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FEDERAL COAL RESOURCE OCCURRENCE AND FEDERAL COAL DEVELOPMENT POTENTIAL MAPS OF THE BLOCKER 7.5-MINUTE QUADRANGLE PITTSBURG AND LATIMER COUNTIES, OKLAHOMA

(Report includes 25 plates)

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INTRODUCTION

Purpose

This text is to be used in conjunction with the Federal Coal Resource Occurrence (FCRO) and Federal Coal Development Potential (FCDP) Maps of the Blocker 7.5-minute quadrangle, Pittsburg and Latimer Counties, Oklahoma.

This report was compiled to support the land-planning work of the Bureau of Land Management (BLM). The work was undertaken by Geological Services of Tulsa, Inc., Tulsa, Oklahoma, at the request of the United States Geological Survey under contract number 14-08-0001-17989. The resource information gathered for this report is in response to the Federal Coal Leasing Amendments Act of 1976 (Public Law 94-377). Published and unpublished publicly available information was used as the data base for this study. No new drilling or field mapping was done to supplement this study, nor was any confidential or proprietary data used.

Location

The Blocker 7.5 minute quadrangle is located in the southern part of the Oklahoma coal field in the southeastern corner of the Quinton-Scipio mining district (Trumbull, 1957; Dane, et al, 1938). This district is in the southwestern part of the Arkoma basin (McAlester basin or McAlester coal basin of earlier publications). The quadrangle lies mostly within southeastern Pittsburg County but includes a small strip of the northwestern corner of Latimer County. The town of Blocker is located near the center of the quadrangle, approximately 100 miles southeast of Tulsa, 60 miles southeast of Muskogee, and 17 miles northeast of McAlester, Oklahoma.

Accessibility

Oklahoma State Highway 31 connects McAlester, Oklahoma with the larger highways around Fort Smith, Arkansas. It runs from the southwest corner of the quadrangle to Blocker, near the center, where it turns east and crosses the eastern half of the quadrangle. An undesignated hard surface highway crosses the western half of the quadrangle, connecting Blocker with Crowder and U.S. Route 69, approximately 8.5 miles to the west. From Oklahoma Highway 31, one secondary road crosses the north half of the quadrangle, skirting Scaffold Mountain. Another secondary road curves around the south side of Blue Mountain in the southern half of the quadrangle, going east from Oklahoma 31; a similar road leads southeast from Oklahoma 31 at the recreation area on Eufaula Lake, in the southwest corner of the quadrangle. A few unimproved roads follow the lake shoreline or lead into relatively isolated homesites and gas well locations. An old railroad grade (Fort Smith and Western Railroad) is indicated as part of a pipeline route across the center of the quadrangle.

Physiography

The Blocker quadrangle is situated in the southern part of the Arkansas Valley physiographic province. This valley occupies the Arkoma structural basin north of the Ouachita mountains, south of the Ozark mountains, east of the central Oklahoma platform, and northeast of the Arbuckle mountains; it is drained by the Arkansas and Canadian Rivers. The general drainage for this portion of the province is north toward the Canadian River; this is modified by the influence of Eufaula Lake, which occupies the lower portion of several major tributary systems into the Canadian River. Two of these tributaries are Mathuldy Creek and Blue Creek, which occupy the east-west valley across the center of the quadrangle. South of Blue Mountain, in the southern third of the quadrangle, Jones Creek flows westward into Eufaula Lake. Lick Creek flows northeast in the northeast corner of the quadrangle; the head of eastward-flowing Featherston Creek occurs near the eastern edge of the map. The valley floors of these streams are broad; the channels meander, and most of the drainage is intermittent. The mountains and ridges are maturely dissected with deeply incised intermittent tributaries. Arms of Eufaula Lake occupy the northwest and southwest quarter of the quadrangle; the normal pool elevation is 585 feet (178 m) above sea level (U.S.G.S., Blocker 7.5 minute Topographic Quadrangle, 1971, revised 1978).

Steep-faced mountains and ridges, alternating with broad valleys, dominate the topography and reflect the large geologic structures of the area (Plate 1). The relatively large valley across the center of the quadrangle is an eroded anticline; stream channels on this valley floor have an upstream elevation greater than 660 feet (201 m). By contrast, Jones Creek Valley in the southern part of the quadrangle, is below 620 feet (189 m) elevation. Blue Mountain, between these valleys, is a dissected syncline capped by resistant sandstones; the curving perimeter and steep face outline the structure and reflect the dip of the resistant strata.

Topographic relief ranges from 160 to over 500 feet (49 to 152 m). Scaffold Mountain, in the northern half of the study area, reaches an elevation of 1109 feet (338 m) above sea level; the highest elevation of Blue Mountain is 1018 feet (310 m).

Climate and Vegetation

The climate in southeastern Oklahoma is for the most part fairly moderate. Winters are short, and extremely cold weather is seldom experienced. Summer, however, are generally long and hot. The mean annual temperature is about 62°F (17°C), and ranges from a daily average of about 41°F (5°C) in January to about 82°F (28°C) in July though it is not unusual to have occasional periods of very hot days (Hendricks, 1939). Annual precipation in the area averages approximately 41 inches (105 cm), with rains generally abundant in the spring, early summer, fall and winter (Hendricks, 1939).

The area supports a wide variety of vegetation, with oaks, blackjacks, hickories, elms and hackberries being most common. On the higher mountains and ridges pines can also be found. In parts of the valleys that have not been cleared for farming, thick stands of water and willow oaks, hickories, cottonwoods, willows and wild plums may be present (Hendricks, 1939).

Land Status

The Blocker Known Recoverable Coal Resource Area (KRCRA) lies almost entirely within the Blocker quadrangle (Plate 2). The Federal government holds title to the coal mineral rights in this area, encompassing approximately 7300 acres (2950 hectares) of the quadrangle. All of this land was unleased as of October 19, 1979.

GENERAL GEOLOGY

Previous Work

Much work has been done on the southeastern Oklahoma coal field. The first geologic study of the Choctaw coal field was published by Chance (1890) and included a map showing the outcrops of the most important coal beds in the area. In 1897, Drake published the results of his study on the coal fields of the Indian Territory, which consisted of a map and text of the principal coal beds, general stratigraphy and structural features.

From 1899 to 1910, Taff and his associates published several reports on the Oklahoma coal lands. These included a number of investigations carried out for the United States Geological Survey on the extent and general character of local stratigraphy, including coal beds. Much of his work was a part of Senate Document 390 (1910), which represented a compilation of material collected for the purpose of determining the value and extent of coal deposits in and under the segregated coal lands of the Choctaw and Chickasaw Nations in Oklahoma.

The Oklahoma Geological Survey published a bulletin by Snider in 1914 on the geology of east-central Oklahoma, emphasizing the geologic structure and oil and gas possibilities of the area. Further studies on the southern Oklahoma coal lands were carried out by Shannon and others (1926), Moose and Searle (1929), and Hendricks (1939). These, along with later works by Knechtel and Oakes in the 1940's added greatly to the body of knowledge on Oklahoma coals, particularly in terms of their quality, chemical composition and extent.

Several estimates as to original and remaining coal reserves have been published; among them are the figures published in papers by Trumbull (1957) and Friedman (1974). Non-proprietary information of coal test holes drilled in various years in the Blocker quadrangle was available from USGS files and incorporated into this report.

Stratigraphy

The Arkoma Basin, once part of the larger Ouachita geosyncline, formed as a result of subsidence beginning in Mississippian time and continuing through Early and Middle Pennsylvanian. Strata in the basin are thought to have been deposited in a deltaic environment with sediment coming primarily from eroding highlands to the northeast, north, and northwest (Branan, 1968). Evidence that the basin was becoming full is provided by coal seams in the Upper Atoka and Lower Desmoinesian section. Sedimentation continued until late Pennsylvanian time, when the Arbuckle Orogeny of southern Oklahoma took place (Branan, 1968). In Early Permian time, Ouachita mountain building to the south of the basin compressed Arkoma Basin strata into a series of long, narrow, east-west anticlinal and synclinal folds (see section on Structure below).

Most of the rock units encountered in the Blocker quadrangle are of Pennsylvanian Age, and include the Atoka Formation (Upper Dornick Hills Group) as well as the Hartshorne, McAlester, Savanna and Boggy Formations of the Lower Desmoinesian (Krebs Group). All of these formations contain coal beds ranging from less than one inch (2.54 cm) to more than 5 feet (1.5 m thick. The Blocker quadrangle is part of the Quinton-Scipio coal district (Dane, et al, 1938).

The Atoka Formation was named by Taff and Adams (1900). It is not exposed in the Blocker quadrangle. Outcrops of this formation in the adjoining McAlester district consist mostly of light to dark gray, sandy, micaceous shale containing fragmental plant material and interbedded with sandstone. The sandstone is highly variable in character, both from bed to bed and within a single bed. In most exposures it is brown, fine-grained, highly micaceous, contains plant fragments, and is irregularly bedded; however, locally it may be coarse-grained, white, and massive to thick-bedded. The portion of the Atoka Formation that crops out in the McAlester district is about 2000 feet (610 m) thick (Hendricks, 1937).

The Hartshorne Formation is the basal unit of the Desmoinesian Series. There are no surface exposures in the Blocker quadrangle. It is probably conformable with the underlying Atoka Formation (Dane, et al, 1938; Hendricks, 1937; Knechtel, 1948). However, a sharp and irregular contact between the Hartshorne and Atoka Formations in areas east of the McAlester mining district has lead some observers to conclude that a minor unconformity separates them, at least locally (Hendricks, 1939; Dane, et al, 1938; Branson, 1962). The contact between the Hartshorne Formation and the overlying McAlester Formation is conformable (Hendricks, 1937, 1939).

The boundaries of the Hartshorne Formation have been modified several times since the unit was first mapped by H. M. Chance in 1890. Then called the "Tobucksy" Sandstone, the formation was renamed the Hartshorne Sandstone by Taff in 1899. Early workers limited the formation to the massive sandstones and the Hartshorne (Lower Hartshorne) coal; the Upper Hartshorne coal and underlying shale were included in the overlying McAlester Formation. However, Oakes and Knechtel (1948) recognized a convergence of the Upper and Lower Hartshorne coals in northern LeFlore and eastern Haskell Counties, and redefined the Hartshorne Formation to include both coals. The Hartshorne coal, undivided to the north, splits into Upper and Lower Hartshorne coals along a northeast-southwest trending line. This split line cuts across the northern part of the Blocker quadrangle (Plate 14); the line represents the approximate 1 foot (0.3 m) interburden contour. The presently used definition of the Hartshorne Formation is one proposed by McDaniel (1961), which supports the boundaries suggested by Oakes and Knechtel (1948), but formally divides the formation into upper and lower members where applicable (based on the above mentioned coal "split line").

The Hartshorne Formation is highly variable in character and thickness throughout the Quinton-Scipio district. Subsurface data from gas fields in the Blocker quadrangle generally confirm characteristics described from sufface exposures in the McAlester and Howe-Wilburton districts (Dane, et al, 1938). The sands are fine-grained, white to light gray, silty and micaceous; the shales are gray and sandy. Plant fossils are abundant, especially in the intervening shales, where surface sections have been described. The lower sandstone is massive and persistent; the middle shale and upper sandstone are variable in thickness and frequently intergrade laterally. Thickness of the Hartshorne sandstones with intervening shale averages 125 feet (38 m) to 326 feet (99 m) in the gas fields of the Blocker quadrangle (Dane, et al, 1938). The total formation thickness is approximately 5 to 100 feet (1.5 to 30 m) greater with the addition of the Upper Hartshorne coal and its underlying shale.

The McAlester Formation averages about 1900 to 2400 feet (579 to 732 m) thick in the McAlester district. It thins to an average between 1600 and 2000 feet (488 to 610 m) in the Quinton-Scipio district. Only small exposures of the uppermost shale member may be found in the Blocker quadrangle. Contact with the underlying Hartshorne Formation is considerable to be gradational and conformable. Thinning of the formation appear to reflect compaction of the shales, but is partly due to the unconformity with the overlying Savanna Formation (Hendricks, 1937). The McAlester Formation consists basically of shale units alternating with several persistent sandstone members. In the

Blocker quadrangle, this formation may be subdivided into three parts: upper and lower divisions consisting primarily of shale and a middle division containing three relatively prominent sandstones.

The lowermost unit of the McAlester Formation is the McCurtain Shale Member (Plate 3). Average thickness for this member, estimated from well log information, is 500 feet (152 m) in the Blocker quadrangle. The McCurtain Shale is a brown or dark gray clay-shale with numerous siderite concretions and a few thin local sandstones. One persistent sandstone with an associated local coal occurs approximately 200 feet (61 m) above the base of the shale.

The middle subdivision of the McAlester Formation averages roughly 500 feet (152 m) in thickness. In ascending order, it includes the Warner Sandstone Member, an unnamed shale, the Lequire Sandstone Member, an unnamed shale, and the Cameron Sandstone Member. The shale units range from light gray and sandy to dark gray and carbonaceous, and are generally lighter and more sandy than those of the upper or lower subdivision of the McAlester Formation. The three sandstone members are buff, fine-grained, massive to thinly and regularly bedded, and ripple-marked (Hendricks, 1937). Thin local coals may be found in the shale just above the sandstone units. The local coal above the Lequire Sandstone is commonly noted in the subsurface of the Blocker quadrangle (Plate 3).

In the Quinton-Scipio coal district the upper portion of the McAlester Formation consists of the following units, in ascending order: an unnamed shale (containing the Lower McAlester coal, Upper McAlester coal and a local coal), the Tamaha Sandstone Member (not distinguished as a unit in the Blocker quadrangle), an unnamed shale member, the Keota Sandstone Member, and the upper McAlester unnamed shale unit. Thickness of the upper portion averages

900 feet (274 m) in the eastern part of the Quinton-Scipio district (Dane, et al, 1939). Well logs indicate roughly 600 feet (183 m) of thickness in the Blocker quadrangle. These upper shales are generally logged as blue or light-colored. From outcrops in the McAlester district, the shales associated with the McAlester coals and those above the Keota Sandstone are described as dark, carbonaceous, and containing plant fragments or marine and brackish invertebrate fossils. Occasionally, one or more thin fossiliferous limestones are described from these intervals (Hendricks, 1937). The Tamaha and Keota Sandstone Members are discontinuous or lenticular units; each is made up of one to three thin sandstone beds that may thicken and unite or intergrade with sandy shale.

The oldest strata exposed in the Blocker quadrangle are from the Savanna Formation, occurring as a series of alternating shale and sandstone bands across the southeast quarter of the quadrangle (Dane, et al, 1938). Within the sequence may be found thin local coal seams and thin, discontinuous, fossiliferous limestones. The Savanna sandstones form the crest of the Flowery Mound, Kinta, and Burning Springs anticlines (Plate 1).

Sandstones predominate in the lower half of the Savanna Formation. They are highly variable in character from place to place. The upper, more lenticular, sandstones seldom exceed 20 feet (6 m) in thickness; these may be massive or strongly cross-bedded, gray, yellow, or white, gritty, coarse to fine-grained, quartzose, with abundant grains or white chert. Some of these thicker sandstones occur as lumps or masses formed as rolled lenses or in concentric sheets. Thinner beds average a foot in thickness (0.3 m) and vary from massive to platy or thin-bedded; these thinner beds may contain marine invertebrate casts or plant fragments. They frequently occur as a unit interbedded with sandy clay or shale.

More than half of the Savanna Formation consists of blocky, drab gray or greenish-yellow, sandy, micaceous clay containing small siderite concretions, or gray to black carbonaceous shale. Thin fossiliferous limestone beds also occur in some shaly horizons between sandstones within the lower half of the formation.

The nature of the contact between the Savanna and McAlester Formations is not well exposed in the Blocker quadrangle. It is believed to be irregular and to represent an unconformity, as in the McAlester district (Dane, et al, 1938; Hendricks, 1937).

The Boggy Formation is the upper unit of the Krebs Group in the Desmoinesian Series. It lies conformably on the Savanna Formation and is the youngest and most extensive Pennsylvanian unit exposed in the Blocker quadrangle. The base of the Boggy is defined to be the base of the Bluejacket Sandstone or its equivalent (Russell, 1960). The formation is predominantly shale, but it contains a number of distinct sandstone beds, or zones in which sandstone predominates. Some of these zones are as much as 100 feet thick (Dane, et al, 1938). Where dips are gentle, these sandstones are to poorly defined for topographic expression or precise stratigraphic correlation; they are characterized by lenticularity and lateral changes in lithology. Thicker sandstone beds may be massive or may exhibit cross-bedding, contortion, or deformation of bedding; two units may unite to become a single bed. Steeply dipping Boggy sandstones form topographic ridges that define the Flowery Mound and Kinta anticlines and the Panther Mountain and Talawanda synclines (Plate 1).

The lower 200 to 300 feet (61 to 92 m) of the Boggy Formation consist predominantly of dark gray to black even-bedded shale with thin local sandstones. Above this is a sandstone zone 100 to 150 feet (30 to 45 m) thick which contains a thin unnamed coal bed that has been mined locally in the past. From 50 to 125 feet (15 to 38 m) above this sandstone zone is a minable coal, the Secor coal (Dane, et al, 1938). The Secor is overlain by black shale that is locally limy and fossiliferous. The dark shale grades upward through sandy shales into a bedded sandstone that is 5 to 10 feet (1.5 to 3.0 m) thick. A thin coal bed occurs on top of this sandstone or within the shales a few feet above it. The upper part of the Boggy Formation has been removed by erosion, and surface weathering makes it difficult to determine or correlate strata very much higher in sequence above the Secor coal.

Quaternary deposits overlie the eroded surface of the Boggy and Savanna Formations occupying most of the stream valleys and flood plain areas. The alluvium is a gray sandy silt ranging in thickness from a few inches at the edges of floodplains to over 25 feet (7 m) where stream channels have cut down into the deposit (Dane, et al, 1938). Portions of Lake Eufaula now cover much of the western third of the Blocker quadrangle, in valleys formerly occupied by Mathuldy and Ash creeks (Plate 1).

Structure

The Blocker quadrangle is located in the southeastern corner of the Quinton-Scipio mining district and adjoins the northwestern corner of the Howe-Wilburton district (Dane, et al, 1938). These areas lie within the Arkoma Basin, a larger zone of folded Pennsylvanian rocks that are characterized in the study area by broad, shallow synclines and narrow anticlines (Dane, et al 1938; Russell, 1960). The axes of these structures are commonly en echelon, and in general are parallel to the frontal margin of the adjacent Ouachita salient marked by the Choctaw fault. Major surface structures in the Blocker quadrangle are shown on Plate 1.

Structural axes in the region trend east-northeast. Steepness of folding in the Quinton-Scipio district increases towoard the south and east. Anticlines are relatively asymmetrical with the steeper dips occurring on the north flank. The distance between anticlinal and adjacent synclinal axes is generally greater on the north than on the south side of the anticline. Synclines are broad and shallow, and the precise location of their axes is generally difficult to determine. Surface evidence of faulting has been observed at many localities, but displacement and lateral extent appear to be small (Dane, et al, 1938).

COAL GEOLOGY

Several major coal beds have been identified in the Blocker quadrangle. They include in ascending order: the Hartshorne coal bed and its lower and upper splits, two unnamed local coals, the Lower McAlester (Stigler) coal bed, and the Upper McAlester (Stigler Rider) coal bed. In addition to these are several other minor local coals and the Secor coal, which is the only coal seam mined to any appreciable extent in this area of study.

Hartshorne Coal Bed and Upper and Lower Splits

There are no surface exposures of the Hartshorne coals in the Blocker quadrangle. These coals have been identified, thickness estimated, and structure surface determined entirely from wireline well-log data (Plates 3, 18, 19). The Hartshorne coals occur at or near the top of the Hartshorne Sandstone Formation. The split line for the Hartshorne coal runs roughly east-west across the lower portion of the north half of the quadrangle. North of this line only one coal seam is present; south of it the seam is split into Upper and Lower Hartshorne coals. The overburden and the thickness of the interburden between the upper and lower coal seams are shown on Plate 20. The interburden ranges from 0 at the split line to more than 120 feet (36 m).

The Hartshorne coal is generally thicker than either the upper or lower coal bed (Plate 18); isopach estimated measurements average 4 to 5 feet (1.2 to 1.8 m), with local thickening up to 7 feet (2 m) in one location. Estimated measurements of both the upper and lower Hartshorne coal splits range between 0 to 4 feet (1.2 m). The lower Hartshorne split is usually thicker where both beds occur.

Several areas in the southern portion of the Blocker quadrangle (Plate 19) indicate relatively sudden thinning or absence of one or both coal splits. These areas may be a result of erratic coal development, local faulting, or removal by channel sand development; to determine this would require more detailed investigation than this report offers.

An unnamed local coal occurs between the Upper and Lower Hartshorne coal splits (Plate 3) bordering an area of local thinning of the Upper Hartshorne coal split. Further investigation may reveal a structural or stratigraphic relationship between the Upper Hartshorne and this local coal.

Unnamed Local Coal Beds

Three local coal beds occur in the McAlester Formation below the Lower McAlester coal (Plate 3). These coals have been defined from well log data.

Two are areally persistent, average approximately 2 feet (0.6 m) in thickness, and attain a maximum thickess of 3 feet (0.9 m) or more. The lower of these two coals occurs in a thin sandy zone or above a thin, intermittent sandstone near the center of the McCurtain shale member. At one isolated data point, a second local coal occurs in the lower part of the McCurtain shale; it is encountered approximately 136 feet (41 m) above the Hartshorne Formation. The upper coal is found at the base of the shale overlying the Lequire Sandstone Member, or within the upper sandy shale portion of the Lequire. This latter coal may split or be associated with another minor local coal in Sec. 1 and 12, T7N, R16E (Plate 3).

Upper and Lower McAlester Coal Beds

The Upper and Lower McAlester coal beds are not found at the surface in the Blocker Quadrangle; estimated thickness and depth have been derived from wireline well log data. The Lower McAlester (Stigler) coal bed is present in all wells for which that stratigraphic interval was logged. Estimated coal thickness ranges from less than 2 feet (0.6 m) to greater than 6 feet (1.8 m) (Plates 3, 12).

The Upper McAlester coal is laterally discontinuous. There are two areas of local thickening where the coal interval appears greater than 2 feet (0.6 m). The coal is usually 1 foot or less in thickness, and appears to be absent in some well logs. Where this coal is not indicated by a density log, the same stratigraphic horizon may be identified on an electric log. In this way, the approximate interburden between the Lower and Upper McAlester coal beds is readily recognized, and this interval maintains a thickness of approximately 30 feet (0.9 m) throughout the Blocker quadrangle (Plates 3, 11).

Unnamed Local Coal Beds, Upper McAlester Formation

A local coal occurs approximately 100 feet (30 m) above the Lower McAlester (Stigler) coal bed. This seam most commonly occurs where the Upper McAlester coal bed is absent. Maximum thickness is estimated at 4 feet (1.2 m) in Section 28, T7N, R17E (Plate 3).

Another thin local coal is associated with the Keota Sandstone Member or is found in shales above this sandy horizon. The maximum coal thickness may be as much as 3 feet (0.9 m) (Plate 3).

Unnamed Local Coal Beds, Savanna Formation

Numerous local coals within the Savanna Formation are exposed in the McAlester coal district southwest of the Blocker quadrangle; two of these were mined locally in the Krebs area (Hendricks, 1937). No minable coals have been reported from the Savanna Formation in the Blocker area, but one thin coal is encountered in the subsurface (Plate 3). This may be the same local coal defined by prospect pit locations on Plate 1. It occurs 50 to 75 feet (15 to 23 m) below the Secor in T6N, R16 and 17E, and approximately 150 feet (46 m) below the Secor in T7N, R16E (Dane, et al, 1938). These locations were mined for local use in the early 1900's.

Secor Coal Bed

The Secor Coal is exposed along the flanks of the Kinta anticline and Panther Mountain syncline in the central and southern part of the Blocker quadrangle (Plate 1). This coal has been mined on a relatively small scale, generally by stripping, at a number of sites in the outcrop area. Mine or borehole measurements indicate that the coal averages 2.5 to 3 or more feet

(0.86 to 0.9 m) thick; it is underlain by gray clay and overlain by black shale (Dane, et al, 1938).

Unnamed Local Coal Bed, Boggy Formation

Near the base of the lower shale unit in the Boggy Formation, a thin local coal is encountered in isolated data points (Plate 3). Another more persistant local coal has been noted at exposures in the Quinton-Scipio district; it occurs 20 to 35 feet (6.1 to 10.7 m) above the Secor coal, at the top of, or a few feet above, a 5 to 10 foot (1.5 to 3.0 m) bedded sandstone (Dane, et al, 1938). This is probably the local coal horizon encountered above the Secor in well logs and borehole data (Plate 3). For the most part it exceeds Reserve Base thickness (Plates 4, 5, and 6), ranging from 0.5 feet up to 2.0 feet thick (0.15 to 0.61 m).

Chemical Analyses of Coal

Chemical analyses were available only for the Secor coal in the Blocker quadrangle. A summary of the analyses available is presented in Table 1. Average analyses are shown here, as well as the range for all samples used to calculate each average value.

The coals are ranked according to Btu/lb, as determined on a moist, mineral-matter-free (mmf) basis. The "as received" Btu/lb values shown on Table 1 were converted to moist mmf Btu/lb figures according to the following formula:

$$\text{Moist mmf Btu/lb} = \frac{\text{As rec'd Btu/lb} - 50\,S}{[100 - (1.08\,A + 0.55\,S)]} \times 100$$

where S = Sulfur, A = Ash

Based on the average Btu/lb shown on Table 1, the Secor coal is classified as high volatile A bituminous coal, with an average 14,313 moist mmf Btu/lb.

Table 1. Average chemical analyses of coal in the Blocker quadrangle, Latimer and Pittsburg counties, Oklahoma

SECOR COAL BED				
ANALYSES %	FORM OF ANALYSIS	# OF SAMPLES	AVERAGE	RANGE
PROXIMATE				
Moisture	A	6	0.7	0.1-2.7
Volatile Matter	A	6	37.4	35.6-38.6
	C	1	39.7	---
Fixed Carbon	A	6	50.3	46.6-53.3
	C	1	47.8	---
Ash	A	6	11.5	9.4-14.7
	C	1	12.5	---
ULTIMATE				
Sulfur	A	6	5.4	4.3-6.7
	C	1	4.5	---
Hydrogen	A	1	5.4	---
	C	1	5.2	---
Carbon	A	1	69.0	---
	C	1	70.9	---
Nitrogen	A	1	1.4	---
	C	1	1.5	---
Oxygen	A	-	7.8	---
	C	1	5.4	---
HEATING VALUE				
Calories	A	1	7,133	---
	C	1	7,333	---
Btu/lb	A		13,215	12,840-13,467
	C	1	13,200	---

Form of Analyses: A = as received, C = moisture-free.

To convert Btu/lb to kj/kg, multiply by 2.32

Source of information: Dane, et al, 1938, and USGS Bore Hole Files.

Isolated Data Points

In instances where single or isolated measurements of coal beds thicker than 1.0 foot (0.3 m) are encountered, the standard criteria for construction of isopach, structure contour, mining ratio, and overburden isopach maps are not available. The lack of data concerning these beds limits the extent to which they can be reasonably projected in any direction, and usually precludes their correlation with other, better known beds. For this reason, isolated data points have been mapped on separate figures for non-isopached coal beds. These figures are not included in this report, but are kept on file at the USGS office in Denver. However, coal reserves from these isolated data points are included in tables 2 and 3, and in the Reserve Base tonnages shown on Plate 2.

All isolated data points in the Blocker quadrangle are measurements of unnamed local coals.

COAL RESOURCES

Data from drill holes, mine measured sections, outcrops, well logs and mine maps were used to construct outcrop, isopach, and structure contour maps of the various coal beds in the Blocker quadrangle (see below). The source of each indexed data point shown on Plate 1 is listed in Appendix I at the end of this report.

A system for classifying coal resources has been published by the U. S. Bureau of Mines and the U.S. Geological Survey, and published in U.S. Geological Survey Bulletin 1450-B (1976). Under this system, resources are classified as either Identified or Undiscovered. Identified Resources are specific bodies of coal whose location, rank, quality and quantity are known from geologic evidence supported by specific measurements, while Undiscovered Resources are bodies of coal which are thought to exist, based on broad geologic knowledge and theory.

Identified Resources may be subdivided into three categories of reliability of occurrence, according to their distance from a known point of coal-bed measurement. In order of decreasing reliability, these categories are: measured, indicated and inferred. Measured coal is that which is located within 0.25 mile (0.4 km) from a measurement point, indicated coal extends 0.5 mile (0.8 km) beyond measured coal to a distance of 0.75 mile (1.2 km) from the measurement point, and inferred coal extends 2.25 miles 3.6 km) beyond indicated coal, or a maximum distance of 3 miles (4.8 km) from the measurement point.

Undiscovered Resources may be either hypothetical or speculative. Hypothetical resources are those undiscovered coal resources that may reasonably be expected to exist in known coal fields under known geologic conditions. They are located beyond the outer boundary of inferred resources (see above) in areas where the coal-bed continuity is assumed, based on geologic evidence. Hypothetical resouces are those more than 3 miles (4.8 km) from the nearest measurement point. There are no hypothetical resources in the Blocker quadrangle.

Speculative resources are Undiscovered Resources that may occur in favorable areas where no discoveries have yet been made. Speculative resources have not been estimated in this report.

Coal resources for the Secor coal, the Upper and Lower McAlester coals, and the Hartshorne coal and its upper and lower splits were calculated using data obtained from their coal isopach maps (Plates 7, 11, 12, and 18 respectively). The coal-bed acreage (measured by planimeter and calculated using the trapezoidal method [modified from Hollo and Fifadara, 1980]) multiplied by the average thickness of the coal bed, and by a conversion factor of 1800 short tons of coal per acre-foot (13,238 metric tons per hectare-meter) for bituminous coal yields to coal resources in short tons. Coal resources tonnages were calculated for Identified Resources in the measured, indicated, and inferred categories, for unleased Federal coal lands. All coal beds thicker than 1 foot (0.305 m) that lie less than 3000 feet (914 m) below the ground surface are included in these calculations. These criteria differ from those stated in U.S. Geological Survey Bulletin 1450-B, which calls for a minimum thickness of 28 inches (70 cm) and a maximum depth of 1000 feet (305 m) for bituminous coal. Narrow strips between mines where undisturbed coal is less than 75 meters from the nearest mine are considered to have no reserves and are included within mined-out areas. Mine boundaries are only approximately located (as stated in the legend of Plate 1) and therefore these narrow areas may in reality not even exist. For this reason they are considered to have no reason they are considered to have no reserves and have not been planimetered.

Reserve Base and Reserve tonnages for the above mentioned coal beds are shown on Plates 10, 16, 17, 22 and 23, and have been rounded to the nearest 10,000 short tons (9,072 metric tons). In this report, Reserve Base coal is the gross amount of Identified Resources that occurs in beds 1 foot (0.3 m) or more thick and under less than 3,000 feet (914 m) of overburden. Reserves are the recoverable part of the Reserve Base coal. In the southeastern Oklahoma coal field, a recovery factor of 80 percent is applied toward and a surface-minable coal and a recovery factory of 50 percent is applied toward subsurface-minable coal. No recovery factor is applciable for in-situ coal gasification methods.

The total tonnage per section for Reserve Base coal, including both surface and subsurface-minable coal, is shown in the northwest corner of the Federal coal lands in each section on Plate 2. All values shown on Plate 2 are rounded to the nearest 10,000 short tons (9,072 metric tons), and total approximately 99.22 million short tons (90.01 million metric tons) for the entire quadrangle, including tonnages in the isolated data points. Reserve Base tonnages from the various development potential categories for surface and subsurface mining and in-situ coal gasification methods are shown in tables 2 and 3.

The authors have not made any determination of economic recoverability for any of the coal beds described in this report.

COAL DEVELOPMENT POTENTIAL

Coal development potential areas are drawn to coincide with the boundaries of the smallest legal land subdivisions shown on Plate 2. In sections or parts of sections where no land subdivisions have been surveyed by the BLM, approximate 40-acre (16-hectare) parcels have been used to show to limits of the high, moderate, or low development potentials. A constraint imposed by the BLM specifies that the highest development potential affecting any part of a 40-acre (16-hectare) lot, tract, or parcel be applied to that entire lot, tract, or parcel. For example, if 5 acres (2 hectares) within a parcel meet the criteria for a high development potential; 25 acres (10 hectares), a moderate development potential; and 10 acres (4 hectares), a low development potential; then the entire 40 acres (16 hectares) are assigned a high development potential. For purposes of this report, any lot or tract assigned a coal development potential contains coal in beds with a nominal minimum areal extent of 1 acre (0.4 hectare).

Development Potential for Surface Mining Methods

Areas where the coal beds of Reserve Base thickness are overlain by 150 feet (46 m) or less of overburden are considered to have potential for surface mining and are assigned a high, moderate, or low development potential based on their mining ratios (cubic yards of overburden per ton of recoverable coal). The formula used to calculate mining ratios for surface mining of coal is as follows:

$$MR = \frac{t_o\ (cf)}{t_c\ (rf)}$$

where MR = mining ratio

t_o = thickness of overburden in feet
t_c = thickness of coal in feet
rf = recovery factor (80 percent for this quadrangle)
cf = conversion factor to yield MR value in terms of cubic yards of overburden per short tons of recoverable coal:

0.896 for bituminous coal

Note: To convert mining ratio to cubic meters of overburden per metric ton of recoverable coal, multiply MR by 0.8428.

Areas of high, moderate, and low development potential for surface mining methods are defined as areas underlain by coal beds having respective mining ratio values of 0 to 10, 10 to 15, and greater than 15. These mining ratio values for each development potential category are based on economic and technological criteria and were provided by the U.S. Geological Survey.

Areas where the coal data are absent or extremely limited between the 150-foot (46 m) overburden line and the coal outcrop are assigned unknown development potential for surface mining methods. This applies to areas where coal beds 1.0 foot (0.305 m) or more thick are not known but may occur, and to those areas influenced by isolated data points. Limited knowledge pertaining to the areal distribution, thickness, depth and attitude of the coals in these areas prevents accurate evaluation of development potential in the high, moderate, or low categories. The areas influenced by isolated data points in this quadrangle contain approximately no coal available for surface mining.

The coal development potential for surface mining methods is shown on Plate 24. Of Federal coal land not subject to currently outstanding coal lease, permit, license or preference right lease application having a known development potential for surface mining, 16 percent is rated high, 6 percent is rated moderate, and 22 percent is rated low. The remaining Federal lands (56 percent) is classified as having no development potential for surface mining methods.

Development Potential for Subsurface Mining and In-Situ Coal Gasification Methods

Areas considered to have a development potential for conventional subsurface mining methods are those areas where the coal beds of Reserve Base thickness are between 150 and 3,000 feet (46 to 914 m) below the ground surface and have dips of 15° or less. Unfaulted coal beds lying between 150 and 3,000 feet (46 and 914 m) below the ground surface, dipping greater than 15°, are considered to have a development potential for in-situ coal gasification methods.

Areas of high, moderate, and low development potential for conventional subsurface mining methods are defined as areas underlain by coal beds at

Table 2. Coal Reserve Base data for surface mining methods for Federal coal land (in shorton tons) in the Blocker Quadrangle, Pittsburg and Latimer counties, Oklaloma.

Coal Bed or Coal Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Unnamed (local)	60,000	60,000	550,000	670,000
Secor	840,000	1,030,000	6,060,000	7,930,000
Upper McAlester	—	—	—	—
Lower McAlester	—	—	—	—
Upper Hartshorne	—	—	—	—
Hartshorne	—	—	—	—
Lower Hartshorne	—	—	—	—
Isolated Data Points	—	—	—	—
Totals	900,000	1,090,000	6,610,000	8,600,000

depths ranging from 150 to 1,000 feet (46 to 305 m), 1,000 to 2,000 feet (305 to 610 m), and 2,000 and 3,000 feet (610 to 914 m), respectively.

Areas where the coal data are absent or extremely limited between 150 and 3,000 feeet (46 to 914 m) below the ground surface are assigned unknown development potentials. This applies to areas where coal beds of Reserve Base thickness are not known, but may occur, and to those areas influenced by isolated data points. The areas influenced by isolated data points in this quadrangle contain approximatlely 3.03 million short tons (2.75 million metric tons) of coal available for conventional subsurface mining.

The coal development potential for conventional subsurface mining and in-situ gasification methods is shown on Plate 25. Of the Federal land areas having a known development potential for conventional subsurface mining methods, 87 percent is rated high, 13 percent are rated moderate, and none is rated low. No Federal land in the quadrangle is classified as having unknown or no development potential for either conventional subsurface mining or in-situ gasification methods.

Based on criteria provided by the U.S. Geological Survey, coal beds of Reserve Base thickness dipping between 15° and 35°, regardless of tonnage, have a low development potential for in-situ coal gasification methods. Beds dipping from 35° to 90°, with a minimum of 50 million tons of coal in a single unfaulted bed or multiple, closely spaced, approximately parallel beds have a moderate development potential for in-situ coal gasification methods. Coal lying between the 150-foot (46 m) overburden isopach and the outcrop is not included in total coal tonnages available because it is needed for cover and containment in the in-situ process. There is no development potential for in-situ coal gasification in the Blocker quadrangle.

Table 3. Coal Reserve Base data for subsurface mining and in-situ gasification methods for Federal coal land (in short tons) in the Blocker Quadrangle, Pittsburg and Latimer counties, Oklahoma.

Coal Bed or Coal Zone	High Subsurface Development Potential	Moderate Subsurface Development Potential	Low Subsurface Development Potential	Low In-Situ Development Potential	Unknonwn Development Potential	Total
Unnamed Local	140,000	—	—	—	—	140,000
Secor	22,500,000	—	—	—	—	22,500,000
Upper McAlester	—	180,000	230,000	—	—	410,000
Lower McAlester	—	27,140,000	8,330,000	—	—	35,470,000
Upper Hartshorne	—	—	12,240,000	—	—	12,240,000
Hartshorne	—	—	4,680,000	—	—	4,680,000
Lower Hartshorne	—	—	12,150,000	—	—	12,150,000
Isolated Data points	—	—	—	—	3,030,000	3,030,000
Totals	22,640,000	27,320,000	37,630,000	—	3,030,000	90,620,000

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APPENDIX I. SOURCE AND RELIABILITY OF DATA USED ON PLATE 1.

Listed below is a point by point accounting as to the source and reliability of all information shown on Plate 1. Also presented are any notes or comments pertaining to individual data points.

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	C SE	Location					x	Long & Atteberry, Inc.,	KB = 15'
	Section 4	Overburden					x	1974, Browne #1-4	
1	T 7 N | R 16 E	Coal Thickness			x				
	N/2 SW	Location					x	Apexco, Inc., 1976, Sarkeys	Have DIL log & densilog
	Section 12	Overburden					x	#1	KB = 8'
2	T 7 N | R 16 E	Coal Thickness			x				
	C SE	Location					x	Estoril Prod. Corp., #1	CFD & IEL logs
	Section 1	Overburden					x	John Daniel, 1977	KB = 13.5'
3	T 7 N | R 16 E	Coal Thickness			x				
	C NE	Location					x	Apexco, 1977, Davenport #1	KB = 8' above GL
	Section 7	Overburden					x		DIL, GRN logs.
4	T 7 N | R 17 E	Coal Thickness			x				
	S/2 NW	Location					x	R.L. Davenport #1-8, 1977,	Log top, 260. KB = 10'
	Section 8	Overburden					x	Nelson Petro.	
5	T 7 N | R 17 E	Coal Thickness			x				
	C NE	Location					x	Potts-Stephenson, 1-8	CFD, DIL, E logs. KB = 13'
	Section 8	Overburden				x		Stanfield, 1979	
6	T 7 N | R 17 E	Coal Thickness				x			
	C NE	Location					x	Transok, 1975, Browne #1	IGR & CFD logs. KB = 14'
	Section 9	Overburden					x	(9)	
7	T 7 N | R 17 E	Coal Thickness			x				
	S/2 NW	Location					x	Nelson Petrol., #1-10	1120 FSL, 1320 FWL. DIL,
	Section 10	Overburden				x		Browne, 1976	CFD logs. KB = 9'
8	T 7 N | R 17 E	Coal Thickness				x			
	SW NW	Location					x	Nelson Petrol., #1 C.M.	DIL, CFD logs. KB = 9'
	Section 15	Overburden				x		Taylor, 1976	
9	T 7 N | R 17 E	Coal Thickness				x			
	SE SW	Location				x		Nelson Petrol., Clara	DIL, CFD logs. KB = 9'
	Section 15	Overburden				x		Featherston #1-15, 1976	
10	T 7 N | R 17 E	Coal Thickness				x			
	C SW	Location					x	Quanah Co., Davenport #2,	Logs: IE Densilog (large
	Section 16	Overburden					x	1975	scale). KB = 7'
11	T 7 N | R 17 E	Coal Thickness			x				

DATE POINT #	LOCATION	INCREASING RELIABILITY	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SW SE	Location					x	Nelson Petrol., #1 Moody,	CFD, DIL - partial logs
	Section 17	Overburden		x				1976	only. KB = 9'
12	T 7 N | R 17 E	Coal Thickness		x					
	SE SW	Location					x	Quanah Oil Co., #1 Cochran,	IEL, CFD logs. UH & LH -
	Section 17	Overburden				x		1975	CNI. KB = 7'
13	T 7 N | R 17 E	Coal Thickness				x			
	SE SE	Location					x	Quanah Co., Harmon D #1-18,	IEL, Densilog. UH - CHI.
	Section 18	Overburden				x		1976	KB = 7'
14	T 7 N | R 17 E	Coal Thickness				x			
	NE SE	Location			x			Dane, et al, 1938, Plates	Data estimated by measuring
	Section 21	Overburden		x				13, 20 and p. 207, 209.	correlation section on
15	T 7 N | R 17 E	Coal Thickness		x				Bore Hole #53	Plate 20.
	W/2 NW	Location			x			Dane, et al, 1938, Plates	Data estimated by measuring
	Section 21	Overburden		x				13, 20 and p. 207, 209.	correlation section, Plate
16	T 7 N | R 17 E	Coal Thickness		x				Bore Hole #52	20.
	SE NW	Location					x	Okla. Nat. Gas, Burr #4,	IE & Densilog. KB = 8'
	Section 20	Overburden					x	1977	UH - CNI
17	T 7 N | R 17 E	Coal Thickness				x			
	NE SE	Location			x			Dane, et al, 1938, Plates	
	Section 19	Overburden		x				13, 20 and p. 207, 209.	
18	T 7 N | R 17 E	Coal Thickness		x				Bore Hole #51	
	NE SE	Location					x	Quanah Co., Leitrum #1,	KB = 7'. IEL only
	Section 19	Overburden					x	1972	
19	T 7 N | R 17 E	Coal Thickness			x				
	NW NE	Location					x	Quanah Co., #1 Blocker Town	DIL, FDC/CNL. GR logs.
	Section 24	Overburden				x		Site, 1979	KB = 8'
20	T 7 N | R 16 E	Coal Thickness				x			
	SE NW	Location					x	W.P. Lerblance, Lee #1,	CDL, I-E logs. KB = 12'
	Section 24	Overburden					x	1978	
21	T 7 N | R 16 E	Coal Thickness			x				
	SW NE	Location					x	Quinton Spelter, #1 Brown,	Also in Dane, et al, 1938,
	Section 23	Overburden				x		1924	Bore Hole #50, pl. 13 & 20.
22	T 7 N | R 16 E	Coal Thickness			x				
	NW SW	Location				x		USGS files, Bore Hole #44,	Also on Blocker KRCRA Map,
	Section 23	Overburden					x	9/14/55	1978
23	T 7 N | R 16 E	Coal Thickness				x			
	NW SW	Location				x		USGS files, 1955, Bore Hole	Location from Blocker KRCRA
	Section 23	Overburden					x	C-2	Map, 1978.
24	T 7 N | R 16 E	Coal Thickness					x		

DATE POINT #	LOCATION	INCREASING RELIABILITY	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NW SW	Location				x		USGS files, Bore Hole #45,	Also on Blocker KRCRA Map,
	Section 23	Overburden					x	9/14/55	1978.
25	T 7 N | R 16 E	Coal Thickness				x			
	NW SW	Location				x		USGS files, Bore Hole #41,	Also on Blocker KRCRA Map,
	Section 23	Overburden			x			9/12/55	1978.
26	T 7 N | R 16 E	Coal Thickness			x				
	NE SE	Location				x		USGS files, Bore Hole #46,	Also on Blocker KRCRA Map,
	Section 22	Overburden					x	9/14/55	1978.
27	T 7 N | R 16 E	Coal Thickness				x			
	NE SE	Location				x		USGS files, Bore Hole #47,	Also on Blocker KRCRA Map,
	Section 22	Overburden					x	9/15/55	1978.
28	T 7 N | R 16 E	Coal Thickness				x			
	NE SE	Location				x		USGS files, Bore Hole #43,	Also on Blocker KRCRA Map,
	Section 22	Overburden					x	9/12/55	1978.
29	T 7 N | R 16 E	Coal Thickness				x			
	SE NE	Location				x		USGS files, Bore Hole #54,	Also on Blocker KRCRA Map,
	Section 22	Overburden			x			9/20/55	1978.
30	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #55,	Also on Blocker KRCRA Map,
	Section 22	Overburden			x			9/20/55	1978.
31	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #56,	Also on Blocker KRCRA Map,
	Section 22	Overburden			x			9/21/55	1978.
32	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #57,	Also on Blocker KRCRA Map,
	Section 22	Overburden			x			9/21/55	1978.
33	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #58,	Also on Blocker KRCRA Map,
	Section 22	Overburden			x			9/22/55	1978.
34	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #59,	Also on Blocker KRCRA Map,
	Section 22	Overburden			x			9/22/55	1978.
35	T 7 N | R 16 E	Coal Thickness			x				
	SW NE	Location					x	BLM Emria Project, 1979,	Coal intervals subject to
	Section 22	Overburden			x			Bore Hole #DH-AB-3	question. Loc. scaled on
36	T 7 N | R 16 E	Coal Thickness			x				topo. sheet.
	SW NE	Location				x		USGS files, Bore Hole #60,	
	Section 22	Overburden			x			9/23/55.	
37	T 7 N | R 16 E	Coal Thickness			x				

DATA POINT #	LOCATION		INCREASING RELIABILITY	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NE NE		Location				x		USGS files, 1955, Bore Hole	Map location from Blocker
	Section 22		Overburden					x	#C-1	KRCRA Map, 1978.
38	T 7 N	R 16 E	Coal Thickness					x		
	SE SE		Location				x		USGS files, Bore Hole #61,	Also on Blocker KRCRA Map,
	Section 15		Overburden			x			9/23/55	1978.
39	T 7 N	R 16 E	Coal Thickness			x				
	SW SW		Location				x		USGS files, Bore Hole #53,	Also on Blocker KRCRA Map,
	Section 14		Overburden			x			9/19/55	1978.
40	T 7 N	R 16 E	Coal Thickness			x				
	SW SW		Location				x		USGS files, Bore Hole #52,	Also on Blocker KRCRA Map,
	Section 14		Overburden		x				9/19/55	1978.
41	T 7 N	R 16 E	Coal Thickness			x				
	NW NW		Location				x		USGS files, Bore Hole #51,	Also on Blocker KRCRA Map,
	Section 23		Overburden			x			9/16/55	1978.
42	T 7 N	R 16 E	Coal Thickness			x				
	NW NW		Location				x		USGS files, Bore Hole #50,	Also on Blocker KRCRA Map,
	Section 23		Overburden			x			9/15/55	1978.
43	T 7 N	R 16 E	Coal Thickness			x				
	SW NW		Location				x		USGS files, Bore Hole #48,	Also on Blocker KRCRA Map,
	Section 23		Overburden			x			9/15/55	1978.
44	T 7 N	R 16 E	Coal Thickness			x				
	SW NW		Location				x		USGS files, Bore Hole #49,	Also on Blocker KRCRA Map,
	Section 23		Overburden			x			9/15/55	1978.
45	T 7 N	R 16 E	Coal Thickness			x				
	NW SW		Location				x		USGS files, Bore Hole #42,	Also on Blocker KRCRA Map,
	Section 23		Overburden			x			9/12/55	1978.
46	T 7 N	R 16 E	Coal Thickness				x			
	NW SE		Location					x	Steve Gose, Browne #1, 1961	KB = 11'
	Section 28		Overburden					x		
47	T 7 N	R 16 E	Coal Thickness			x				
	C NE		Location					x	Dyco Petrol., F. Browne	KB = 6'. Secor behind CSG
	Section 27		Overburden					x	#1-27, 1974	HAve CFD, IE logs.
48	T 7 N	R 16 E	Coal Thickness			x				
	C SW		Location					x	Okla. Nat. Gas Co., Browne	KB = 11'
	Section 26		Overburden					x	#1, 1970	
49	T 7 N	R 16 E	Coal Thickness			x				
	NW NW		Location				x		USGS files, Bore Hole #40,	
	Section 26		Overburden			x			9/12/55	
50	T 7 N	R 16 E	Coal Thickness			x				

DATA POINT #	LOCATION	INCREASING RELIABILITY	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NW NW	Location				x		USGS files, Bore Hole #39,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/12/55	1978.
51	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #38,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/9/55	1978.
52	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #37,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/9/55	1978.
53	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #36,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/9/55	1978.
54	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #35,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/9/55	1978.
55	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #34,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/9/55	1978.
56	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #33,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/8/55	1978.
57	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #32,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/8/55	1978.
58	T 7 N | R 16 E	Coal Thickness			x				
	NW NE	Location	-	-	-	-	-	USGS files, Bore Hole #31,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				9/8/55	1978.
59	T 7 N | R 16 E	Coal Thickness			x				
	SW SE	Location		x				USGS files, Bore Hole #29,	Log location is sec. 24,
	Section 23	Overburden			x			9/8/55	KRCRA Map location is Sec.
60	T 7 N | R 16 E	Coal Thickness		x					23.
	SW SE	Location			x			USGS files, Bore Hole #30,	Also on Blocker KRCRA Map,
	Section 23	Overburden		x				9/8/55	1978.
61	T 7 N | R 16 E	Coal Thickness			x				
	NE NW	Location				x		USGS files, Bore Hole #C-3,	Also on Blocker KRCRA Map,
	Section 26	Overburden					x	1955	1978.
62	T 7 N | R 16 E	Coal Thickness					x		
	NW NE	Location				x		USGS files, Bore Hole #1,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/21/55	1978.
63	T 7 N | R 16 E	Coal Thickness			x				

DATE POINT #	LOCATION	INCREASING RELIABILITY	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SW NE	Location				x		USGS files, Bore Hole #2,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/22/55	1978.
64	T 7 N | R 16 E	Coal Thickness			x				
	S 1/2 NE	Location				x		USGS files, Bore Hole #3,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/22/55	1978.
65	T 7 N | R 16 E	Coal Thickness			x				
	SW NE	Location				x		USGS files, Bore Hole #4,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/25/55	1978.
66	T 7 N | R 16 E	Coal Thickness			x				
	SW NE	Location				x		USGS files, Bore Hole #6,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/25/55	1978.
67	T 7 N | R 16 E	Coal Thickness			x				
	SW NE	Location				x		USGS files, Bore Hole #7,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/25/55	1978.
68	T 7 N | R 16 E	Coal Thickness			x				
	SW NE	Location				x		USGS files, Bore Hole #8,	Also on Blocker KRCRA Map,
	Section 26	Overburden		x				7/26/55	1978.
69	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #10,	Also on Blocker KRCRA Map,
	Section 26	Overburden					x	7/26/55	1978.
70	T 7 N | R 16 E	Coal Thickness				x			
	SE NE	Location				x		USGS files, Bore Hole #9,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/26/55	1978.
71	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #5,	Also on Blocker KRCRA Map,
	Section 26	Overburden			x			7/25/55	1978.
72	T 7 N | R 16 E	Coal Thickness			x				
	SE NE	Location				x		USGS files, Bore Hole #C-4,	Also on Blocker KRCRA Map,
	Section 26	Overburden					x	1955	1978.
73	T 7 N | R 16 E	Coal Thickness					x		
	NW NW	Location				x		USGS files, Bore Hole #17,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			8/31/55	1978.
74	T 7 N | R 16 E	Coal Thickness			x				
	NW NW	Location				x		USGS files, Bore Hole #16,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			8/31/55	1978.
75	T 7 N | R 16 E	Coal Thickness			x				
	NW NW	Location				x		USGS files, Bore Hole #15,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			8/31/55	1978.
76	T 7 N | R 16 E	Coal Thickness			x				

DATE POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SW NW	Location				x		USGS files, Bore Hole #14,	Also on Blocker KRCRA Map,
	Section 25	Overburden		x				8/30/55	1978.
77	T 7 N | R 16 E	Coal Thickness			x				
	SW NW	Location				x		USGS files, Bore Hole #13,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			8/30/55	1978.
78	T 7 N | R 16 E	Coal Thickness			x				
	SW NW	Location				x		USGS files, Bore Hole #12,	Also on Blocker KRCRA Map,
	Section 25	Overburden					x	8/30/55	1978.
79	T 7 N | R 16 E	Coal Thickness				x			
	SW NW	Location				x		USGS files, Bore Hole #11,	Also on Blocker KRCRA Map,
	Section 25	Overburden					x	8/29/55	1978.
80	T 7 N | R 16 E	Coal Thickness					x		
	NW NW	Location				x		USGS files, Bore Hole #18,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			8/31/55	1978.
81	T 7 N | R 16 E	Coal Thickness			x				
	NW NW	Location				x		USGS files, Bore Hole #19,	250 ft. E of #18. Also on
	Section 25	Overburden			x			9/1/55	Blocker KRCRA Map, 1978.
82	T 7 N | R 16 E	Coal Thickness			x				
	SE NW	Location				x		USGS files, Bore Hole	Also on Blocker KRCRA Map,
	Section 25	Overburden					x	#C-5, 1955	1978.
83	T 7 N | R 16 E	Coal Thickness					x		
	S/2 N/2	Location				x		USGS files, Bore Hole #22,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			9/1/55	1978.
84	T 7 N | R 16 E	Coal Thickness			x				
	SW NE	Location				x		USGS files, Bore Hole #21,	Also on Blocker KRCRA Map,
	Section 25	Overburden	-	-	-	-	-	9/1/55	1978.
85	T 7 N | R 16 E	Coal Thickness	-	-	-	-	-		
	S/2 N/2	Location				x		USGS files, Bore Hole #20,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			9/1/55	1978.
86	T 7 N | R 16 E	Coal Thickness			x				
	S/2 N/2	Location				x		USGS files, Bore Hole #23,	Also on Blocker KRCRA Map,
	Section 25	Overburden			x			9/1/55	1978.
87	T 7 N | R 16 E	Coal Thickness			x				
	S/2 N/2	Location		x				USGS files, Bore Hole #25,	Coal not reached.
	Section 25	Overburden		x				1978, KRCRA Map	
88	T 7 N | R 16 E	Coal Thickness	-	-	-	-	-		
	N/2 S/2	Location		x				USGS files, Bore Hole #25,	Loc. 400'S of #92, KRCRA
	Section 25	Overburden		x				9/5/55	Map shows loc. 400'N of
89	T 7 N | R 16 E	Coal Thickness			x				#92.

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	N/2 S/2	Location				x		USGS files, Bore Hole #26,	Also on Blocker KRCRA Map,
	Section 25	Overburden		x				9/7/55	1978.
90	T 7 N R 16 E	Coal Thickness			x				
	N/2 S/2	Location			x			USGS files, Bore Hole #27,	
	Section 25	Overburden		x				1978, KRCRA Map	
91	T 7 N R 16 E	Coal Thickness			x				
	N/2 S/2	Location				x		USGS files, Bore Hole #28,	Also on Blocker KRCRA Map,
	Section 25	Overburden					x	9/7/55	1978.
92	T 7 N R 16 E	Coal Thickness	x						
	SE SW	Location					x	BLM Emria Project, 1979,	
	Section 25	Overburden			x			Bore Hole #DH-AD-2	
93	T 7 N R 16 E	Coal Thickness			x				
	SW NW	Location				x		Dane, et al, 1938, Plate 12	Also on Blocker KRCRA Map,
	Section 30	Overburden	-	-	-	-	-	Fig. 9, strip pit meas.	1978.
94	T 7 N R 17 E	Coal Thickness				x		M-13	
	SW NE	Location					x	Tri-State Oil & Gas,	I-GR, SNP & CFD logs.
	Section 30	Overburden					x	Wallace #1, 1975	KB = 19.5'
95	T 7 N R 17 E	Coal Thickness			x				
	NE NE	Location				x		BLM Emria Project, 1979,	
	Section 31	Overburden				x		Bore Hole #DH-AB-1	
96	T 7 N R 17 E	Coal Thickness				x			
	NE SE	Location				x		Dane, et al, 1938, Plate 12	Also on Blocker KRCRA Map,
	Section 29	Overburden	-	-	-	-	-	Fig. 9, mine meas. M-14	1978.
97	T 7 N R 17 E	Coal Thickness				x			
	N/2 SW	Location					x	Arkla. Expl. Co., Buchanan	KB = 9'
	Section 28	Overburden					x	#1-28, 1979	
98	T 7 N R 17 E	Coal Thickness			x				
	NE SW	Location				x		Dane, et al, 1939, Pl. 9,	See Bureau of Mines Tech.
	Section 28	Overburden	-	-	-	-	-	Fig. 9, p. 198-9, 202-3,	Paper 411, 1928, p. 41.
99	T 7 N R 17 E	Coal Thickness				x		mine meas. M-15	M-14 in SW/4
	SE NW	Location					x	Ark. La. Gas., John L.	KB = 12'
	Section 27	Overburden					x	Martin #1, 1964	
100	T 7 N R 17 E	Coal Thickness			x				
	C SW	Location					x	Lerblance, #4 Pruitt,	I-E, CDL & Laser log
	Section 27	Overburden					x	1977	KB = 8'
101	T 7 N R 17 E	Coal Thickness			x				
	NE SE	Location				x		Dane, et al, 1938, Pl. 12,	
	Section 33	Overburden	-	-	-	-	-	Fig. 9, p. 198-99, mine	
102	T 7 N R 17 E	Coal Thickness				x		meas. M-16	

DATA POINT #	LOCATION	INCREASING RELIABILITY	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SE SE	Location					x	Oxley Petrol., Lee Davis	KB = 12'
	Section 33	Overburden					x	#1, 1969	
103	T 7 N R 17 E	Coal Thickness			x				
	SE SE	Location					x	Oxley Petrol., Palmer #1,	I-GR log. KB = 15'
	Section 32	Overburden					x	1970	
104	T 7 N R 17 E	Coal Thickness			x				
	SW NE	Location					x	Humble O & R, Turner	FDL, IEL logs. KB = 19.4',
	Section 32	Overburden					x	Sisters, 1962	LH - CNI
105	T 7 N R 17 E	Coal Thickness			x				
	C SW	Location					x	Mobil, C.H. Cheney Unit No.	IEL & CFD logs. KB = 14'
	Section 31	Overburden					x	1, 1971	(LH - CNI)
106	T 7 N R 17 E	Coal Thickness			x				
	C SW	Location					x	Oxley Petrol, Cochran #1,	I-GR, CFD logs. KB = 15'.
	Section 36	Overburden					x	1973	UH-CNI
107	T 7 N R 16 E	Coal Thickness			x				
	W/2 SE	Location					x	Oxley Petrol., #1 William	1320 FSL, 867 FWL of SE 1/4
	Section 35	Overburden			x			Riedt, 1974	DF = 22'
108	T 7 N R 16 E	Coal Thickness			x				
	SE SW	Location				x		Dane, et al, 1938, Pl. 12,	Slope mime
	Section 35	Overburden	-	-	-	-	-	Fig. 9, p. 198, 200, mine	
109	T 7 N R 16 E	Coal Thickness				x		meas. M-18	
	NE NW	Location				x		Dane, et al, 1938, Pl. 12,	Elevation and TD not
	Section 2	Overburden	-	-	-	-	-	Fig. 9, p. 198, 200, mine	available
110	T 6 N R 16 E	Coal Thickness				x		meas. M-21	
	SE SW	Location				x		Dane, et al, 1938, Pl. 12,	
	Section 27	Overburden	-	-	-	-	-	Fig. 9, p. 198, 200, 202-3,	
111	T 7 N R 16 E	Coal Thickness				x		mine meas. M-19	
	NE SW	Location			x			Empire O & R, Williams #1,	See also Dane, et al, 1938.
	Section 33	Overburden		x				1930	p. 206-207, Pl. 12, 209
112	T 7 N R 16 E	Coal Thickness	-	-	-	-	-		Bore Hole #48
	NW SE	Location					x	Snee & Eberly, Chastain #1-	I-GR CRD, KB = 18', UH-CNI
	Section 4	Overburden					x	4, 1977	
113	T 6 N R 16 E	Coal Thickness			x				
	NW SE	Location					x	Snee & Eberly, Mason #1,	KB = 8'
	Section 2	Overburden					x	1972	
114	T 6 N R 16 E	Coal Thickness			x				
	NE SE	Location					x	BTA & Oxley, Mason Estate	I-E log, KB = 14'
	Section 2	Overburden					x	#1, 1976	
115	T 6 N R 16 E	Coal Thickness			x				

DATA POINT #	LOCATION		INCREASING RELIABILITY	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NW SE		Location				x		Dane, et al, 1938, Pl. 17,	Slope mine.
	Section 6		Overburden	-	-	-	-	-	Fig. 9, p. 198-9, mine	
116	T 6 N	R 17 E	Coal Thickness				x		meas. M-17	
	S/2 SW		Location					x	Oxley Petrol., Hooks #2,	CFD & IEL logs. KB = 8'
	Section 6		Overburden					x	1975	LH-CNI
117	T 6 N	R 17 E	Coal Thickness			x				
	NW SE		Location					x	Monsanto Co., Hooks #1,	IEL & CFD logs. KB = 15'
	Section 6		Overburden					x	1970	LH and UH-CNI
118	T 6 N	R 17 E	Coal Thickness			x				
	NW SE		Location					x	Oxley Petrol., Gallion #1,	KB = 15'. LH-CNI
	Section 5		Overburden					x	1970	
119	T 6 N	R 17 E	Coal Thickness			x				
	SW NE		Location					x	Oxley Petrol., Cab Hughes	KB = 15'
	Section 4		Overburden					x	#1, 1969	
120	T 6 N	R 17 E	Coal Thickness			x				
	C NW		Location					x	Monsanto, 1970, Erle #1	KB = 14'. I-E, CFD logs.
	Section 3		Overburden					x		
121	T 6 N	R 17 E	Coal Thickness			x				
	NW SE		Location			x			Cities Service Co., #1	See also Dane, et al, 1938,
	Section 9		Overburden		x				Featherston, 1930	Pl. 13, Bore Hole #67
122	T 6 N	R 17 E	Coal Thickness		x					
	NW NW		Location					x	Sampson Res., #1 Meadows	IGR & D logs. KB = 14'
	Section 8		Overburden					x	Unit, 1979	UH-CNI
123	T 6 N	R 17 E	Coal Thickness			x				
	NE SW		Location					x	Skelly White "E" #1, 1966	KB = 11'
	Section 7		Overburden					x		
124	T 6 N	R 17 E	Coal Thickness			x				
	C NW		Location					x	Snee & Eberly, #2 Gov.,	Trace of UM on logs 40'
	Section 7		Overburden					x	1978	above LM. DIL, CFD logs.
125	T 6 N	R 17 E	Coal Thickness			x				KB = 9'.
	NW SE		Location					x	Snee & Eberly, Davis #1,	I-GR, FDL logs. KB = 7'
	Section 12		Overburden					x	1965	
126	T 6 N	R 16 E	Coal Thickness			x				
	C NE		Location					x	Snee & Eberly, USA #1, 1970	KB = 13.5. I-E log only.
	Section 12		Overburden					x		
127	T 6 N	R 16 E	Coal Thickness			x				
	NW SE		Location					x	Oxley Petrol., Baldwin #1,	I-GR log only. KB = 15'
	Section 10		Overburden					x	1970	
128	T 6 N	R 16 E	Coal Thickness			x				

APPENDIX II TABLES OF OIL AND GAS TEST HOLES

Note: "Top Log Int." refers to the measured depth to the top of the interval logged by the particular sonde. Driller log total depth, referenced to K.B. or D.F., has been abbreviated to T.D. (Note: This may vary from T.D. referenced to G.L.). The measured depth at which coal is reported on the scout card appears in the column titled "Scout Card Coal". The column titled "Harts./Drill./Scout" contains the measured depths drilled to the top of the Hartshorne Sandstone, as reported by the driller logs and the scout cards.

* Logged interval stratigraphically below Hartshorne Coals.

Sec-Tn-Rg	Operator/Farm Location	Driller Logs Coal Reported Thickness & Depth	Scout Card Coal	Harts. Drill. Scout	Top Log Int. Gamma Elec.	Top Log Int. Dens. Sonic	T.D. Year
1-6-16	Oxley/#1 Belt			2670			7378
	1503 FSL 1300 FWL of SE/4	NR	NR	2670			1970
1-6-16	Oxley/#1 Davis			NR			7150
	NW SE SE	NR	NR	NR			1973
1-6-16	Oxley/#2 Belt			2640			3070
	1420 FSL 1320 FWL	NR	NR	2640			1973
1-6-16	Oxley/#1 Baldwin			2577			7200
	C W/2 SW	NR	NR	2577			1977
2-6-16	Snee & Eberly/#1 Mason			2550	1450		2965
	CSE	NR	NR	2550	131		1972
2-6-16	BTA/#1 Mason			2560			7500
	1426 FSL 1426 FWL of SE/4	NR	NR	2560	805		1976
3-6-16	Snee & Eberly/#1 Chastain			2726			3172
	CSW SW	NR	NR	2726			1972
3-6-16	Oxley/#1 Hudgens			NR			8550
	1520 FSL 808 FWL of NE/4	NR	NR	NR			1977
4-6-16	Snee & Eberly/#1-4 Chastain			2630	55	850	7500
	2200 FSL 940 FWL of SE/4	NR	NR	2630	55		1978
9-6-16	Oxley/#1 G. Collins			3175			8000
	CSW	NR	NR	3175			1974
9-6-16	Oxley/#1 B. Collins			3020			3377
	660 FSL 2280 FWL of NE/4	NR	NR	3020			1974
10-6-16	Oxley/#1 Baldwin			2730	656		8444
	1420 FSL 1300 FWL of SE/4	NR	NR	2730	656		1970
10-6-16	Snee & Eberly/#1 Lake			2650			3030
	1035 FSL 1600 FWL of NE/4	NR	NR	2650			1972

Sec-Tn-Rg	Operator/Farm Location	Driller Logs Coal Reported Thickness & Depth	Scout Card Coal	Harts. Drill. Scout	Top Log Int. Gamma Elec.	Dens. Sonic	T.D. Year
11-6-16	Snee & Eberly/#1 A. Baldwin			2495			8552
	C SE/4	NR	NR	2505			1971
11-6-16	Snee & Eberly/#1 Williams			2500			7500
	1320 FSL 200 FWL of NE/4	NR	NR	2550			1971
11-6-16	Snee & Eberly/#1 Muddy Bottom			2590			7130
	CNE NE	NR	NR	2590			1977
12-6-16	Snee & Eberly/#1 Davis			2278		1100	2604
	SE NW SE	NR	NR	2278	100		1965
12-6-16	Snee & Eberly/#1 USA			2405			7418
	CNE	NR	NR	NR	1306		1971
12-6-16	Snee & Eberly/#2 USA			2456			2850
	CSE NW NE	NR	NR	2456			1978
3-6-17	Monsanto/#1 Erle			NR		1700	8150
	CNW	NR	NR	NR	935		1970
4-6-17	Oxley/#1 C. Hughes			1740	100	2480	8393
	660 FSL 500 FWL of NE/4	NR	NR	2150	100		1970
5-6-17	Oxley/#1 Gallion			NR	891	1760	8000
	2240 FSL 1220 FWL of SE/4	NR	NR	NR	891		1970
6-6-17	Oxley/#2 Hooks			2625		1600	3040
	CSW	NR	NR	2625	224		1974
6-6-17	Monsanto/#1 Hooks			NR		1900	7312
	1620 FSL 1170 FWL of SE/4	NR	NR	NR	413		1970
7-6-17	Snee & Eberly/#1-A Govt.			2335			7600
	1495 FSL 1408 FWL of NW/4	NR	NR	2335			1971
7-6-17	Skelly/#1 White "E"			2242	244	1350	2811
	CNE NE SW	NR	NR	2184	244		1966
7-6-17	Snee & Eberly/#1 Govt.			2308			5404
	NW SE NW	NR	NR	2308			1971
7-6-17	Snee & Eberly/#2 Govt.			2243		130	2580
	CNW	NR	NR	2243	130		1978
8-6-17	Intex/#1 Wittancock		1933 1966				2307
	CNW SE		2015 2033	1935			1953
8-6-17	Samson/#1 Meadows			2295	850	1100	8442
	CNW NW	NR	NR	2295	850		1979
8-6-17	Oxley/Invest. Royal #1			NR			8500
	1319 FSL 2210 FWL of NW/4	NR	NR	NR			1970

Sec-Tn-Rg	Operator/Farm Location	Driller Logs Coal Reported Thickness & Depth	Scout Card Coal	Harts. Drill. / Scout	Top Log Int. Gamma / Elec.	Top Log Int. Dens. / Sonic	T.D. / Year
9-6-17	Empire/Featherston #1			1991			3004
	CNW SE	3' @ 680	NR	NR			1930
10-6-17	Cose/#1 Hughes			2100	150	150	11675
	3115 FSL 2108 FWL	NR	NR	2100	150		1964
16-6-17	Oxley/#1 D. Harrison			2110		600	2465
	760 FSL 1340 FWL of NW/4	NR	NR	2110	177		1973
1-7-16	Estoril/#1 J. Daniel			NR	365	365	3400
	CSE	NR	NR	3048	365		1977
4-7-16	Long & Atterberry/#1-4 Brown			NR	150	2644	8237
	CSE	NR	NR	2765	2644		1974
12-7-16	Apexco/#1 Sarkeys			3134		250	3500
	1520 FSL 1320 FWL	NR	NR	1390	250		1977
23-7-16	Quinton Spelter Co./Brown #1			NR			3235
	SW SW NE	NR					1924
24-7-16	Lerblance/#1 W. R. Lee			2600		1596	2900
	CSE NW	NR	NR	2600	218		1978
24-7-16	Quanah/#1 Blocker			2574		1500	2948
	CSE NW NE	NR	NR	2574	215		1979
26-7-16	ONG/#1 Browne			NR			3351
	CSW	NR	NR	3000	203		1971
27-7-16	No information, location only:						
	SW NE						
27-7-16	No information, location only:						
	NW SE						
27-7-16	Dyco/#1-27 F. Browne			NR		1250	3263
	CNE	NR	NR	2990	240		1974
28-7-16	Gose/#1 Browne			NR			8624
	2310 FSL 3120 FWL	NR	NR	2710	36	6500	1961
33-7-16	Empire/#1 Williams						3980
	CNW NE SW	2' @ 2425	NR				1930
35-7-16	Oxley/#1 Riedt			2850	805	2800	8015
	1320 FSL 867 FWL of SE/4	NR	NR	2850	805		1974
36-7-16	Oxley/#1 Cochran			2370	832	2300	8150
	CSW	NR	NR	2370	832		1974
7-7-17	Apexco/#1 Davenport				0		3250
	CNE		NR	2753	290		

Sec-Tn-Rg	Operator/Farm Location	Driller Logs Coal Reported Thickness & Depth	Scout Card Coal	Harts. Drill. Scout	Top Log Int. Gamma Elec.	Dens. Sonic	T.D. Year
8-7-17	Potts Stephenson/#1-8 Stanfield			2685	272	1650	3045
	CNE	NR	NR	2685	272		1979
8-7-17	Nelson/#1-8 Davenport			2738			3150
	1220 FSL 1320 FWL of NW/4	NR	NR	2736	200		1977
9-7-17	Transok Pipeline/Browne #1				554	1500	8220
	CNE						1975
10-7-17	Nelson Petr./Browne #1-10					450	3085
	N/2 S/2 NW/4 1120 FSL 1320 FWL				250		1976
15-7-17	Nelson/#1 Taylor					900	2925
	960 FSL 710 FWL of NW/4		NR	2500	268		1976
15-7-17	Nelson/#1 C. Featherston			NR		1350	2470
	CSE SW	NR	NR	2360	267		1976
16-7-17	Quanah/#1 Davenport			2211			2778
	SE SE	NR	NR	2330			1975
16-7-17	Quanah/#2 Davenport			2398		1150	2794
	CSE SW	NR	NR	2398	205		1975
17-7-17	Quanah/#1 Cochran					1200	2710
	CSE SW		NR	2308	210		1976
17-7-17	Nelson/#1 Moody			2316		1199	2713
	660 FSL 860 FWL of SE/4	NR	NR	2316	252		1976
17-7-17	Nelson/#1-17 F. J. Brown			2944			3105
	CNW	NR	NR	2944			1976
18-7-17	Quanah/#1-18 Harmon "D"			2402		1150	2750
	CSE SE	NR	NR	2402	190		1976
19-7-17	Choctaw/#1 Pilgrim						2770
	SE SE NW		NR	2560			1952
19-7-17	Choctaw/#1 Woody			2507			2830
	2290 FSL 350 FWL of NW/4	NR	NR	2507			1979
19-7-17	Bergen/#1 J. Daniels			2622			3000
	1485 FSL 330 FWL	NR	NR	2622			1979
19-7-17	McAlester/Bassett #1						2550
	NE NE SE						1920
19-7-17	McAlester Gas & C/Bassett #2						2904
	SE NE SE						1926
19-7-17	Quinton Spelter/Pickerel						2698
	SE SE NE						1923

Sec-Tn-Rg	Operator/Farm Location	Driller Logs Coal Reported Thickness & Depth	Scout Card Coal	Harts. Drill. Scout	Top Log Int. Gamma Elec.	Dens. Sonic	T.D. Year
19-7-17	Quanah/#2-19 H. Davenport			2315			2740
	CSE NE NE	NR	NR	2315			1978
19-7-17	Quanah/#1 Leitrium			2465	255		2850
	C S/2 NE SE	NR	NR	NR			1973
20-7-17	(No Name)/Blocker #2						3100
	SW SE NE						
20-7-17	Choctaw/#1 Davenport			2376			2623
	1310 FSL 720 FWL of NE/4	NR	NR	2376			1972
20-7-17	Choctaw/#1 Patrick			2547			2680
	SE SE NE	NR	NR	2445			1965
20-7-17	Quanah/#1 Mendenhall			2518			2870
	CNW SE SW	NR	NR	2464			1978
20-7-17	San Bois/McGaha #1						2669
	SW NE	NR	NR				1928
20-7-17	San Bois/Burr #2						2673
	SW SW NW						1927
20-7-17	San Bois/Burr #1						2729
	NW NW SW						1925
20-7-17	McAlester G &C/(No Name) #1			NR			3190
		NR	NR	NR			1924
20-7-17	ONG/#4 Burr			2378		1000	2628
	SE NW	NR	NR	2374	284		1977
21-7-17	Utilities Prod./Stringer #2						2631
	SE NE						1938
21-7-17	Choctaw/#1 Stringer			2409			2703
	NE SE NE	NR	NR	1628			1951
21-7-17	Choctaw/#1 Sans Bois			2467			2640
	NE SE NW		2390	2501			1964
21-7-17	Choctaw/#1 Browne			2541			2670
	2000 FSL 3320 FWL		NR	2540			1965
21-7-17	Choctaw/#1 R. Featherston						2538
	1360 FSL 760 FWL of NW/4		NR	2350			1970
21-7-17	Choctaw/#3A Featherston						2514
	CNW NW NE		NR	NR			1976
21-7-17	Choctaw/#2 Stringer						2631
	CSE NE		NR	NR			1937

Sec-Tn-Rg	Operator/Farm Location	Driller Logs Coal Reported Thickness & Depth	Scout Card Coal	Harts. Drill. Scout	Top Log Int. Gamma Elec.	Top Log Int. Dens. Sonic	T.D. Year
21-7-17	Quinton Spelter/Yoho #1						2644
	NE SE						1928
21-7-17	Quinton Spelter/Stringer #1						2644
	NW SW NE						1927
21-7-17	Quinton Spelter/Featherston #1						2629
	SW SW NW						1928
21-7-17	Choctaw/#1 Hughes			2263			2567
	NW NE SE	NR	2260	NR			1951
22-7-17	Choctaw/#1-A Stringer			2382			2700
	1660 FSL 980 FWL of NW/4	NR	NR	2382			1974
22-7-17	Choctaw/#1 Hatter Farms			2400			2605
	1980 FSL 2120 FWL of NW/4		NR	2400			1978
22-7-17	Producers/#1 C. Cooper						2620
	CNE NE SW		NR	NR			1933
22-7-17	Choctaw/Cangraro #1			2335			
	NE NW SW	NR					
22-7-17	Q. Spelter/Featherston #1						2575
	NW SW NW						1927
27-7-17	Ark. LA./#1 J. L. Martin			NR			8520
	S/2 SE NW	NR	NR	2672			1965
27-7-17	Anderson/#1 Pruitt			NR			8520
	510 FSL 660 FEL of NW/4	NR	NR	2672			1970
27-7-17	Lerblance/#2 Pruitt			2600	970	970	3100
	CSW NE	NR	NR	2660	250		1978
27-7-17	Lerblance/#4 Pruitt			2900	950	950	3309
	CSW	NR	NR	2900	262		1978
27-7-17	Ark. LA/J.L. Martin #1				740		8520
	150' S of C SE NW				740		1964
28-7-17	Quanah/Pruitt #1			2520			2990
	CNE NE	NR	NR	2520			1977
28-7-17	Ark LA/#1-28 Buchanan						3580
	C N/2 SW		NR	3010	363		1979
30-7-17	Rodman/#30-1 Esther			2920			7640
	CSW NE	NR	NR	2920			1978
30-7-17	Tri State/#1 Wallace			2920	551	700	7640
	CSW NE	NR	NR	2920	551		1975

Sec-Tn-Rg	Operator/Farm Location	Driller Logs Coal Reported Thickness & Depth	Scout Card Coal	Harts. Drill. Scout	Top Log Int. Gamma Elec.	Top Log Int. Dens. Sonic	T.D. Year
31-7-17	Mobil/#1 Cheney			NR	80	80	8000
	CSW/4	NR	NR	3070	80		1971
32-7-17	Humble/#1 Turner Sisters			NR		1500	8807
	CSW NE	NR	NR	NR	447		1962
32-7-17	Oxley/#1 Palmer			NR	675		8635
	C SE SE	NR	NR	NR	675		1970
33-7-17	Oxley/#1 Lee Davis			2764	2700	2700	7714
	NW SE SE SE	NR	NR	2764	1100		1969