. 16/64		
0-10	Dark brown clay	80-85	Grey siltstone
10-20	Dark brown weathered shale ¹	85-120	Grey siltstone; some black shale
20-30	Buff weathered siltstone; ironstone		
30-35	Fine grey weathered ss		NE cor. 9-5-6 3080; Aug. 21/64
35-40	Buff weathered siltstone; ironstone	0-15	Brown sandy clay
40-75	Blue grey & dark grey siltstone	15-30	Sand; some pea gravel
75-85	Fine grey ss	30-60	Brown clay; many pebbles
85-90	Grey siltstone	60-70	Grey silty clay
90-95	Grey s & p ss	70-75	Dark grey siltstone ¹
95-100	Coarse grey siltstone	75-105	Coarse grey siltstone
100-105	Fine grey ss		
105-120	Blue grey siltstone		
	NE cor. 31-5-5 3190; Sept. 16/64		NE cor. 20-5-6 3070; Aug. 21/64
0-40	Brown sandy clay; few pebbles	0-5	Brown sandy clay
40-60	Grey silty clay	5-55	Buff, yellow buff & green siltstone; little ironstone ¹
60-75	Coarse grey siltstone ¹		
75-80	Fine light grey ss	55-100	Grey fine s & p ss
80-135	Blue grey siltstone	100-115	Grey blue & grey brown siltstone
	NE cor. 7-5-6 2896; Aug. 20/64	115-120	Green grey siltstone
0-35	Brown sandy clay; many pebbles		
35-48	Blue grey bentonitic clay		
48-53	Gravel		
53-75	Grey fine ss ¹		
75-80	Dark grey & blue silty shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 31-5-6 2895; Aug. 12/64		NE cor. 9-5-7 2820; Aug. 22/64
0-29	Brown & grey clay; few pebbles	0-15	Brown grey bentonitic clay
29-35	Coarse gravel	15-30	Blue grey sand
35-60	Green blue shale ¹	30-38	Fine gravel
60-90	Grey siltstone	38-65	Grey clay
90-100	Dark grey & chocolate brown shale	65-95	Grey sandy clay
100-115	Grey & dark grey fine siltstone	95-135	Grey silty shale ¹
115-130	Grey s & p ss		NE cor. 11-5-7
130-135	Dark grey siltstone		2848; Aug. 11/64
	NE cor. 33-5-6 3000; Aug. 20/64	0-30	Brown sandy clay
0-20	Brown sandy clay; few pebbles	30-50	Buff weathered shale ¹
20-30	Weathered s & p ss ¹	50-65	Grey coarse siltstone
30-85	Blue grey shale	65-75	Grey ss
85-100	Blue grey s & p ss	75-77	Coal
100-120	Grey & dark grey siltstone	77-81.5	Grey ss
120-150	Grey s & p ss	81.5-83.8	Coal
	NE cor. 35-5-6 3150; Sept. 16/64	83.8-95	Dark grey & chocolate brown shale
0-90	Brown & grey sandy clay; few pebbles	95-120	Dark grey siltstone
90-93	Fine gravel		NE cor. 22-5-7
93-101	Grey clay		2845; Aug. 11/64
101-103	Fine gravel	0-40	Brown & grey silty clay
103-110	Blue grey shale ¹	40-55	Coarse grey siltstone ¹
110-125	Blue grey siltstone	55-100	Dark grey & black shale
125-150	Blue grey coarse siltstone	100-115	Dark grey shale; very small trace of coaly material
		115-150	Dark grey & grey siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 24-5-7 2940; Aug. 20/64		NE cor. 20-5-15 3125; July 2/64
0-5	Brown sandy clay	0-30	Brown grey clay; some boulders
5-40	Buff s & p ss ¹	30-40	Brown weathered shale ¹
40-85	Grey & brown siltstone	40-65	Grey siltstone
85-90	Fine grey ss	65-85	Dark grey & black shale; little poor coal
90-95	Grey siltstone	85-105	Dry grey shale
95-105	Fine grey s & p ss		
	NE cor. 33-5-7 2875; Aug. 20/64		NE cor. 22-5-15 3080; July 17/63
0-35	Brown clay	0-30	Sand; sandy brown clay; minor pebbles; boulders; coal fragments
35-165	Grey very bentonitic clay	30-65	Grey sandy clay; gravel lenses @ 50-60 feet
165-180	Grey blue fine ss ¹	65-85	No cuttings, probably as above
180-210	Grey blue siltstone	85-105	Dark grey sandy clay; minor coal fragments; pebbles; boulders
	NE cor. 35-5-7 2865; Aug. 12/64		NE cor. 33-5-15 3000; July 2/64
0-25	Brown silty clay	0-32	Brown sandy clay; some large boulders
25-45	Brown bentonitic clay	32-34	Shield gravel
45-65	Grey bentonitic clay	34-37	Black & dark brown shale - little coaly ¹
65-79	Grey silty clay	37-60	Grey siltstone & shale
79-84	Brown coarse gravel	60-70	Fine s & p ss
84-105	Dark grey to chocolate brown shale ¹	70-95	Grey shale
	NE cor. 9-5-15 3105; July 17/63	95-105	Chocolate brown & dark grey shale
0-70	Sandy brown clay; some pebbles; coal fragments	105-120	Dark grey silty shale; hard ledge @ 117 feet
70-105	Sandy grey clay; some pebbles; coal fragments; rare gravel stringers		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 35-5-15 3095; July 16/63		NE cor. 24-5-16 3130; July 29/64
0-65	Brown sandy clay; gravel @ 58-60 & 63-66 feet	0-35	Brown sandy clay; few boulders
65-85	Sandy green grey clay; pebbles; few minor lenses of gravel; few boulders	35-40	Grey green siltstone ¹
85-90	Grey clay; pebbles; few minor lenses of gravel; few boulders	40-70	Dark grey & grey shale; siltstone
90-105	Gravel; some sandy clay	70-80	Narrow band of coaly material in shale
		80-95	Grey to dark grey shale; siltstone
		95-100	Grey s & p ss
		100-105	Dark grey shale; hard ledges
	NE cor. 20-5-16 3110; July 21/64		NE cor. 31-5-16 3120; July 21/64
0-35	Brown clay; many boulders	0-25	Brown sandy clay; some boulders
35-105	Grey bentonitic clay; many pebbles	25-131	Grey bentonitic clay; few boulders
	NE cor. 22-5-16 3125; July 23/64	131-133	Shield gravel
0-25	Brown grey sandy clay; many boulders	133-142	Grey shale ¹
25-50	Dark brown & dark grey shale ¹	142-146	Chocolate brown shale; little coal
50-55	Grey siltstone	146-150	Grey shale
55-65	Fine grey s & p ss		NE cor. 7-5-17 3185; July 21/64
65-70	Black shale - very small trace of coal	0-50	Brown sandy clay; some boulders
70-90	Grey siltstone	50-85	Grey clay; small pebbles
90-105	Dark grey shale	85-114	Soft grey shale ¹
		114-117	Hard siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 9-5-17 3165; July 20/64		NE cor. 22-5-17 3155; July 21/64
0-40	Brown silty clay	0-50	Brown grey clay; many boulders
40-55	Brown grey silty clay	50-60	Dark buff weathered shale ¹
55-105	Grey bentonitic clay; many boulders	60-100	Reddish brown weathered ss; some siltstone
	NE cor. 11-5-17 3165; July 20/64	100-105	Dark brown siltstone
0-41	Brown clay; many small pebbles	105-115	Dark grey siltstone
41-44	Buff & chocolate brown shale ¹	115-120	Light grey s & p ss
44-55	Dark grey shale		NE cor. 24-5-17 3137; July 21/64
55-60	Dark grey siltstone	0-80	Brown clay; many boulders
60-70	Light grey fine s & p ss	80-170	Grey bentonitic clay; few boulders
70-105	Dark grey shale	170-178	Fine shield gravel
105-120	Grey fine ss	178-195	Grey bentonitic clay
	NE cor. 20-5-17 3180; July 21/64		NE cor. 31-5-17 3165; July 22/64
0-25	Brown clay; many boulders	0-65	Brown sandy clay; many boulders
25-45	Buff weathered shale ¹	65-130	Blue grey silty clay; some boulders
45-55	Buff, grey & dark grey shale; trace of coal		NE cor. 33-5-17 3148; July 22/64
55-60	Buff silty shale	0-35	Brown clay; few boulders; pebbles
60-65	Dark grey siltstone	35-65	Buff weathered siltstone ¹
65-95	Blue grey shale	65-70	Grey shale
95-100	Black & chocolate brown shale	70-100	Grey siltstone; band of chocolate brown shale
100-120	Blue grey shale	100-120	Grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 35-5-17 3127; July 21/64		NE cor. 20-5-18 3265; July 22/64
0-15	Brown sandy clay	0-25	Light brown clay; few boulders
15-35	Dark buff weathered shale ¹	25-30	Yellow to brown shale ¹
35-70	Dark grey & dark brown shale	30-40	Buff siltstone
70-75	Blue shale - trace of coaly material	40-45	Chocolate brown & black shale; some very soft coal
75-105	Grey siltstone; band of brown black shale	45-55	Grey blue shale
		55-70	Grey siltstone
		70-80	Fine s & p ss
	NE cor. 7-5-18 3352; July 11/64	80-100	Dry light grey siltstone
0-15	Brown very sandy clay	100-105	Light grey siltstone with narrow band of grey brown shale
15-25	Light brown ss; ironstone ¹		
25-55	Yellow to brown grey shale		NE cor. 22-5-18 3230; July 23/64
55-60	Dark grey shale & chocolate brown shale	0-25	Brown clay; few large boulders
60-100	Uniform blue grey shale	25-45	Buff weathered siltstone ¹
100-105	Dark grey dry siltstone	45-50	Buff weathered shale
		50-55	Grey siltstone
	NE cor. 9-5-18 3310; July 11/64	55-65	Dark grey & black shale; little coaly material
0-5	Light brown sandy clay	65-80	Light grey fine ss; hard @ 70 feet
5-75	Grey brown clay; many large boulders; pebbles	80-90	Grey siltstone
75-90	Buff, medium to coarse siltstone ¹	90-95	Dark grey & some chocolate brown shale
10-105	Very silty grey shale	95-105	Light grey & grey shale
105-120	Grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 24-5-18 3205; July 23/64		NE cor. 9-5-19 3370; July 10/64
0-10	Brown clay; few pebbles	0-35	Brown clay; few pebbles
10-40	Buff & chocolate brown shale ¹	35-55	Creamy & buff siltstone ¹
40-50	Coarse grey siltstone	55-70	Fine grey blue ss
50-90	Grey siltstone	70-85	Grey blue shale; ledge @ 84 feet
90-95	Dark brown shale	85-95	Grey blue siltstone; band of chocolate brown shale
95-105	Grey siltstone	95-125	Blue grey & brown grey shale
	NE cor. 33-5-18 3125; July 22/64	125-135	Blue grey fine siltstone
0-8	Brown grey till		NE cor. 11-5-19 3390; July 10/64
8-20	Buff weathered shale ¹	0-14	Brown sandy clay; few boulders
20-30	Buff weathered siltstone	14-30	Brown weathered siltstone ¹
30-70	Grey & chocolate brown shale	30-35	Brown weathered shale
70-75	Fine blue grey s & p ss	35-45	Brown weathered siltstone
75-100	Grey siltstone	45-75	Grey blue shale
100-105	Grey & chocolate brown shale	75-105	Very dry grey blue siltstone
	NE cor. 35-5-18 3180; July 22/64		NE cor. 20-5-19 3235; July 10/64
0-10	Brown grey clay; few small boulders	0-7	Brown sandy clay
10-30	Buff weathered shale; little ironstone ¹	7-9	Fine pea gravel
30-40	Green grey fine ss	9-15	Brown weathered ss ¹
40-60	Blue grey siltstone	15-40	Green brown & grey weathered siltstone
60-85	S & p ss; hard @ 80 feet	40-45	Grey s & p ss
85-105	Blue, dark grey & dark brown shale	45-105	Grey blue dry silty shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-5-19 3305; July 22/64		Lsd. 9-9-5-20 3405; July 4/64
0-5	Dark brown silty clay; few pebbles	0-20	Brown sandy clay; small pebbles
5-20	Buff shale; little ironstone ¹	20-30	Green & creamy white shale ¹
20-30	Buff siltstone	30-45	Green grey siltstone
30-40	Green grey fine ss	45-55	Creamy siltstone; ledges
40-100	Grey, dark grey & little dark brown siltstone	55-95	Very dry blue grey shale
100-105	Blue grey shale	95-100	Blue grey s & p ss
		100-120	Blue grey siltstone
	NE cor. 24-5-19 3310; July 22/64		NE cor. 17-5-20 3375; July 9/64
0-5	Brown clay	0-13	Brown clay; few pebbles
5-20	Buff, grey & green shale ¹	13-20	Green grey weathered siltstone ¹
20-35	Grey & green siltstone	20-35	Green grey & blue grey fine ss
35-40	Blue grey shale	35-120	Green grey & blue grey siltstone; hard ledges
40-45	Fine s & p ss		
45-55	Blue grey, dark grey to black shale		
55-65	Light grey siltstone		
65-100	Dark grey & blue grey shale		
100-105	Blue grey coarse siltstone		NE cor. 20-5-20 3275; July 9/64
	NE cor. 7-5-20 3480; July 6/64	0-10	Grey brown clay
0-7	Buff clay; few pebbles	10-30	Greenish siltstone ¹
7-25	Buff siltstone ¹	30-70	Blue grey & dark grey shale
25-30	Dark grey shale	70-80	Brown grey & grey siltstone
30-40	Blue grey siltstone	80-85	Coarse s & p ss
40-85	Bright blue shale	85-90	Blue grey dry shale
85-90	Dry bright blue siltstone	90-95	Dark grey siltstone
90-105	Dry bright blue shale	95-110	Blue grey & dark grey shale
		110-120	Light grey very fine ss

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-5-20 3305; July 10/64		NE cor. 9-5-21 3517; July 8/64
0-25	Brown sandy clay; many boulders	0-10	Brown grey clay
25-30	Green grey s & p weathered ss ¹	10-40	Coarse red mountain pebble gravel
30-55	Green grey weathered siltstone; some ironstone	40-50	Creamy yellow siltstone ¹
55-70	Grey siltstone	50-75	Blue grey siltstone
70-80	Fine grey s & p ss		NE cor. 11-5-21
80-100	Dry grey shale		3435; July 8/64
100-105	Dry grey siltstone	0-4	Soil
	NE cor. 24-5-20 3248; July 10/64	4-44	Grey brown sandy clay
0-25	Brown clay; few small pebbles	44-55	Green yellow siltstone
25-35	Green buff shale; some ironstone ¹	55-62	Fine dry green grey ss
35-45	Grey siltstone	62-80	Grey blue siltstone
45-50	Dark grey & some chocolate brown siltstone	80-85	S & p ss
50-120	Uniform dry grey siltstone; ledge @ 110 feet	85-90	Dark grey shale
	NE cor. 7-5-21 3480; July 9/64	90-127	Blue grey siltstone; ledges
0-42	Grey & yellow sandy clay; pebbles	127-135	Fine s & p ss
42-50	Red fine gravel		NE cor. 20-5-21
50-75	Buff & grey shale ¹		3330; July 9/64
75-80	Grey siltstone	0-5	Sandy soil
80-85	Grey s & p ss	5-20	Brown & dark buff weathered shale; hard @ 10 feet ¹
85-90	Green grey shale	20-25	Grey siltstone
90-95	Green grey siltstone	25-35	Dark grey shale
95-120	Blue grey siltstone; ledges	35-40	Very dark grey shale
120-135	Light grey siltstone	40-50	S & p ss
		50-110	Blue grey & dark grey siltstone
		110-120	Light grey s & p ss

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-5-21 3385; July 9/64		NE cor. 10-6-6 3215; Aug. 12/64
0-25	Brown grey clay; pebbles	0-45	Brown sandy clay
25-35	Buff yellow weathered siltstone ¹	45-85	Grey clay; few pebbles
35-40	Black shale; little coaly material		Lost circulation
40-45	Buff siltstone		NE cor. 12-6-6
45-50	Dark grey & black shale		3310; Sept. 16/64
50-85	Grey shale	0-65	Brown & grey sandy clay; few pebbles
85-100	Grey & dark grey dry siltstone	65-66	Coal ¹
10-105	Light grey ss	66-80	Grey siltstone; thin poor coal seam
	NE cor. 24-5-21 3265; July 9/64	80-85	Chocolate brown & black shale
		85-110	Grey siltstone
0-50	Brown clay; many boulders		NE cor. 19-6-6
50-60	Green creamy weathered siltstone ¹		3250; Aug. 13/64
60-75	Grey brown siltstone	0-10	Grey clay
75-90	Grey blue siltstone	10-15	Brown siltstone; some black soft shale ¹
90-120	Grey blue shale; hard ledges	15-25	Brown shale with some badly weathered coal
	NE cor. 8-6-6 3120; Aug. 12/64	25-30	Brown grey weathered siltstone
		30-35	Brown, dark brown & black shale; little coaly material
0-20	Brown sandy clay; few pebbles	35-120	Blue, grey & dark grey siltstone
20-40	Green buff weathered siltstone ¹		
40-50	Blue grey coarse siltstone		
50-60	Brown grey ss		
60-80	Blue grey siltstone		
80-85	Blue grey ss		
85-105	Blue grey coarse siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 21-6-6 3306; Aug. 13/64		
0-50	Brown grey & blue grey silty clay	55-60	Coarse grey ss
50-75	Light to dark brown & dark grey to black weathered shale ¹	60-70	Grey siltstone
75-85	Grey siltstone	70-100	Blue grey ss
85-125	Bright blue grey siltstone	100-135	Blue grey siltstone; little shale
125-130	Bright blue grey coarse ss		NE cor. 8-6-15 3098; July 15/63
	NE cor. 10-6-7 2890; Aug. 12/64	0-25	Gravel; minor clay bands; some clay in gravel
0-22	Brown sandy clay	25-56	Brown & grey sandy clay; some pebbles; coal fragments
22-38	Solid very coarse gravel	56-60	Gravel
38-45	Blue grey shale ¹	60-105	Grey & blue grey sandy clay; minor gravel lenses
	NE cor. 12-6-7 3003; Aug. 12/64		NE cor. 10-6-15 3080; July 16/63
0-30	Brown clay; few pebbles	0-90	Brown & grey sandy clay; gravel lenses; few pebbles; coal fragments
30-45	Grey buff weathered siltstone ¹	90-102	Brown yellow silty clay; minor gravel lenses
45-70	Blue grey siltstone	102-105	Grey to dull black coaly shale ¹
70-105	Very uniform blue grey coarse siltstone	105-113	Grey brown silty shale; some shell fragments
	NE cor. 23-6-7 3040; Aug. 13/64	113-120	Grey shaly ss
0-15	Brown sandy clay; many boulders		
15-25	Buff brown weathered ss ¹		
25-55	Buff green weathered shale; siltstone		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 10-6-16 3103; July 16/63		
0-45	Brown sandy clay; some pebbles; rare coal fragments	90.5-93 93-105 105-120	Sandy grey clay Silty grey shale ¹ Silty to sandy grey brown shale
45-90	Sandy grey clay; rare coal fragments		
90-105	Gravel		NE cor. 31-7-10 2793; Sept. 20/63
	NE cor. 12-6-16 3120; July 16/63	0-8	Top soil; sandy brown clay
0-40	Brown sandy clay; minor gravel; pebbles	8-11	Chocolate brown shale ¹
40-80	Sandy grey clay; rare coal fragments; some pebbles	11-25	Very thin coal stringer in chocolate brown & grey shale
80-105	Very sandy dark grey clay; minor gravel stringers; coal fragments; boulders @ 101 feet	25-50	Brown grey & brown shale; ironstone concretions @ 27 & 29 feet; thin coal seam @ 47-47.5 feet
	NE cor. 21-6-16 3105; July 15/63	50-57 57-58 58-70	Grey shale Ironstone concretions Chocolate brown & brown shale
0-35	Brown sandy clay; gravel lenses @ 20 & 33 feet	70-71	Silty & sandy grey shale
35-107	Sandy brown clay; coal fragments; pebbles	71-71.5 71.5-95	Ironstone concretions Brown & grey shale
107-121	Very sandy grey clay; pebbles; gravel lenses	95-95.5 95.5- 105	Ironstone concretions Silty to sandy grey shale
121-135	Gravel; same sandy clay		
	NE cor. 32-6-16 3110; July 15/63		
0-87	Dark brown & dark grey sandy clay; coal fragments; pebbles; rare gravel		
87-90.5	Gravel		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 33-7-10 2846; Sept. 20/63		NE cor. 31-7-18 3075; Aug. 7/63
0-35	Sandy brown grey clay; pebbles	0-10	Very poor sample; probably top soil & sandy clay
35-45	Buff fine to medium sand, some coarse grains; pebbles	10-25	Sandy to silty brown clay
45-100	Sandy grey clay; some pebbles	25-40	Sandy brown clay; some pebbles; minor coal fragments
100-105	Fine soft grey ss ¹	40-105	Dark grey sandy clay; some pebbles; coal fragments
	NE cor. 8-7-16 3075; July 15/63		NE cor. 19-8-9 2741; Sept. 19/63
0-43	Sandy brown & brown grey clay; few gravel lenses	0-40	Sandy brown clay; some pebbles
43-91	Grey sandy to silty clay; gravel lenses @ 44, 58 & 85 feet	40-105	Sandy grey clay; some pebbles; rare boulders; coal fragments
91-95	Dark brown shale ¹		
95-105	Grey shale; siltstone stringer @ 101 feet		
	NE cor. 19-7-16 3030; July 15/63		NE cor. 21-8-9 2700; Sept. 19/63
0-85	Very sandy clay; pebbles & gravel stringers	0-10	Very sandy brown clay
85-95	Yellow brown clay; coal fragments	10-35	Fine buff sand; some pebbles
95-100	Sandy dark brown clay	35-105	Sandy brown & grey clay; some pebbles; boulder @ 79 & 81 feet — granite
100-105	Fine yellow brown sand	105-120	Sandy brown & grey clay; stringers of gravel

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 32-8-9 2716; Sept. 10/63		
0-75	Sandy brown clay; some pebbles; boulders; rare gravel stringers	65-80	Fine soft grey sand; sandy clay lenses
5-105	Sandy dark grey clay; some pebbles; boulders; rare gravel stringers	80-96	Sandy grey clay; rare pebbles; some coal fragments
	NE cor. 34-8-9 2649; Sept. 10/63	96-100	Silty to sandy grey shale ¹
		100-105	Brown & chocolate brown shale
0-85	Sandy brown clay; rare pebbles		NE cor. 19-8-10 2774; Sept. 19/63
5-105	Sandy grey clay; numerous pebbles, boulders & lenses of gravel	0-40	Sandy brown clay; pebbles; boulder @ 39 feet
	NE cor. 8-8-10 2826; Sept. 20/63	40-40.5	Thin coal stringer ¹
		40.5-54	Grey shale
		54-56	Coal seam
		56-75	Grey shale
		75-86.5	Brown & chocolate brown shale; poor thin coal stringer @ 81 feet
0-55	Sandy brown clay; some pebbles; rare boulders	86.5-87.5	Coal seam
5-70	Sandy dark grey clay; rare pebbles	87.5-100	Brown shale
7-97	Very sandy dark grey clay; rare pebbles	100-105	Silty grey shale
7-98	Shale ¹		
8-104	Coal		
4-120	Shale		
	NE cor. 10-8-10 2800; Sept. 20/63		
0-40	Sandy brown clay; rare pebbles		
0-65	Sandy dark grey clay; rare pebbles		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 21-8-10 2794; Sept. 19/63		NE cor. 34-8-10 2835; Sept. 18/63
0-10	Sandy yellow brown clay	0-60	Very sandy brown clay; rare pebbles
10-83	Sandy, silty brown & grey clay; rare pebbles	60-105	Sandy grey clay; rare pebbles
83-90	Dark brown shale; some coaly shale ¹		
90-92.5	Brown shale		NE cor. 36-8-10
92.5-94.5	Coal seam		2800; Sept. 19/63
94.5-96	Brown shale		
96-99	Coal seam	0-30	Sandy brown clay
99-102	Brown & chocolate brown shale	30-55	Sandy to silty brown clay
102-105	Brown shale	55-85	Sandy dark grey clay; rare pebbles
		85-105	Dark grey soft silt, drills quickly
	NE cor. 23-8-10 2786; Sept. 19/63		
0-60	Dark brown sandy clay; some pebbles; rare gravel stringers		NE cor. 12-8-11 2777; Sept. 21/63
60-75	Silty to sandy blue grey clay	0-5	Sandy brown clay
75-105	Sandy dark grey clay; rare pebbles	5-30	Buff fine to medium sand
		30-69	Grey shale, silty in upper 20 feet ¹
		69-69.5	Coal
	NE cor. 32-8-10 2811; Sept. 18/63	69.5-70	Grey shale
		70-72	Brown shale
		72-72.8	Coal
0-20	Sandy brown clay; rare pebbles	72.8-75	Brown shale
20-30	Light grey & buff fine sand	75-90	Grey shale
30-75	Grey & green grey shale; siltstone stringer @ 73 feet ¹		
75-85	Grey shale		
85-86	Thin coal seam		
86-90	Brown shale		
90-105	Light grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 23-8-11 2753; Sept. 21/63		
0-30	Sandy brown clay; rare pebbles	65-80	Silty buff sand
0-34	Shale ¹	80-100	Sandy brown & grey clay; rare pebbles
0-38	Coal seam		
0-40	Grey shale	100-105	Blue grey sandy clay — lake deposit
0-50	Shale		
0-80	Shale with coal traces		
0-105	Shale; concretion @ 81 feet		NE cor. 36-8-11 2745; Sept. 18/63
	NE cor. 32-8-11 2701; Sept. 21/63	0-45	Dark brown sandy clay; some pebbles
0-60	Sandy brown clay; some pebbles; rare boulders	45-60	Light brown silty clay
0-90	Silty to sandy brown clay; rare pebbles	60-75	Dark grey shale; some coaly shale ¹
0-96	Sandy dark grey clay; some pebbles; boulders	75-95	Brown & dark grey silty shale
		95-96	Siltstone stringer
		96-105	Grey siltstone
	NE cor. 34-8-11 2712; Sept. 18/63		NE cor. 32-8-12 2694; June 20/63
0-30	Silty to sandy brown clay; rare coal fragments	0-95	Buff drift
0-50	Silt? No circulation	95-105	Brown silty shale ¹
0-65	Silty to sandy brown clay; rare pebbles		NE cor. 34-8-12 2686; Sept. 21/63
		0-75	Brown sandy clay; pebbles; boulders
		75-95	Sandy dark brown & grey clay; some pebbles
		95-105	Sandy to silty brown clay

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 32-8-13 2735; June 21/63		NE cor. 19-8-16 2863; July 15/63
0-30	Buff drift	0-38	Sandy to silty brown clay; coal fragments; pebbles
30-40	River sand	38-39	Gravel
	NE cor. 34-8-13 2706; June 20/63	39-55	Very sandy clay; coal fragments
0-30	Buff drift	55-72	Yellow brown & dark brown clay; rare pebbles
30-105	Dark grey drift	72-75	Grey green & dark brown coaly shale ¹
	NE cor. 36-8-13 2712; June 20/63	75-80	Very sandy silty shale
0-30	Buff drift	80-85	Chocolate brown shale; coal stringer @ 81 feet
30-105	Dark grey drift	85-96	Silty green grey shale
	NE cor. 8-8-16 2915; July 15/63	96-105	Very sandy shale; some coal flakes
0-8	Sandy clay		NE cor. 32-8-16 2778; July 13/63
8-12	Gravel		
12-54	Sandy clay	0-10	Brown silty clay, till or lake deposit
54-56	Gravel	10-15	Chocolate brown shale ¹
56-72	Sandy clay	15-30	Yellow brown & grey sandy shale; minor ss lenses
72-78	Dark grey to black coaly shale ¹	30-35	Coaly shale; chocolate brown minor coal partings
78-83	Grey & yellow brown silty shale	35-54	Grey shale, coaly shale & chocolate brown shale
83-87	Coaly shale & grey shale	54-80	Very sandy grey shale; siltstone stringers; minor coal partings
87-87.5	Coal stringer	80-95	Grey shale; ss stringers @ 83 & 87-88.5 feet
87.5-88	Ss	95-105	Grey sandy shale
88-98	Coaly shale & grey shale		
98-99	Coaly		
99-105	Silty grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 19-8-18 2945; Aug. 7/63		NE cor. 12-8-19 3022; Aug. 7/63
0-85	Brown sandy clay; some pebbles, very many @ 73-75 feet	0-30	Sandy brown clay; pebbles; some small coal fragments
5-101	Very sandy dark grey clay; pebbles; some coal fragments	30-60	Sandy brown clay; coal fragments
1-105	Green grey shale; some chips of chocolate brown shale ¹	60-105	Dark grey sandy clay; coarse sand lenses @ 60-65 feet; gravel @ 77-80 feet; boulder @ 80 feet
	NE cor. 32-8-18 2850; Aug. 6/63		NE cor. 20-9-8 2540; Aug. 14/63
0-25	Boulders, gravel & clay	0-30	Grey silty sandy clay
5-45	Chocolate brown, yellow brown & grey silty to sandy shale ¹	30-65	Sandy silt; coal fragments; very poor returns
15-56	Grey, brown grey & blue grey shale	65-105	Sandy grey clay
3-60	Sandy grey shale; s & p siltstone stringer @ 59 feet	105-135	Sandy dark grey clay
0-62	Soft light grey s & p ss		NE cor. 31-9-8 2580; Aug. 14/63
2-66	Chocolate brown & some coaly shale	0-55	Sandy brown clay; some pebbles; rare coal fragments
6-75	Grey silty shale	55-75	Sandy dark grey clay; some pebbles
5-80	Grey silty shale, some dark brown & dark grey shale	75-100	Gravel; sand; some clay; probably interbedded gravel with clay
3-83	Chocolate brown shale; very thin coal parting		
3-86	Grey silty shale	100-105	Sandy dark grey clay
4-87	Siltstone stringer		
7-105	Hard silty grey shale; some fine ss		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
NE cor. 7-9-9 2746; Sept. 9/63			
0-30	Sandy brown clay	62-66	Chocolate brown shale
30-60	Sandy grey clay	66-69	Coal
60-90	Sandy & silty grey clay	69-71	Chocolate brown shale
90-105	Silty grey clay - lake deposit	71-71.5	Coal stringer
		71.5-99	Brown grey, grey & brown shale
		99-105	Grey shale
NE cor. 9-9-9 2644; Sept. 9/63		NE cor. 22-9-9 2598; Aug. 16/63	
0-35	Sandy brown clay; pebbles; boulders; rare gravel stringers	0-55	Sandy brown clay; some pebbles; rare boulders; coal fragments
35-75	Dark grey clay; pebbles; boulders; rare gravel stringers	55-90	Dark grey clay; sand; some pebbles
75-90	Light grey fine soft ss ¹	90-105	Very sandy grey clay; rare pebbles
90-105	Grey silty shale		
NE cor. 11-9-9 2621; Sept. 10/63		NE cor. 24-9-9 2580; Aug. 15/63	
0-60	Sandy brown clay; some pebbles	0-5	Top soil
60-90	Very sandy brown clay; some pebbles	5-50	Sandy brown clay; some pebbles; minor coal fragments
90-100	Sandy brown clay; some pebbles	50-105	Sandy dark grey clay; some pebbles; rare coal fragments
100-105	Brown slightly sandy silt - lake deposit		
NE cor. 20-9-9 2675; Aug. 16/63		NE cor. 31-9-9 2730; Aug. 19/63	
0-48	Sandy brown & dark grey clay; some pebbles; coal fragments	0-30	Sandy brown clay; some pebbles
48-62	Grey shale ¹	30-105	Sandy dark grey clay; some pebbles; rare boulders

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 33-9-9 2650; Aug. 19/63		NE cor. 9-9-10 2777; Sept. 17/63
0-30	Very sandy brown clay; pebbles	0-45	Brown, grey & blue grey sandy clay
30-105	Very sandy & silty grey clay	45-55	Green grey shale ¹
		55-60	Grey & green grey shale; some carbon- aceous bands
	NE cor. 35-9-9 2600; Aug. 14/63	60-70	Grey shale; coaly shale layers
		70-73	Coaly shale; trace of coal
0-56	Rust brown sandy clay; numerous pebbles; rare coal fragments	73-82.5	Grey shale
		82.5-83	Coal seam
56-105	Dark grey sandy clay; some pebbles; rare coal fragments; boulders @ 80-90 feet	83-94	Brown grey shale
		94-95	Brown siltstone stringer
		95-98	Grey shale
		98-99	Coal
		99-101	Grey, brown grey & chocolate brown shale
	NE cor. 7-9-10 2758; Sept. 17/63	101-102.5	Coal
0-10	Sandy brown clay; pebbles	102.5-107	Grey, brown grey & chocolate brown shale
10-20	Buff sand		Coal
20-25	Slightly bentonitic grey shale ¹	107-109	Grey, brown grey & chocolate brown shale
		109-113	Coal
25-67	Grey, brown & chocolate brown shale; coal stringer @ 40 feet	113-114	Coal
67-70	Coal seam	114-120	Grey, brown grey & chocolate brown shale
70-74	Brown & chocolate brown shale		
74-76.5	Coal seam		
76.5-78	Brown grey shale		
78-78.5	Coal stringer		
78.5-92	Coaly shale; stringers of poor coal		
92-100	Light grey ss & siltstone		
100-105	Brown shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 11-9-10 2800; Sept. 10/63		NE cor. 24-9-10 2752; Aug. 16/63
0-25	Sandy brown clay; some pebbles	0-70	Brown & grey sandy clay; pebbles; coal fragments
25-35	Buff fine-grained clayey sand	70-88	Grey silty shale; rare streaks of coaly shale ¹
35-50	Sandy brown clay; pebbles	88-95	Brown shale
50-90	Sandy grey clay; some pebbles	95-105	Grey silty shale; siltstone stringer @ 98 feet
90-105	Sand; gravel; clay		
	NE cor. 20-9-10 2785; Aug. 21/63		NE cor. 31-9-10 2785; Aug. 23/63
0-5	Top soil	0-28	Brown clay; sand
5-15	Brown silty clay	28-50	Green grey, chocolate brown & grey shale ¹
15-30	Soft fine brown sand	50-50.5	Hard light grey siltstone stringer
30-65	Soft grey s & p sand	50.5-65	Dark grey silty shale
65-70	Grey sandy shale ¹	65-70	Light grey siltstone
70-75	Grey shale	70-75	Silty bentonitic grey shale
75-90	Grey shale, partly bentonitic		
90-105	Brown, grey, chocolate brown & light grey shale		
	NE cor. 22-9-10 2798; Aug. 16/63		NE cor. 33-9-10 2768; Aug. 20/63
0-55	Sandy brown clay; some pebbles; coal fragments	0-30	Sandy brown clay
55-60	Grey brown shale; some coaly shale ¹	30-104 ¹	Sandy dark grey clay; some pebbles
60-95	Grey, grey green & brown grey shale	104-120	Brown & chocolate brown shale; coaly stringers @ 109 & 112 feet ¹
95-98	Silty grey shale; siltstone stringer @ 98 feet		
98-101	Light grey siltstone		
101-105	Silty grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 35-9-10 2775; Sept. 9/63		NE cor. 11-9-11 2732; Sept. 17/63
0-5	Top soil	0-10	Sandy brown clay
5-35	Sandy brown clay; some pebbles	10-30	Yellow grey siltstone ¹
35-105	Sandy dark grey clay; rare pebbles; rare minor gravel lenses	30-45	Chocolate brown, grey & coaly shale
		45-48	Coal seam
		48-60	Brown & grey shale
		60-61.5	Coal seam
		61.5-72	Grey shale
	NE cor. 7-9-11 2661; Sept, 18/63	72-73	Siltstone stringer
		73-95	Grey shale to silty shale
0-10	Fine buff sand	95-105	Brown shale; coal traces
10-30	Sandy dark brown clay; rare pebbles		
30-50	Sandy dark brown clay; some pebbles; rare gravel stringers		NE cor. 20-9-11 2652; Aug. 22/63
50-70	Sandy grey clay; some pebbles	0-55	Sandy brown clay; rare pebbles
70-85	Grey silty clay	55-56	Coaly shale; trace of coal ¹
85-92	Sandy grey clay; rare pebbles	56-62.5	Grey shale
92-105	Blue grey clay - lake deposit, silty in lower 5 feet	62.5-63	Coal
		63-65	Grey shale
		65-66	Coaly shale
		66-75	Brown & grey shale
	NE cor. 9-9-11 2696; Sept. 18/63	75-105	Lost circulation; probably grey shale
0-24	Sandy brown clay; rare pebbles		NE cor. 22-9-11 2680; Aug. 21/63
24-31	Grey & some brown shale ¹		
31-32	Coal seam	0-65	Sandy brown clay; rare pebbles
32-42	Grey shale	65-75	Brown fine to medium sand
42-42.5	Grey siltstone stringer	75-100	Fine unconsol. gravel
42.5-69	Dark grey, grey & brown grey shale	100-105	Sandy dark grey clay; rare pebbles
69-70	Siltstone stringer		
70-78.5	Silty brown grey shale		
78.5-90	Grey siltstone stringer		
90-105	Grey & brown shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 24-9-11 2710; Aug. 21/63		
0-60 60-105	Sandy brown clay Lost circulation	91.5-94.5 94.5-100 100-100.5	Coal seam Brown shale Light grey siltstone stringer
	NE cor. 31-9-11 2625; Aug. 22/63	100.5-103 103-105	Grey shale Light grey siltstone stringer
0-5 5-75 75-105	Dark brown top soil Brown silty to sandy clay; rare pebbles Dark grey silty to sandy clay; rare pebbles		NE cor. 7-9-12 2653; June 20/63
	NE cor. 33-9-11 2670; Aug. 23/63	0-10 10-20 20-45 45-75	Buff drift Sand; fine pea gravel Dark grey drift Sand; pea gravel
0-42.5 42.5-44 44-68.5 68.5-69.5 69.5-73 73-75 75-96 96-98 98-105	Brown & grey sandy clay Coal ¹ Brown grey shale Coal seam Brown grey shale Coaly shale Grey, chocolate brown & brown shale Siltstone stringer Grey shale		NE cor. 9-9-12 2677; June 20/63
	NE cor. 35-9-11 2710; Aug. 23/63	0-90 90-105	Buff drift Chocolate brown shale ¹
0-15 15-30 30-90 90-91.5	Brown sandy clay Brown sandy clay; gravel lenses; boulders Brown & grey sandy clay Brown grey & coaly shale ¹	0-25 25-65 65-105	Sandy brown clay; some gravel lenses; some sand Clay; numerous gravel & sand lenses Sandy dark grey clay; some coal fragments; lenses of gravel & sand

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 24-9-12 2630; Aug. 22/63		
0-5	Coarse sand & clay	80-95	Dark grey clay; rare coal fragments;
5-70	Brown & grey sandy clay; rare pebbles		some pebbles
70-75	Grey silty clay	95-105	Very sandy grey clay
75-79	Sandy dark grey clay; some coal fragments		
			NE cor. 7-9-13 2728; June 21/63
79-81	Silty grey shale ¹	0-5	Sand; gravel
81-84	Very fine ss stringer	5-15	Buff drift
84-95	Silty grey shale	15-23	Brown shale ¹
95-100	Brown & chocolate brown shale; minor siltstone stringer @ 96 feet	23-23.5	Coal
		23.5-37	Brown shale
		37-37.5	Coal
100-105	Grey bentonitic shale	37.5-45	Brown shale
		45-55	Light grey shale
		55-61	Chocolate brown shale
	NE cor. 31-9-12 2675; June 19/63	61-62	Coal seam
		62-66	Chocolate brown shale
0-30	Buff drift; sand; gravel	66-66.5	Coal
30-45	Fine pea gravel	66.5-69	Chocolate brown shale
45-105	Dark grey drift		Coal
		69-69.5	Light grey shale
		69.5-90	Coal
	NE cor. 33-9-12 2625; Aug. 22/63	90-92	Dark grey shale
		92-105	
0-65	Sandy brown clay; some pebbles; coal fragments		NE cor. 9-9-13 2710; June 19/63
65-105	Sandy dark grey clay; some pebbles	0-30	Buff drift
		30-105	Dark grey drift
	NE cor. 35-9-12 2628; Aug. 22/63		
0-80	Sandy brown clay; rare coal fragments; some pebbles		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 11-9-13 2702; June 20/63		
0-45	Buff drift	33-34	Coal
45-50	Sand; gravel	34-56	Brown shale
50-105	Dark grey drift	56-56.5	Coal
		56.5-60	Brown shale
		60-65	Light grey shale
	NE cor. 22-9-13 2628; June 19/63	65-90	Dark grey & brown shale; coal & bone stringer @ 66 feet
0-25	Brown shale ¹	90-95	Brown shale; trace of coal
25-30	Dark grey shale		
30-35	Hard siltstone stringers	95-105	Brown shale
35-41	Brown shale		
41-43	Coal		
43-48	Brown shale		NE cor. 33-9-13 2635; June 18/63
48-50	Coal		
50-53	Brown shale		
53-53.5	Coal	0-30	Buff drift
53.5-65	Brown shale	30-105	Dark grey drift
65-65.5	Coal		
65.5-95	Dark grey shale		
95-100	Light grey silty shale		NE cor. 35-9-13 2670; June 18/63
100-105	Brown shale		
		0-30	Buff drift
	NE cor. 24-9-13 2600; June 19/63	30-105	Dark grey drift - lost circulation @ 90 feet
0-30	Sand; gravel		
			NE cor. 9-9-14 2727; June 21/63
	NE cor. 31-9-13 2647; June 18/63	0-5	Buff drift
0-5	Buff drift	5-10	Sand; gravel
5-15	Dark grey & brown shale ¹	10-105	Dark grey drift
15-20	Brown shale; siltstone stringers		
20-25	Brown shale		
25-26.5	Coal		
26.5-33	Brown shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 11-9-14 2731; June 21/63		NE cor. 20-9-14 2700; June 25/63
0-15	Buff drift	0-10	Sand
15-25	Brown shale ¹	10-25	Buff shale ¹
25-30	Dark grey shale	25-55	Brown & dark grey shale
30-35	Chocolate brown shale; poor coal @ 33-33.5 feet	55-75	Dark grey shale; hard stringers @ 55-56 feet
35-40	Dark grey shale	75-80	Light grey siltstone
40-45	Hard siltstone stringers; brown shale	80-85	Dark grey shale; coal stringer @ 82-83 feet
45-70	Brown shale	85-95	Dark grey & brown shale
70-85	Light grey shale; hard ss stringer; thin coal stringer @ 74-74.5 feet	95-100	Brown shale; coal stringer @ 95-95.3 feet
85-105	Dark grey to brown shale	100-105	Dark grey shale
	NE cor. 19-9-14 2705; Sept. 22/63		NE cor. 22-9-14 2685; June 26/63
0-15	Brown sandy clay; minor gravel in sand layers	0-30	Buff drift
15-55	Sandy brown clay; rare pebbles	30-105	Dark grey drift
55-72	Very silty brown clay		NE cor. 31-9-14 2685; June 25/63
72-75	Coaly shale ¹	0-55	Sand; fine pea gravel
75-80	Grey shale; some coaly shale fragments; siltstone stringer @ 80 feet	55-105	Light grey silt
80-90	Grey & chocolate brown shale		
90-91	Thin coal stringer		
91-97	Grey shale		
97-97.5	Dark grey concretion band		
97.5-105	Silty brown grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 33-9-14 2660; June 17/63		
0-5	Drift	81-82	Coal
5-20	Brown shale ¹	82-84.5	Shale
20-25	Light grey shale	84.5-85	Coal
25-64	Light grey silty shale	85-87	Shale
64-65	Coal in brown shale	87-105	Chocolate brown & grey shale
65-70	Brown shale		
70-72	Poor coal with parting		
72-75	Brown shale		NE cor. 11-9-15
75-90	Dark grey shale		2875; Sept. 21/63
90-105	Dark grey to brown shale; hard stringers	0-30	Very sandy brown clay
		30-105	Very soft grey sand - porous, fine to medium grained
	NE cor. 35-9-14 2690; June 18/63		
0-25	Buff drift		NE cor. 22-9-15
25-30	Buff shale ¹		2731; Sept. 21/63
30-35	Brown shale		
35-36	Coal		
36-45	Brown shale; coal stringer @ 44 feet	0-9	Brown sandy clay
45-55	Dark grey shale; hard stringers	9-40	Yellow grey, brown & grey shale ¹
55-61	Hard stringers	40-44	Bentonitic grey shale
61-61.5	Coal in brown shale	44-44.5	Siltstone stringer
61.5-70	Brown shale	44.5-75	Grey brown & grey shale; siltstone stringer @ 67.5 feet
70-105	Dark grey silty shale; hard stringer @ 88 feet	75-95	Brown grey shale
		95-100	Chocolate brown & coaly shale; thin coal seam @ 96- 97 feet
	NE cor. 9-9-15 2760; July 9/63	100-105	Grey shale
0-40	Silty to sandy rusty & brown clay		NE cor. 31-9-15
40-58	Brown & grey shale ¹		2660; June 10/63
58-60	Dark brown & black coaly shale		
60-81	Brown & grey shale; coaly stringer @ 72 feet	0-60	Buff drift
		60-105	Dark grey drift

Location W 4th Mer.
Top elevation (feet); Date

Depth
(feet) Location W 4th Mer.
Top elevation (feet); Date

NE cor. 35-9-15
2700; July 9/63

NE cor. 11-9-16
2703; July 15/63

37 Silty to sandy
brown clay; rare
pebbles; some coal
fragments @ 35 feet

0-45

Sandy clay; few
pebbles; few
gravel lenses

45-105

Grey sandy clay;
less pebbles; no
gravel

58 Silty to sandy
dark grey clay
71.5 Brown & grey shale¹

72.5 Coal

78 Grey shale

78.5 Coal

82 Grey shale

101 Brown & grey shale;
coal stringer @
87 feet

102 S & p ss

105 Grey shale

0-50

50-70

70-71

71-95

95-105

NE cor. 20-9-16
2703; June 7/63

Buff drift

Brown shale¹

Coal

Brown very

bentonitic shale

Light & dark
grey shale; hard

stringers @ 95-

100 feet

NE cor. 7-9-16
2716; Sept. 22/63

10 Sand; gravel
30 Sandy dark brown
clay; pebbles;
boulders

105 Sandy dark grey
clay; pebbles

NE cor. 22-9-16
2683; June 10/63

0-60

60-95

95-100

100-105

Buff drift

Dark grey shale;
coal @ 62 feet¹

Dark grey shale; very
thin coal stringers

Dark grey shale

NE cor. 9-9-16
2714; July 13/63

53 Brown & grey very
sandy clay; some
coal fragments; minor
pebbles

56 Grey shale¹

57 Coal

61.5 Coaly shale

65 Dark brown shale

105 Very sandy to

silty grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 24-9-16 2690; July 13/63		NE cor. 20-9-17 2740; June 6/63
0-53	Sandy clay; rare pebbles	0-40	Buff drift
53-55	Coaly shale ¹	40-45	Brown shale ¹
55-56	Coal	45-47	Brown shale; very thin coal stringer
56-60	Coaly shale	47-65	Brown & dark grey shale & siltstone
60-71	Grey shale	65-90	Dark grey bentonitic shale
71-71.5	Coal	90-105	Dark grey to brown bentonitic shale
71.5-73	Chocolate brown shale; rare coal stringers		
73-95	Grey shale		
95-105	Grey & some chocolate brown shale		
	NE cor. 33-9-16 2663; June 10/63		NE cor. 22-9-17 2730; June 7/63
0-60	Buff drift	0-45	Buff drift
60-75	Dark grey drift	45-60	Buff & grey shale ¹
75-85	Dark grey shale; thin coal stringers ¹	60-65	Brown shale; very small trace of coal
85-95	Grey shale	65-70	Shaly coal & grey shale stringers
95-96	Coal	70-80	Dark grey, grey & brown shale
96-98.5	Grey shale	80-85	Brown shale; trace of coal
98.5-99.5	Coal	85-90	Light grey s & p ss; thin coal stringer
99.5-105	Brown shale	90-95	Hard stringer
	NE cor. 35-9-16 2670; June 10/63	95-105	Light grey s & p ss
0-45	Buff drift		
45-75	Dark grey drift		
75-100	Fine pea gravel		
100-105	Shale ¹		
			NE cor. 24-9-17 2735; June 7/63
		0-40	Buff drift
		40-50	Brown & buff shale ¹
		50-60	Brown & buff shale; thin shaly coal stringer
		60-100	Light grey shale; some brown shaly coal @ 75-80 feet
		100-102	Coal
		102-104	Grey shale
		104-105	Coal
		105-120	Grey shale; hard siltstone

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 31-9-17 2700; June 6/63		NE cor. 7-9-18 2851; Aug. 6/63
0-65 6-100	Buff drift Grey, dark grey, brown & dark brown shale; siltstone; few hard stringers ¹	0-45	Brown & brown grey very sandy clay; numerous boulders; pebbles
0-105	Brown shale; coal stringers	45-75	Dark brown & dark grey sandy clay; some pebbles; coal fragments
	NE cor. 33-9-17 2650; June 6/63	75-95	Light grey & brown silty shale ¹
	Buff drift Brown & blue shale ¹ Coal	95-105	Dark grey & some chocolate brown shale
0-40 4-78 4-80 4-105	Grey & brown shale & siltstone		NE cor. 9-9-18 2840; Aug. 6/63
0-110 0-120	Shale; coal trace Dark grey shale; hard siltstone stringer @ 115 feet	0-30	Yellow brown clay; sand
	NE cor. 35-9-17 2650; June 5/63	30-40	Grey brown s & p ss ¹
	Buff drift Grey siltstone ¹ Coal	40-64	Light grey, grey & rust brown shale
0-45 0-58 0-60 0-160	Grey, brown & dark brown shale	64-66	Chocolate brown & some coaly shale
0-165	Chocolate brown shale; thin coal stringers	66-85	Grey & grey brown silty shale
0-240	Grey, dark grey & black shale; siltstone	85-94	Grey silty shale; siltstone stringers @ 92-94 feet
		94-100	Hard dark grey shale
		100-105	Brown grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 11-9-18 2800; Aug. 6/63		
0-10	Sandy brown clay	72-75	Fine buff sand
10-30	Very sandy brown clay; some pebbles; coal fragments	75-80	Green grey shale ¹
30-35	Sandy dark brown clay	80-94	Grey shale
35-60	Very silty brown shale; some fine sand ¹	94-96	Coal
60-70	Chocolate brown & grey shale	96-100	Chocolate brown shale; coal trace
70-80	Slightly bentonitic grey shale; siltstone band @ 77 feet	100-105	Green grey & some silty grey shale
80-85	Light grey silty shale		NE cor. 24-9-18 2725; July 31/63
85-90	Hard silty dark shale	0-33	Grey brown sandy clay; some pebbles
90-105	Silty brown grey shale; rare shell fragments	33-35	Dark grey silty shale; some coaly particles ¹
	NE cor. 20-9-18 2765; July 31/63	35-40	Coaly shale
0-80	Brown & dark brown sandy clay; some pebbles; coal fragments	40-75	Grey brown, chocolate brown & grey shale
80-90	Dark grey shale, silty in part ¹	75-85	No return
90-95	Grey shale	85-90	Sandy light grey shale; siltstone @ 88 feet
95-105	Dark grey & brown shale; some coaly flecks	90-94	Grey shale
	NE cor. 22-9-18 2727; Aug. 5/63	94-105	Light grey shaly s & p ss; minor carbonaceous flecks - very porous
0-30	Light brown sandy clay		NE cor. 31-9-18 2762; Aug. 5/63
30-72	Dark brown sandy clay; rare pebbles; coal fragments	0-75	Very sandy brown clay; some pebbles
		75-105	Very sandy grey clay; some pebbles

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 33-9-18 2723; Aug. 5/63		NE cor. 19-10-9 2840; Aug. 13/63
0-45	Brown sandy clay; rare coal fragments; rare pebbles	0-30	Sandy brown clay
5-105	Very sandy grey clay	30-60	Brown very clayey fine sand
	NE cor. 35-9-18 2703; July 31/63	60-89	Sandy grey clay; rare pebbles
		89-93	Ironstone concretions (prob. pebbles in till)
		93-105	Buff fine sand
0-15	Brown sandy clay; rare pebbles		NE cor. 21-10-9 2820; Aug. 14/63
5-105	Dark grey sandy clay; some pebbles; some coal fragments	0-75	Brown & dark grey sandy clay; rare pebbles
	NE cor. 24-9-19 2780; Aug. 6/63	75-85	Very silty dark grey to blue grey clay; rare pebbles
0-105	Dark brown sandy clay; some pebbles; coal fragments; rare boulders	85-90	Sandy grey clay; rare pebbles
		90-105	Silty to sandy dark grey to blue grey clay; rare pebbles
	NE cor. 8-10-9 2780; Aug. 19/63		NE cor. 23-10-9 2750; Aug. 14/63
0-20	Very sandy to silty clay; some pebbles	0-5	Sandy clay
20-105	Brown clay; some pebbles	5-15	Gravel
		15-45	Brown clay; some pebbles; boulders
		45-70	Sandy dark grey clay; some pebbles
	NE cor. 10-10-9 2700; Aug. 14/63	70-75	Grey green silty shale ¹
0-50	Sandy brown clay; rare pebbles; rare coal fragments	75-80	No return
50-105	Sandy dark grey clay; some pebbles	80-94	Grey green & grey shale
		94-100	Slightly sandy grey siltstone
		100-105	Fine grey ss

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 32-10-9 2802; Aug. 13/63		NE cor. 12-10-10 2800; Aug. 20/63
0-30	Sandy brown clay; rare pebbles	0-30	Very sandy to silty brown clay; some coal fragments
30-45	Sandy dark grey clay; rare pebbles	30-100	Very sandy grey clay; some pebbles; coal fragments
45-80	Silty buff clay - lake deposit	100-105	Soft sandy to silty brown clay
80-88	Fine brown sand		
88-90	Light grey shale ¹		NE cor. 19-10-10 2640; Sept. 4/63
90-105	Grey green silty shale		
	NE cor. 8-10-10 2710; Aug. 20/63		
0-70	Sandy brown clay; some pebbles; coal fragments	0-86	Sandy brown & grey clay; pebbles Coaly shale ¹
70-105	Sandy dark grey clay; some pebbles; coal fragments	86-91	Thin coal seam
		91-92	Silty grey brown shale
		92-95	Silty grey green & light grey shale
		95-105	
	NE cor. 10-10-10 2832; Aug. 20/63		NE cor. 21-10-10 2715; Sept. 4/63
0-20	Sandy brown & yellow brown clay	0-30	Sandy brown clay
20-35	Soft light yellow grey fine sand	30-45	Silty light brown & grey shale ¹
35-42	Brown grey slightly bentonitic shale ¹	45-46	Coaly shale
42-65	Grey green shale	46-80	Grey & green grey silty shale
65-75	Silty to sandy grey shale	80-85	Brown, chocolate brown & some carbonaceous shale
75-85	Grey siltstone	85-86	Thin coal seam
85-105	Grey silty shale	86-90	Chocolate brown shale
		90-105	Green grey & grey shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 23-10-10 2820; Sept. 4/63		NE cor. 34-10-10 2780; Aug. 13/63
0-30	Sandy brown clay; some pebbles	0-15	Brown sandy clay; boulders
30-40	Silty light grey to buff s & p sand	15-20	Soft light grey fine sand
40-50	Yellow brown shale; siltstone concretions ¹	20-40	Silty grey green & brown clay
50-60	Grey & light brown shale	40-65	Unconsol. well- sorted brown grey sand
60-75	Light grey fine s & p ss	65-70	Fine blue green sand
75-90	Silty grey green shale	70-105	Grey green & grey shale ¹
90-105	Slightly bentonitic silty grey green shale		
	NE cor. 32-10-10 2677; Aug. 13/63		NE cor. 36-10-10 2830; Aug. 13/63
0-30	Sandy brown clay; rare pebbles	0-10	Brown grey sandy clay
30-38	Grey shale ¹	10-25	Fine rusty sand
38-39	Coal stringer	25-30	Rusty brown clay
39-45	Grey shale	30-90	Green grey & some grey brown shale ¹
45-72	Grey & brown grey shale	90-100	Grey & green grey silty shale
72-74	Slightly bentonitic grey shale	100-105	Fine light grey s & p ss
74-75	Chocolate brown shale; coal trace		
75-81	Brown & grey shale		
81-82	Coal		
82-95	Brown, chocolate brown & some grey shale		
95-105	Very silty grey & brown shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 8-10-11 2658; Aug. 28/63		NE cor. 12-10-11 2695; Aug. 28/63
0-33	Sandy brown clay	0-20	Sandy brown clay
33-35	Chocolate brown shale; coal trace ¹	20-25	Clay; coarse sand
35-46	Brown & grey shale	25-43	Grey shale; some coaly shale ¹
46-49	Coal seam	43-45	Coaly shale
49-75	Grey & chocolate brown shale; coal stringer @ 60-60.5 feet	45-63	Grey & dark brown shale
75-85	No return	63-64	Coal stringer
85-89	Grey shale	64-95	Grey & brown shale
89-90.5	Very hard light grey siltstone	95-100	Chocolate brown shale
90.5-94	Chocolate brown shale; trace of coal	100-105	Green grey & grey shale
94-100	Brown shale		NE cor. 19-10-11
100-105	Brown grey shale; siltstone stringer @ 103 feet		2575; Sept. 3/63
	NE cor. 10-10-11 2681; Aug. 28/63	0-10	No samples; prob. clay
		10-50	Sandy brown clay; some pebbles
		50-105	Well-sorted, unconsol. fine to very fine buff sand
0-20	Sandy brown clay		NE cor. 21-10-11
20-35	Green grey & brown shale ¹		2622; Sept. 3/63
35-55	Grey & chocolate brown shale		
55-56	Coal traces	0-50	Sandy brown clay; some pebbles
56-62	Brown shale	50-70	Sand
62-67	Light grey siltstone stringer	70-100	Silty brown to yellow brown clay
67-75	Light grey silty shale	100-105	Grey shale ¹

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 23-10-11 2627; Sept. 4/63		NE cor. 36-10-11 2600; Aug. 13/63
0-10	Top soil; brown sandy clay; pebbles	0-40	Very sandy brown clay; some pebbles; coal fragments
10-55	Sandy brown clay; some pebbles	40-105	Dark grey clay; sand; some pebbles; coal fragments; boulder @ 45 feet
55-88	Dark grey sandy clay; pebbles		
88-90	Coaly & chocolate brown shale ¹		NE cor. 8-10-12 2582; June 28/63
90-105	Silty grey shale		
	NE cor. 32-10-11 2575; Sept. 6/63	0-5	Sand; gravel
0-20	Sandy brown clay; some pebbles	5-105	Buff drift
20-75	Sandy brown clay		NE cor. 10-10-12 2575; June 28/63
75-105	Sandy dark grey clay; some pebbles	0-30	Buff drift
	NE cor. 34-10-11 2603; Sept. 6/63	30-105	Dark grey drift
0-45	Sandy brown clay; rare pebbles		NE cor. 12-10-12 2590; Sept. 3/63
45-70	Silty brown clay; coal fragments	0-5	Top soil; some gravel
70-81	Sandy dark grey clay	5-30	Very sandy brown clay; some pebbles
81-90	Slightly bentonitic silty to sandy yellow grey shale ¹	30-60	Brown clay; sand
90-105	Light grey sandy & silty shale	60-105	Sandy grey clay
			NE cor. 19-10-12 2656; June 28/63
		0-45	Buff drift; boulders

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 21-10-12 2605; June 27/63		NE cor. 19-10-13 2635; June 26/63
0-30	Buff drift	0-40	Buff drift
30-105	Dark grey drift	40-50	Brown shale ¹
		50-85	Dark grey shale; hard stringers; coal stringer @ 51-51.5 feet
	NE cor. 23-10-12 2578; June 27/63	85-100	Brown shale; hard stringers
0-30	Buff drift	100-101	Brown shale
30-105	Dark grey drift	101-103	Coal
		103-105	Brown shale
	NE cor. 32-10-12 2620; June 27/63	105-106	Dark grey shale
0-60	Buff drift	106-109	Coal
60-105	Dark blue grey drift	109-110	Dark grey shale
		110-116	Black coaly shale
		116-117	Coal
		117-125	Brown shale
	NE cor. 34-10-12 2600; June 27/63	125-130	Brown shale; siltstor stringers @ 128- 129 feet
0-60	Buff drift	130-135	Brown shale
60-105	Dark grey drift		NE cor. 21-10-13 2635; July 3/63
	NE cor. 8-10-13 2620; June 19/63	0-50	Brown clay
0-30	Buff sand	50-52	Shale ¹
30-50	Sand; gravel	52-53	Coal
		53-60	Grey shale
		60-67.5	Dark grey shale
		67.5-70	Coal
	NE cor. 10-10-13 2660; June 19/63	70-80	Coaly shale
0-5	Sandy drift	80-81	Coal
5-90	Sand; gravel	81-85	Black shale
		85-105	Grey to dark grey shale; some light grey siltstone @ 90 feet
	NE cor. 12-10-13 2625; June 28/63		
0-105	Buff & dark grey drift		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 23-10-13 2644; July 3/63		NE cor. 36-10-13 2650; June 27/63
0-60	Silty to sandy clay; few pebbles	0-30	Buff drift
60-65	No sample	30-105	Dark grey drift
65-105	Silty to sandy clay; few pebbles; few coal fragments; few thin gravel stringers		NE cor. 8-10-14 2607; June 14/63
	NE cor. 32-10-13 2595; June 26/63	0-25	Brown sand
		25-55	Dark grey drift
		55-65	Sand; gravel
		65-95	Dark grey drift; sand; gravel
0-20	Buff drift	95-105	Dark grey silt
20-46	Buff shale ¹		NE cor. 10-10-14 2600; June 14/63
46-46.5	Coal		
46.5-49	Buff shale	0-10	Buff drift
49-60	Dark grey shale	10-15	Rust-coloured shale ¹
60-65	Light buff siltstone	15-20	Light grey & brown shale; hard stringers
65-92	Light grey shale - hard @ 84-85 feet	20-26	Brown shale; coal traces
92-93.5	Coal	26-38	Brown shale
93.5-95	Light grey shale	38-40	Coal
95-98.5	Dark grey shale	40-47.5	Brown shale
98.5-99.5	Coal	47.5-49	Coal
99.5-105	Brown shale	49-70	Brown shale
	NE cor. 34-10-13 2652; June 27/63	70-105	Brown shale; hard stringers
0-35	Buff drift		
35-50.5	Brown & grey shale; siltstone stringers ¹		
50.5-51	Coal		
51-55	Brown & grey shale		
55-90	Brown & dark grey shale		
90-92	Coal		
92-94	Brown shale		
94-94.3	Coal		
94.3-105	Dark brown shale		

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Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 12-10-14 2650; June 17/63		NE cor. 23-10-14 2596; June 14/63
0-10	Buff drift	0-30	Buff drift
10-28	Brown shale ¹	30-85	Dark grey drift; boulders
28-30	Coal	85-105	Dark grey shale ¹
30-39	Brown shale		
39-39.5	Coal		
39.5-42	Brown shale		
42-42.5	Coal		NE cor. 32-10-14 2595; July 9/63
42.5-45	Brown shale		
45-56	Brown & grey shale		
56-57	Poor coal		
57-100	Dark grey shale	0-22	Slightly silty clay - lake deposit
100-105	Brown shale; coal stringer @ 103- 103.5 feet	22-75	Grey to dark grey silty to sandy clay; pebble stringer @ 72-75 feet
105-120	Dark grey to brown shale	75-105	Dark grey sandy & silty clay
	NE cor. 19-10-14 2597; June 13/63	105-115	Silty sandy clay; pea gravel
0-20	Brown sand		
20-60	Buff drift; sand; gravel		NE cor. 36-10-14 2545; June 26/63
60-105	Dark grey drift	0-80	Sand; till
	NE cor. 21-10-14 2603; June 14/63		NE cor. 8-10-15 2628; June 11/63
0-40	Buff drift	0-55	Buff & dark grey drift
40-90	Dark grey drift	55-60	Light grey shale ¹
90-102.5	Light grey & brown shale ¹	60-62	Coal
102.5-103	Coal	62-70	Brown shale
103-105	Brown shale	70-70.5	Coal
		70.5-100	Dark grey shale
		100-105	Brown shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 10-10-15 2638; July 9/63		NE cor. 21-10-15 2590; June 13/63
0-67	Brown yellow sandy silty clay; pebbles; chunk of coal @ 40 feet	0-30 30-105	Buff drift Dark grey drift
67-76	Dark grey shale ; coaly shale; coal stringer @ 74 feet ¹		NE cor. 23-10-15 2605; June 13/63
76-77	Ss stringer	0-30	Buff drift
77-80	Dark grey & chocolate brown shale	30-105	Dark grey drift
80-82	Chocolate brown shale - slightly coaly		NE cor. 32-10-15 2550; June 13/63
82-83	Coal		
83-85	Chocolate brown shale - slightly coaly	0-45	Buff drift
85-91	Chocolate brown silty shale; some grey shale @ 90 feet	45-105	Dark grey drift; sand & gravel stringers
91-91.5	Coal		
91.5-94	Chocolate brown silty shale		NE cor. 34-10-15 2565; June 13/63
94-105	Grey shale; bands of dark brown shale @ 100-105 feet; ss @ 99 feet	0-30 30-90 90-105	Buff drift Dark grey drift Dark grey sandy drift
	NE cor. 12-10-15 2650; June 17/63		NE cor. 36-10-15 2585; June 13/63
0-30	Buff drift		
30-90	Dark grey drift; gravel	0-30	Buff drift
90-105	Dark grey drift; boulders	30-95 95-105	Dark grey drift Gravel
	NE cor. 19-10-15 2591; June 12/63		NE cor. 8-10-16 2648; June 11/63
0-20	Buff drift	0-30	Buff river sand
20-105	Dark grey drift	30-105	Dark grey drift

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 10-10-16 2633; June 11/63		NE cor. 36-10-16 2560; June 12/63
0-30	Buff sand	0-75	Buff drift
30-90	Dark grey drift	75-105	Fine pea gravel; sand
90-105	Fine pea gravel		
	NE cor. 12-10-16 2650; June 11/63		NE cor. 10-10-17 2645; July 18/63
0-15	Buff drift	0-30	Fine buff sand; minor gravel lenses
15-65	River sand	30-95	Grey sandy clay; rare gravel lenses; coal fragments
65-75	Dark grey silt	95-103	Sandy brown clay
75-105	Dark grey drift	103-105	Dark brown clay
	NE cor. 21-10-16 2615; June 11/63		NE cor. 21-10-17 2677; July 18/63
0-90	Buff & dark grey drift	0-80	Fine buff clayey sand; coal fragments; some pebble lenses
90-105	Rusty & brown shale; poor coal @ 105 feet ¹	80-105	Slightly sandy grey clay; rare pebbles; minor coal fragments
105-111	Brown shale		
111-111.3	Poor coal		
111.3-115	Grey shale		
	NE cor. 32-10-16 2602; June 12/63		NE cor. 23-10-17 2630; July 18/63
0-35	Buff drift	0-40	Fine buff sand; some coal fragments
35-105	Dark grey drift	40-70	Grey sandy clay; many coal fragments
	NE cor. 34-10-16 2577; June 12/63	70-105	Grey sandy clay; coal fragments
0-35	Buff drift		
35-105	Dark grey drift		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 32-10-17 2678; July 18/63		
0-35	Fine buff sand; some pebbles; gravel lenses	40-105	Sandy grey clay; some pebbles; coal fragments; slightly sandier towards bottom
5-80	Sandy dark brown clay; minor coal fragments		
0-90	Lost circulation		
	NE cor. 34-10-17 2615; July 18/63		NE cor. 12-10-18 2703; July 31/63
0-41	Fine buff sand; little clay	0-55	Sandy brown clay; some pebbles
1-70	Grey & green grey silty to sandy clay	55-94	Sandy dark grey clay; rare coal fragments; pebbles
70-95	Sandy grey clay; minor coal fragments	94-100	Grey shale ¹
75-105	Sandy grey clay; some coal fragments; rare pebbles	100-105	Silty light grey shale
	NE cor. 8-10-18 2747; Aug. 5/63		NE cor. 32-10-18 2760; July 30/63
0-55	Brown & dark grey very sandy clay; pebbles; coal fragments	0-5	Brown clay
55-65	Slightly silty grey clay	5-80	Brown to yellow brown very sandy clay; some pebbles
65-80	Sandy grey clay	80-105	Grey very sandy clay; some pebbles
80-105	Very sandy grey clay; some pebbles; coal fragments		NE cor. 34-10-18 2725; July 30/63
	NE cor. 10-10-18 2727; July 31/63	0-5	No sample
0-30	No return; prob. dune sand	5-40	Sandy brown clay; rare coal fragments; pebbles
30-40	Slightly sandy grey clay	40-80	Very sandy brown clay; rare coal fragments; many pebbles
		80-105	Sandy grey clay; rare pebbles

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet);
	NE cor. 36-10-18 2700; July 30/63		NE cor. 12-11-10 2725; Aug. 12/63
0-25	Buff sand - poor sample	0-15	Very sandy brown clay
25-35	Silty brown clay	15-53	Yellow grey, grey & brown silty shal
35-60	Very soft silty to sandy grey clay	53-58	Fine to very fine grey ss
60-105	Silty to sandy grey clay; rare pebbles	58-105	Grey, green grey & light grey shale to silty shale
	NE cor. 12-10-19 2780; Aug. 5/63		NE cor. 19-11-10 2578; Aug. 9/63
0-70	Sandy brown clay; rare pebbles	0-20	Sandy brown clay
70-105	Sandy grey clay; some pebbles	20-26	Rusty sand; coal flecks
	NE cor. 8-11-10 2594; Aug. 12/63	26-40	Light brown silty shale ¹
0-45	Sandy brown clay; rare pebbles	40-45	Coaly shale
45-105	Sandy dark grey clay; rare pebbles	45-60	Brown & grey green shale; siltstone stringer @ 51 feet
	NE cor. 10-11-10 2649; Aug. 12/63	60-69	Grey brown & chocolate brown silty shale; thin coal stringer @ 63 feet
0-68	Sandy brown clay; rare pebbles	69-71	Coal
68-98	Grey & brown grey shale ¹	71-76	Dark grey & grey brown shale
98-100	Brown shale; thin coal stringer	76-76.5	Siltstone stringer
100-105	Silty grey shale	76.5-82	Grey shale
		82-83.5	Coal
		83.5-105	Green grey, grey & brown shale; siltstone stringer @ 97-99 feet

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 21-11-10 2605; Aug. 12/63		
0-77	Sandy brown clay; some pebbles; coal fragments	80-81	Siltstone stringer
		81-84	Coal
77-87	Yellow grey silty shale; siltstone stringer @ 81.5-83 feet ¹	84-94	Chocolate brown & grey shale
		94-94.5	Coal
87-88	Coaly stringers	94.5-100	Siltstone stringers
88-98	Grey, grey brown & dark grey shale	100-105	Grey silty shale
98-100	Coal		NE cor. 34-11-10 2599; Aug. 8/63
10-105	Brown shale		
	NE cor. 23-11-10 2635; Aug. 12/63	0-15	Sandy brown clay
		15-25	Sandy brown clay; pebbles
0-10	Sandy clay	25-41	Fine buff s & p ss ¹
10-20	Very sandy brown clay	41-65	Grey brown, grey & green grey shale
20-35	Buff sand	65-69.5	Grey silty bentonitic shale
35-40	Very sandy brown clay	69.5-70	Coal
40-45	Pea gravel; sand	70-82	Grey shale
45-105	Very sandy grey clay; some pebbles	82-83	Coal
		83-90	Brown grey shale
		90-95	Grey & light grey silty shale
	NE cor. 32-11-10 2558; Aug. 9/63	95-100	Chocolate brown shale
		100-105	Light brown grey silty shale
0-30	Sandy brown clay; some pebbles		
30-44	Sandy brown clay		
44-46	Coaly shale; coal trace ¹		
46-56	Brown & buff shale		
56-57	Coal		
57-78	Chocolate brown, grey & some coaly shale		
78-80	Chocolate brown shale; coal trace		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
NE cor. 36-11-10 2700; Sept. 4/63			
0-10	Sandy brown clay	45-56	Brown, dark grey & grey shale
10-15	Light brown shale ¹		
15-40	Grey slightly bentonitic silty shale	56-57	Coal
		57-61.5	Chocolate brown shale
40-70	Brown, grey & green grey silty shale	61.5-63	Coal
70-75	Slightly sandy light grey siltstone	63-87.5	Grey shale
		87.5-88.5	Coal
75-105	Grey & green grey shale	88.5-103	Grey & brown shale; thin coal stringer @ 94-94.5 feet
		103-105	Siltstone stringer
NE cor. 12-11-11 2568; Aug. 12/63		NE cor. 32-11-12 2500; Sept. 7/63	
0-80	Sandy brown clay; rare pebbles		
80-90	Silty brown grey clay	0-10	Sandy brown clay
		10-21	Grey & brown shale ¹
90-105	Light grey brown clay; some pebbles	21-22	Siltstone stringer; ironstone concretion
		22-28	Silty to sandy brown shale
		28-29	Siltstone stringer
		29-45	Brown, grey & some coaly shale
		45-46	Coal
		46-50	Grey & coaly shale
		50-52	Coal
		52-65	Grey brown shale
		65-67	Siltstone stringer; ironstone
		67-80	Brown grey & dark brown shale
		80-80.5	Coal
		80.5-86	Brown & coaly shale
		86-86.5	Coal
		86.5-92	Brown & coaly shale
		92-92.5	Coal
		92.5-105	Chocolate brown & grey shale
NE cor. 10-11-12 2625; July 3/63			
0-45	Brown silty clay; some grey sand		
45-60	Lost circulation		
60-65	Very sandy clay; coal fragments		
65-90	Lost circulation		
NE cor. 19-11-12 2585; Sept. 7/63			
0-33	Sandy & silty brown clay		
33-40	Light grey siltstone ¹		
40-45	Slightly bentonitic green grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 36-11-13 2395; Sept. 7/63		
0-45	Fine buff river sand; some coal fragments; some pebbles	65-70	Very clayey brown sand
45-60	Sandy dark grey clay	70-105	Dark brown & dark grey sandy clay; rare pebbles; boulders @ 99-102 feet
60-80	Light grey soft s & p ss ¹		
80-95	Brown & grey shale		
95-105	Dark brown shale		
			NE cor. 36-11-14 2470; July 27/63
	NE cor. 8-11-14 2555; July 9/63	0-15	Rusty brown dune sand
0-35	Silty sandy clay; pebbles @ 22 feet	15-65	Brown & dark grey sandy clay; rare pebbles; some coal fragments
35-52	Sandy silty clay; rare pebbles; rare coal fragments; gravel @ 52 feet	65-105	Dark grey very sandy clay; rare pebbles; some coal fragments
52-75	Till; silty sandy clay		
75-77	Gravel		
77-80	Till; silty sandy clay		
80-95	Till; silty sandy clay; rare coal fragments		
95-105	Till; silty sandy clay; many coal fragments		
		0-85	Buff drift
		85-105	Grey drift sand; pea gravel
	NE cor. 34-11-14 2535; July 27/63		
0-15	Silty brown clay; rare coal fragments; pebbles		NE cor. 21-11-16 2575; June 12/63
15-30	Very sandy brown clay; small pebbles; gravel stringers	0-15	Buff drift
30-65	Very sandy brown clay; small pebbles; gravel stringers; rare coal fragments	15-20	Sand
		20-30	Buff drift
		30-80	Grey drift
		80-90	Sand; fine pea gravel
		90-105	Grey drift

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 10-11-17 2627; July 18/63		NE cor. 34-11-17 2615; July 22/63
0-65	Brown & grey sandy clay; pebbles; boulders; minor coal fragments	0-20	Sandy brown clay; pebbles
65-70	Gravel	20-73	Brown grey & dark grey shale to silty shale ¹
70-105	Very sandy grey clay; some pebbles; rare coal fragments	73-83	Grey silty shale; siltstone stringer @ 78-79 feet
	NE cor. 12-11-17 2577; July 19/63	83-85	Chocolate brown shale
0-25	Fine buff sand; some clay	85-90	Green grey silty shale; some grey brown silty bands @ 90 feet
25-82	Sandy brown to dark brown clay; some pebbles	90-103	Silty brown shale
82-100	Gravel; boulder @ 100 feet	103-105	Coaly shale
	NE cor. 21-11-17 2648; July 19/63		NE cor. 36-11-17 2594; July 22/63
0-35	Dark brown sandy clay	0-75	Brown sandy clay; some pebbles; coal fragments
35-48	Gravel	75-105	Sandy dark grey clay
48-105	Grey sandy clay; some pebbles; boulder @ 80 feet		NE cor. 8-11-18 2820; July 30/63
	NE cor. 23-11-17 2605; July 18/63	0-5	Brown grey clay
0-105	Sandy brown clay; coal fragments; gravel @ 50-60 feet; many pebbles throughout	5-80	Silty to sandy brown & yellow brown clay; rare coal fragments; pebbles
		80-105	Sandy grey clay; rare pebbles

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 19-11-18 2825; July 30/63		NE cor. 9-12-10 2560; Aug. 8/63
0-75	Sandy brown clay; rare pebbles	0-10	Brown clay
75-105	Dark grey clay; sand; some pebbles	10-33	Sandy brown clay
		33-40	Silty light grey shale ¹
		40-47	Light brown silty bentonitic shale
	NE cor. 12-11-19 2780; July 30/63	47-50	Dark grey shale
		50-53	Coaly shale
0-85	Sandy to silty brown clay; rare pebbles; lost circulation @ 35-60 feet	53-58.5	Brown grey shale
		58.5-60	Coal
		60-60.5	Brown grey shale
85-105	Dark grey clay; sand; some coal fragments; pebbles	60.5-61.5	Coal
		61.5-66	Brown grey shale
		66-85	Green grey shale; siltstone stringer @ 76 feet
		85-105	Fine green grey ss
	NE cor. 7-12-9 2650; Sept. 5/63		NE cor. 11-12-10 2650; Aug. 9/63
0-45	Sandy brown clay; some pebbles	0-25	Brown & green brown sandy clay; some pebbles
45-50	Green grey clay		
50-60	Brown fine sand	25-35	Buff s & p ss ¹
60-95	Fine green grey s & p sand	35-50	Green grey & grey silty shale
95-105	Sandy grey shale ¹	50-74.5	Grey green & chocolate brown shale; siltstone stringer @ 74 feet
	NE cor. 20-12-9 2652; Sept. 5/63	74.5-80	Green grey ss
0-5	Dark brown sandy top soil	80-85	Green grey silty slightly bentonitic shale
5-74	Brown & grey sandy to silty clay	85-93	Lost circulation
74-75	Fine brown ss ¹	93-96	Grey silty shale
75-80	Siltstone	96-103	Lost circulation
80-95	Fine buff ss	103-105	Fine grey s & p ss
95-105	Sandy green grey & light grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-12-10 2585; Aug. 8/63		
0-88	Slightly to very sandy brown to dark grey clay	55-77	Grey brown sandy clay; coal flecks; gravel stringers
88-91	Grey brown shale; some minor coal partings ¹	77-82	Green grey silty clay
91-94	Coaly shale	82-105	Grey brown sandy clay; rare pebbles
94-105	Lost circulation		
	NE cor. 24-12-10 2603; Sept. 6/63		NE cor. 20-12-14 2615; July 23/63
0-5	Top soil; sandy brown clay; coal fragments	0-55	Sandy brown clay; many pebbles; some boulders
5-65	Very sandy brown clay; some pebbles	55-75	Gravel
65-75	Sandy grey brown shale ¹	75-88	Sandy grey clay
75-85	Light grey silty shale	88-105	Very sandy silty buff clay
85-95	Very sandy silty grey brown & grey shale		
95-105	Fine light grey ss		NE cor. 31-12-14 2625; July 24/63
	NE cor. 9-12-12 2480; Sept. 7/63		
0-40	Buff sand; gravel Abandoned due to caving	0-23	Rusty brown clayey sand
		23-35	Grey brown shaly ss ¹
		35-45	Green grey silty shale
		45-50	Light grey shaly ss
		50-80	Green grey & brown silty shale
	NE cor. 9-12-14 2578; July 26/63	80-95	Green grey silty shale
0-15	Sandy brown clay	95-105	Light grey silty to sandy shale
15-30	Sand		
30-45	Gravel; sandy clay		
45-55	Brown slightly sandy clay		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 33-12-14 2591; July 24/63		NE cor. 9-12-15 2575; July 23/63
0-30	Very sandy dark brown clay; rare pebbles	0-40	Brown sandy clay
30-35	Gravel	40-55	Yellow brown & dark brown shale; coal flecks @ 50 feet ¹
35-55	Very sandy dark brown clay; rare pebbles	55-90	Green grey slightly bentonitic silty shale
55-73	Very sandy grey clay	90-95	Brown shale
73-80	Rusty brown silty shale ¹	95-97	Coal
80-95	Soft brown shaly ss	97-105	Dark grey silty shale
95-100	Dark brown shale; some coal flecks		
100-105	Grey silty shale		NE cor. 22-12-15 2548; July 24/63
	NE cor. 35-12-14 2577; July 24/63	0-10	Brown silty clay
0-20	Very fine buff dune sand	10-50	Silty brown, green grey & grey shale ¹
20-45	Grey brown sandy clay; rare pebbles; gravel stringers	50-88	Silty brown & brown grey shale
45-105	Dark grey sandy clay ; rare pebbles; gravel stringers	88-90	Chocolate brown shale; coal flecks; minor bright coal fragments
		90-105	Very shaly grey ss
	NE cor. 7-12-15 2590; July 23/63		NE cor. 24-12-15 2620; July 24/63
0-65	Sandy brown & grey clay	0-5	Buff clay
65-75	Green grey shale ¹	5-40	Yellow grey & yellow brown silty shale ¹
75-100	Silty brown & chocolate brown shale; some coal flecks	40-50	Blue grey & green grey silty shale
100-102	Grey silty shale	50-65	Silty grey shale - quite hard
102-105	Chocolate brown shale	65-75	Silty to very sandy grey shale
		75-100	Shaly silty light grey ss
		100-105	Brown silty shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 7-12-16 2590; July 22/63		NE cor. 24-12-16 2595; July 23/63
0-5	Sand; brown clay	0-19	Sandy brown clay
5-50	Yellow grey & grey shale - some slightly bentonitic ¹	19-35	Grey brown & brown silty sandy shale ¹
50-60	Green grey & grey shale	35-60	Very sandy grey shale
60-95	Grey shale - quite hard; minor siltstone stringers	60-70	Grey shaly ss
95-101	Grey shale; coaly shale @ 99-101 feet	70-75	Sandy grey shale
101-105	Dark grey shale	75-80	Light grey ss
		80-84	Very sandy light grey shale
		84-95	Chocolate brown shale; minor coal partings
		95-100	Brown silty shale
		100-105	Grey shaly ss
	NE cor. 9-12-16 2583; July 23/63		NE cor. 11-12-17 2610; July 23/63
0-10	Brown sandy clay		
10-40	Yellow brown & brown silty shale ¹	0-5	Sandy brown clay
40-45	Blue grey silty shale	5-30	Brown & grey brown silty sandy shale ¹
45-55	Grey & green grey slightly bentonitic shale	30-65	Buff & yellow brown silty shale; minor siltstone stringers
55-85	Silty sandy grey shale	65-80	Grey & green grey shale
85-94	Silty grey shale; siltstone stringer @ 92 feet	80-85	Grey silty bentonitic shale
94-105	Dark brown & grey brown shale	85-92	Grey silty shale; coaly shale; trace of coal
	NE cor. 11-12-16 2595; July 22/63	92-94	Chocolate brown shale; minor coal flecks
0-45	Sandy brown clay; pebbles; coal fragments	94-105	Grey shale - quite hard
45-65	Dark grey sandy clay; pebbles; coal fragments		
65-90	Yellow brown & brown bentonitic shale; siltstone band @ 73 feet ¹		
90-105	Very silty sandy grey shale		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 20-12-17 2650; July 29/63		
0-50	Grey brown sandy clay; rare pebbles; coal fragments	30-53	Unconsol. sand; few pebbles
50-55	Soft s & p sand	53-90	Dark grey sandy clay; rare pebbles; coal fragments
55-60	Sandy grey clay; very rare pebbles	90-105	Sandy grey clay
60-90	S & p sand		
90-95	Grey sandy clay		
95-102	Very fine brown sandy clay		NE cor. 8-13-13 2600; July 25/63
102-105	Light grey & green grey shale ¹	0-91	Very sandy rusty brown clay
		91-100	Silty grey shale ¹
	NE cor. 22-12-17 2600; July 29/63	100-105	Grey fine shaly s & p ss
0-45	Brown & green brown sandy clay; some pebbles; some coal fragments; some gravel stringers		NE cor. 12-13-13 2528; July 25/63
45-50	Grey to dark grey clayey silt	0-80	Brown & dark brown sandy clay; rare coal fragments; some pebbles
50-90	Grey & dark grey sandy clay; rare pebbles; coal fragments	80-105	Very coarse unconsol. sand
90-100	Soft light brown clayey sand		
100-105	Dark grey & rusty brown clay		NE cor. 21-13-13 2535; July 25/63
		0-77	Brown clay; sand; rare pebbles
	NE cor. 31-12-17 2640; July 29/63	77-85	Green grey silty shale ¹
0-25	Rusty brown & yellow brown sandy clay; layers of sand @ 18-20 feet	85-90	Dark brown shale
25-30	Silty grey clay	90-105	Grey brown shale

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 23-13-13 2505; July 25/63		
0-60	Brown & green grey sandy clay	15-60	Yellow brown sandy clay; some pebbles
60-97	Sandy grey clay; rare pebbles; some fine gravel @ 65-73 feet	60-80	Silty sandy grey clay
97-105	Rusty brown sand	80-105	Silty sandy grey clay; rare pebbles
	NE cor. 12-13-14 2603; July 25/63		NE cor. 7-14-13 2473; July 26/63
0-60	Dark brown sandy clay; fine buff sand beds @ 50-55 feet	0-57	Dark brown sandy clay; some pebbles; rare coal flecks
60-85	Grey shale; trace of fossil shell fragments; ss stringers @ 83 feet ¹	57-105	Dark grey sandy clay; rare pebbles
85-105	Silty sandy grey s & p shale		NE cor. 9-14-13 2470; July 26/63
	NE cor. 10-13-18 2705; July 29/63		
0-5	Brown silty clay	0-150	Dark brown & grey sandy clay; rare pebbles
5-25	Yellow brown very sandy clay	150-160	Dark brown & grey sandy clay; rare pebbles; some gravel lenses
25-55	Brown, dark brown & grey sandy clay; rare pebbles	160-195	Silty soft grey clay; some pebbles
55-75	Very sandy grey clay		
	NE cor. 12-13-18 2675; July 29/63		
0-5	Dark grey silty clay		
5-15	Very sandy yellow brown clay; boulders & pebbles @ 13 feet		

APPENDIX B
MANALTA COAL LTD. COAL TESTHOLES,
CYPRESS HILLS

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Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 32-6-1 4075; Sept. 10/63		Lsd. 9-3-7-1 4040; Sept. 11/63
0-7	Clay and rocks	0-19	Sandy clay and rocks
7-39	Brown clay	19-32	Brown clay
39-42	Grey clay	32-34.7	Black and brown clay
42-46	Brown clay	34.7-35.5	Coal
46-47	Black clay and bloom	35.5-36.5	Brown clay
47-63	Grey clay	36.5-38.8	Coal
63-85	Brown sandy clay	38.8-41	Brown clay
		41-61	Grey clay
		61-65	Grey sand
	NE cor. 35-6-2 4090; Sept. 3/63		NE cor. 3-7-1 4078; Sept. 11/63
0-17	Gravel and some clay		
17-40	Sand		
40-70	Brown clay	0-10	Sandy brown clay
70-100	Sandy clay; lost circulation	10-20	Brown sand
100-105	Grey clay	20-23	Brown sandy clay
		23-29	Black and brown clay
		29-46	Brown clay; bentonite stringers
	Lsd. 6-2-7-1 4150; Sept. 12/63	46-85	Green clay
0-4	Brown clay	85-85.6	Brown clay
4-12	Gravel	85.6-89.6	Coal
12-46	Brown clay	89.6-89.9	Brown clay
46-48	Black and brown clay	89.9-90.5	Coal
48-48.5	Coal	90.5-93	Brown clay
48.5-53	Brown clay	93-113	Grey clay
53-95	Grey sand	113-125	Grey sand
	Lsd. 8-2-7-1 4087; Sept. 12/63		Lsd. 8-4-7-1 4052; Sept. 11/63
		0-5	Brown clay and rocks
0-8	Gravel; little clay	5-14	Gravel
8-41	Brown clay	14-19	Brown clay
41-48	Bentonite	19-39	Grey clay
48-61	White clay (tuff)	39-42	Black and brown clay
61-78	Green clay	42-86	Grey sand
78-90	Brown clay; coal traces at 90 feet	86-105	Grey sandy clay
90-96	Grey clay		
96-97.5	Brown clay		
97.5-98	Coal		
98-113	Brown clay		
113-125	Grey clay		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	Lsd. 9-4-7-1 4060; Sept. 27/63		NE cor. 5-7-1 4190; Sept. 10/63
0-3	Brown clay	0-15	Clay and rocks
3-10	Gravel	15-52	Brown clay
10-15	Brown clay	52-88	Black and brown clay
15-17	White clay (tuff)	88-115	Bentonite
17-38	Grey clay	115-129	Brown clay
38-42.8	Brown clay	129-147	Green clay
42.8-44.2	Coal	147-155	Grey and brown clay
44.2-44.6	Brown clay	155-157.5	Coal
44.6-47	Coal	157.5-158	Brown clay
47-49	Brown clay	158-159	Coal
49-65	Grey sandy clay	159-185	Grey clay
	Lsd. 9-4-7-1 4077; Sept. 13/63		NE cor. 6-7-1 4080; Sept. 26/63
0-3	Brown clay	0-19	Brown clay and gravel
3-8	Gravel	19-46	White clay (tuff)
8-12	Brown clay	46-47.5	Brown clay
12-37	White clay (tuff)	47.5-49.7	Coal
37-59	Brown clay	49.7-52	Brown clay
59-63	Grey clay	52-60	Grey clay
63-64.4	Brown clay	60-75	Sandy grey clay; sand stringers
64.4-65.7	Coal		
65.7-65.9	Brown clay		
65.9-69.8	Coal		
69.8-73	Brown clay		
73-85	Grey clay		
	NE cor. 4-7-1 4102; Sept. 10/63		Lsd. 8-7-7-1 4175; Sept. 13/63
0-3	Brown clay	0-4	Gravel and some clay
3-9	Gravel	4-39	Brown clay
9-21	Brown clay	39-43	Green clay
21-56	White clay (tuff)	43-78	Black and brown clay
56-74	Green clay	78-82	White clay (tuff)
74-76.2	Coal	82-88	Green clay
76.2-76.5	Bloom	88-96	Green and white clay
76.5-80.5	Coal	96-110	Grey sand
80.5-81	Brown clay	110-145	Grey sandy clay
81-95	Grey clay		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 1-7-2 4098; Sept. 27/63		NE cor. 9-7-2 4110; Sept. 9/63
0-24	Brown clay and gravel	0-9	Gravel
24-29	White clay (tuff)	9-35	Brown clay
29-45	Brown and rusty clay	35-35.5	Black clay
45-46	Coal	35.5-40	Coal
46-48	Brown clay	40-45	Grey clay
48-54	Grey clay	45-48.4	Coal
54-60	Brown sand	48.4-50	Brown clay
60-75	Grey sandy clay with sand stringers	50-75	Soft ss
	Lsd. 14-7-7-2 4135; Aug. 28/63		Lsd. 8-10-7-2 4130; Sept. 25/63
0-23	Brown clay	0-19	Brown clay and gravel
23-24	Coal	19-33	Brown clay
24-29	Black and brown clay; coal traces	33-56	White clay (tuff)
29-70	Brown sandy clay	56-73	Grey clay
70-72	Brown shale; little coal	73-76.7	Black and brown clay
72-83	Grey sandy clay	76.7-78.5	Coal
83-84	Brown shale and coal	78.5-79	Brown clay
84-85	Black and brown clay	79-80	Coal
85-86	Brown shale and coal	80-82	Brown clay
86-87	Brown clay	82-86	Sandy grey clay
87-128	Grey sand	86-91	Soft grey ss
128-217	Sandy grey clay	91-95	Sandy grey clay
217-219	Brown shale and coal		
219-260	Grey sand		NE cor. 10-7-2 4240; Sept. 4/63
260-305	Grey sandy clay		
	NE cor. 8-7-2 4089; Aug. 30/63		
0-17	Brown clay and rocks	0-40	Brown sandy clay
17-41	Brown sand	40-70	Brown clay; some bentonite
41-46	Grey clay	70-95	Grey green clay
46-140	Grey shale	95-133	Grey clay
140-175	Grey sand and clay	133-136.7	Black and brown shale
175-205	Grey sandy shale	136.7-139.7	Coal
		139.7-142	Brown clay
		142-154	Grey clay
		154-163	Black and brown shale
		163-205	Grey sand

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	Lsd. 9-11-7-2 4170; Sept. 9/63		Lsd. 9-17-7-2 4200; Sept. 6/63
0-3	Clay	0-8	Clay and gravel
3-9	Gravel	8-20	Brown clay
9-20	Clay	20-24	Bentonite
20-43	Grey clay	24-27	Brown clay
43-70	Dark brown clay	27-50	Bentonite
70-75	Bentonite	50-58	Green clay
75-100	Soft ss	58-66	Grey clay
100-134	Green clay	66-67	Brown clay
134-139	Brown clay	67-67.5	Coal
139-140	Coal	67.5-68	Brown clay
140-148	Brown clay; coal stringers	68-71	Coal
		71-71.5	Brown clay
148-167	Grey sandy clay	71.5-75.2	Coal
167-196	Brown clay; coal stringers	75.2-78	Brown clay
		78-85	Soft brown sand
196-205	Grey clay		
	Lsd. 9-16-7-2 4203; Sept. 6/63		Lsd. 14-18-7-2 4225; Aug. 27/63
0-7	Brown sand	0-10	Clay and rocks
7-11	Hard ss	10-60	Sandy clay and rocks
11-16	Sand	60-69	Sandy grey and green
16-19	Hard ss	69-104	Brown clay; coal trace
19-29	Sandy clay	104-108	Bentonite
29-41	Green clay	108-156	Grey and green clay
41-60	Grey clay	156-158	Brown shale; coal trace
60-102	Dark brown clay	158-162	Coal
102-105	Bentonite	162-162.5	Brown clay
105-106	Brown clay	162.5-164	Coal
106-107	Coal	164-165	Brown clay
107-107.7	Brown clay	165-169	Coal
107.7-110	Coal	169-174	Brown clay
110-113	Brown clay	174-205	Grey clay
113-145	Grey sandy clay		
			NE cor. 11-7-3 4100; Sept. 5/63
		0-10	Gravel and clay
		10-20	Gravel and rocks
		20-25	Very sandy clay with coal traces
		25-95	Grey sand

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 12-7-3 4150; Aug. 28/63		Lsd. 8-14-7-3 4140; Sept. 4/63
0-8	Clay and gravel	0-20	Gravel
8-43	Sandy brown clay	20-38	Sandy brown clay
43-46	Black and brown clay; lost circulation; abandoned	38-39	Coal
		39-42	Brown clay
		42-48.8	Coal with parting
		48.8-52	Brown clay
		52-52.7	Coal
	Lsd. 8-13-7-3 4130; Sept. 6/63	52.7-53.2	Brown clay
		53.2-55.2	Coal
		55.2-57	Brown clay
0-14	Gravel; rocks and clay	57-58.5	Coal
14-23.7	Sandy brown clay	58.5-68	Brown clay
23.7-28.5	Coal	68-70	Coal
28.5-30.2	Brown clay	70-75	Sand
30.2-36.2	Coal		
36.2-38.5	Brown clay		
38.5-39.8	Coal		
39.8-42	Brown clay		
42-46	Grey clay		
46-55	Grey sand		
	NE cor. 13-7-3 4175; Aug. 28/63		NE cor. 14-7-3 4185; Aug. 30/63
0-11	Gravel and rocks	0-8	Gravel
11-24	Brown clay	8-34	Brown clay
24-40	Bentonite	34-41	Grey clay
40-43	Brown clay	41-50	Bentonite
43-95	Green clay	50-79	Green clay
95-98	Brown clay	79-81	Brown clay
98-100.7	Coal	81-86	Grey sandy clay
100.7-101	Brown clay	86-107	Grey sand
101-102	Coal	107-108	Brown clay
102-102.8	Brown clay	108-111	Coal
102.8-104	Coal	111-112	Brown clay
104-104.2	Brown clay	112-115	Grey clay
104.2-109.5	Coal	115-117	Black and brown clay
109.5-112	Brown clay	117-117.8	Coal
112-115	Sandy grey clay	117.8-118	Brown clay
		118-124	Coal
		124-128.5	Black and brown clay
		128.5-129.5	Coal
		129.5-131.5	Black and brown clay
		131.5-133	Coal
		133-141	Brown clay
		141-145	Grey clay

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	Lsd. 8-15-7-3 4155; Aug. 29/63		NE cor. 16-7-3 cont'd. 4160; Sept. 25/63
0-17	Clay and rocks	57.6-58	Brown clay parting
17-21	Gravel	58-58.7	Coal
21-27	Sandy clay and rocks	58.7-63	Brown clay
27-64	Brown sand	63-63.5	Coal
64-66.5	Black bloom	63.5-64	Brown clay
66.5-68	Brown clay	64-67	Grey clay
68-70.5	Black and brown clay	67-75	Sand
70.5-71.5	Coal		
71.5-73.4	Black and brown clay		
73.4-75	Coal		Lsd. 9-21-7-3 4250; Aug. 29/63
75-76	Brown clay	0-13	Brown clay and rocks
76-78	Grey clay	13-27	Brown sand
78-80	Black and brown clay	27-40	Brown clay
80-85	Grey shale	40-86	Brown sand
	NE cor. 15-7-3 4160; Aug. 29/63	86-130	Grey clay
		130-155	Grey sand
0-26	Brown clay		
26-42	Grey clay		NE cor. 27-8-1 3900; Sept. 18/63
42-43	Brown clay		
43-49.2	Coal		
49.2-56	Brown and black shale	0-62	Brown clay and rocks
56-58.2	Coal	62-71	Brown clay
58.2-60	Brown clay	71-94	Grey clay and rocks
60-62	Grey shale	94-100	Gravel and sand
62-65	Black and brown shale	100-115	Grey clay
65-80	Grey shale		
80-100	Grey sand		
100-105	Grey sandy clay		Lsd. 14-31-8-1 4045; Sept. 23/63
	NE cor. 16-7-3 4160; Sept. 25/63	0-42	Brown clay and rocks
		42-64	Brown sand and clay
		64-101	Grey clay
0-13	Brown clay and gravel	101-113	Brown clay; coal trace
13-37	Brown clay	113-135	Grey sand
37-40.7	Black and brown clay		
40.7-45	Coal		
45-55.8	Black and brown clay		
55.8-57.6	Coal		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 33-8-2 4042; Sept. 23/63		Lsd. 14-36-8-2 4025; Sept. 23/63
0-22	Brown clay and rocks	0-28	Silt and clay
22-38	Sand; gravel; clay	28-40	Sand and gravel
38-65	Grey clay and rocks		
	NE cor. 34-8-2 4150; Sept. 19/63		NE cor. 17-8-3 4152; Sept. 25/63
0-34	Brown clay and rocks	0-20	Brown clay and rocks
34-68	Brown sand and clay	20-23	Brown clay
68-80	Grey sand and clay	23-48	White clay
80-96	Green clay	48-70	Soft brown ss
96-101	Brown clay	70-75	Brown sand
101-118	Green clay	75-85	Sandy grey clay; lost circulation; abandoned
118-127	Grey sand		
127-136	Brown clay		
136-160	White clay (tuff)		
160-167	White sandy clay		Lsd. 5-21-8-3 4085; Sept. 26/63
167-168	Grey clay		
168-171	Brown clay	0-26	Brown clay and rocks
171-182	Green clay	26-37	Brown sandy clay
182-185	Brown clay	37-38	Brown clay
185-190	Coal	38-43	Coal
190-195.5	Brown clay	43-47	Brown clay
195.5-199.7	Coal	47-54	Grey clay
199.7-200	Brown clay	54-65	Sand
200-202	Coal		
202-206	Brown clay		
206-215	Grey sandy clay		Lsd. 15-22-8-3 4160; Sept. 24/63
	Lsd. 10-36-8-2 4050; Sept. 20/63	0-4	Brown clay and rocks
0-41	Brown clay and rocks	4-15	Gravel and clay
41-57	Green clay	15-19	Brown clay and rocks
57-59	Loose hard coal	19-70	Dark brown clay and sand; abandoned due to gravel, and lost circulation
59-60.4	Brown clay		
60.4-61	Coal		
61-115	Grey sand		

Depth (feet)	Location W 4th Mer. Top elevation (feet); Date	Depth (feet)	Location W 4th Mer. Top elevation (feet); Date
	NE cor. 22-8-3 4140; Sept. 24/63		NE cor. 26-8-3 4020; Sept. 18/63
0-22	Brown clay and rocks	0-63	Brown clay and rocks
22-28	Black and brown clay; coal traces	63-130	Grey clay
28-34	Black and brown shale	130-132	Grey shale
34-63	Sand	132-153	Grey clay
63-77	Brown and black sandy clay; coal traces	153-205	Grey sand and clay
77-88	Brown clay		Lsd. 8-4-9-2
88-95	Grey clay		4030; Sept. 20/63
	NE cor. 25-8-3 4100; Sept. 19/63	0-35	Brown clay and rocks
		35-81	Grey clay and rocks
		81-90	Grey sand
		90-145	Grey sandy clay
0-27	Brown clay and rocks		
27-32	Gravel		
32-51	Brown clay		
51-69	Brown sand		
69-73	Black and brown clay; coal traces		
73-137	Grey clay		
137-146	Grey sand		
146-155	Grey clay		