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FEDERAL COAL RESOURCE OCCURRENCE AND FEDERAL COAL DEVELOPMENT POTENTIAL MAPS OF THE BOKOSHE 7.5-MINUTE QUADRANGLE HASKELL AND LEFLORE COUNTIES, OKLAHOMA

(Report includes 11 plates)

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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CONTENTS

TABLES

ILUSTRATIONS

(Plates are in pocket)

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 Bokoshe 7.5-minute quadrangle, Haskell and Le Flore 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, 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 Published and unpublished publicly available information was used as the data base for this study.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 Bokoshe 7.5-minute quadrangle is located to the north of the Howe-Wilburton coal mining district, in the eastern part of the southeastern Oklahoma coal field. Most of the quadrangle lies in LeFlore County, except the northwest corner, which is in Haskell County. The city of McAlester is 60 miles (96 km) west of the quadrangle, and the city of Tulsa is approximately 100 miles (160 km) northwest of the quadrangle.

Accessibility

The town of Bokoshe is in the east-central part of the quadrangle. State Highway 31 runs generally east-west through Bokoshe, and intersects with U.S. Routes 59 and 271 about 4.5 miles (7.2 km) east of the quadrangle.

The Texas and Pacific, and Fort Smith and Van Buren Railroads run basically north-south and east-west respectively through the quadrangle, and cross in the town of Bokoshe.

Many light duty and unimproved dirt roads provide access to most of the quadrangle.

Physiography

The Bokoshe quadrangle is in the Arkoma Basin, north of the Ouachita Mountains, in the Arkansas Valley physiographic province (Hendricks, 1939). The Choctaw fault, which essentially marks the southern edge of the Arkoma Basin, is approximately 18 miles (29 km) south of the quadrangle.

Much of the region is hilly, due largely to the action of streams on bedrock strata with differing capacities for resisting erosion (Knechtel, 1949). The landscape is characterized by long, sinuous, nearly parallel hogbacks that generally coincide with the outcrop of sandstone members. Between the hogbacks are wide erosional valleys underlain mostly by shale (Knechtel, 1949). Folding is quite widespread, resulting in sandstone-capped synclinal mountains. Total relief in the quadrangle is over 450 feet (137 m), with elevations ranging from about 450 feet (137 m) in the valleys over 900 feet (274 m) on Buck Creek Mountain.

The Arkansas River flows north of the study area. One of its tributaries, Brazil Creek, runs through the southeast corner of the Bokoshe quadrangle.

Numerous other small creeks also drain the area. The Arkansas River Navigation Channel is located just north of the study area.

Climate and Vegetation

The climate in southeastern Oklahoma is for the most part fairly moderate. Winters are short, and extremely cold weather is rare. Summers, 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 percipitation in the area averages approximately 41 inches (104 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

Federal coal lands in the Bokoshe quadrangle total approximately 14,420 acres (5840 hectares) or 37% of the quadrangle. Of that, 6480 acres (2620 hectares), or 45% are leased (as of October 19, 1979), 6360 acres (2570 hactares) or 44% are unleased, and the remaining 1580 acres (640 hactares), or 11%, of Federal coal lands are part of the Spiro-Bokoshe Known Recoverable Coal Resources Area (KRCRA) (Plate 2).

GENERAL GEOLOGY

Previous Work

Much work has been done on the southeastern Oklahoma coal field. The first geologic study of the region 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 figures published in papers by Trumbull

(1957) and Friedman (1974). Non-proprietary information from coal test holes drilled in various years in the Bokoshe quadrangle was obtained from USGS files.

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 though 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).

All of the rock units encountered in the Bokoshe quadrangle are of Pennsylvanian Age and include the Atoka Formation as well as the Hartshorne, McAlester, and Savanna Formations of the Lower Desmoinesian Krebs Group. The Hartshorne and McAlester Formations are coal-bearing in this quadrangle.

The Atoka Formation was named by Taff and Adams (1900). It is the oldest exposed formation in the quadrangle, and crops out across the central and northeastern section of it (Knechtel, 1949). The formation consists mostly of gray silty shale interbedded with ridge-forming brown or light

gray sandstone units (Knechtel, 1949). The sandstone is highly variable in character, both from bed to bed and within a single bed. In most exposures it is fine-grained, silty and irregulary bedded; however, locally it may be course-grained, clean, and massive to thick bedded. The Atoka Formation thickens somewhat across the quadrangle, from about 5000 feet (1525 m) in the northwest to 7000 feet (2135 m) in the southeast (Hendricks, 1939).

The Hartshorne Formation forms the basal unit of the Desmoinesian Series. It is most probably conformable with the underlying Atoka Formation (McDaniel, 1961, Oakes and Knechtel, 1948), although the sharp and irregular contact between the Hartshorne and Atoka Formations has lead some observers to conclude that a minor unconformity separates them, at least locally (Hendricks, 1939, and Branson, 1962). The contact between the Hartshorne Formation and the overlying McAlester Formation is conformable (Hendricks, 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 Bokoshe quadrangle from southwest to northeast (Plate 6). 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. In general it contains interbedded sandstones and shales which tend to become discontinous as the upper and lower coals merge. The sands are for the most part fine-grained, brown to gray, silty and micaceous, and the shales are gray and sandy. Plant fossils are abundant in the shales. The formation is roughly 300 feet (92 m) thick in the Bokoshe quadrangle.

The McAlester Formation averages about 1600 feet (488 m) thick in the Bokoshe quadrangle, thinning to the north. It crops out in the southwest quarter of the quadrangle, and lies conformably on the Hartshorne Formation. The McAlester Formation consists primarily of various unnamed shale units, but includes one shale member and several sandstone members as well. In acsending order, the McAlester Formation includes the McCurtain Shale Member, and the Warner, Lequire, Cameron, Tamaha, and Keota Sandstone Members. Between each of these sandstones, and above the Keota Sandstone Member, is an unnamed shale unit. The thickness given below of each individual member or unit has been estimated from well logs in the area.

The lowermost unit of the McAlester Formation is the McCurtain Shale Member. This is a blue to dark gray, clayey shale with numerous siderite concretions and plant material (Knechtel, 1949). The McCurtain Shale Member contains a few thin sandstone units, including a locally persistent thin sandstone with an associated unnamed local coal found approximately 300 feet

(92 m) above the base of the shale. In the northern part of T. 8 N., R. 23 E., this unit forms prominent cliffs of sandstone beds totalling 175 feet (53 m) thick (Knechtel, 1949).

The most persistent sandstone of the McAlester Formation is the Warner Sandstone Member, a fine-grained, argillaceous unit which forms the first prominent escarpment stratigraphically above the Hartshorne Formation. This member forms the upper boundary of the McCurtain Shale. It is highly variable in thickness ranging from 15 to 150 feet (5 to 45 m), and has a locally persistent coal associated with it. Above the Warner Sandstone is an unnamed shale unit which is dark gray, silty and fissile, and in northern LeFlore County ranges in thickness from 120 to 300 feet (37 to 92 m) (Knechtel, 1949). Siderite concretions are common, and a few thin sandstones can be found within it.

The Lequire Sandstone Member of the McAlester Formation overlies this unnamed shale. This unit includes lenticular sandstone beds interbedded with siltstones and shales, and can include a thin local coal. It crops out in the southwest part of the Bokoshe quadrangle, forming in most places low, inconspicuous ridges (Knechtel, 1949). To the north it is either absent or so close to either the Warner Sandstone or Cameron Sandstone that it has not been recognized as a separate unit (Knechtel, 1949). Units between the Lequire and Keota Sandstone Members are highly variable in thickness and lateral extent. They include two unnamed shale units and the Cameron and Tamaha Sandstone Members.

The Cameron Sandstone Member is a buff to gray, fine-grained, ripple-marked sandstone with interbeds and lenses of shale and sandy shale. It ranges from 10 to 20 feet (3 to 6 m) in the northern LeFlore County (Knechtel, 1949). The Cameron does not crop out in the Bokoshe quadrangle, though it is found

at the surface in the Panama quadrangle, to the east. Overlying the Cameron is an unnamed gray shale unit with siderite concretions near the base and sandstone laminae throughout (Knechtel, 1949). This shale includes the Stigler coal, which crops out in the south of the Bokoshe quadrangle but for which no specific information was available.

The Tamaha Sandstone Member averages about 15 feet (5 m) thick in the area. In general it is buff to gray, fine-grained, micaceous, cross-bedded and hard. Like the Cameron, the Tamaha is discontinuous and is not found at the surface in the Bokoshe quadrangle.

Quaternary deposits of alluvium cover some stream valleys and flood plains in the area.

Structure

The Bokoshe quadrangle lies within a zone folded Pennsylvanian rocks characterized by broad, shallow synclines and narrow anticlines. The axes of these structures are commonly en echelon, and in general run parallel to the frontal margin of the adjacent Ouachita salient, marked by the Choctaw fault. There are also many faults, including both normal and thrust faults. The principal surface structures in the Bokoshe quadrangle are shown on Plate 1. They include the Milton anticline, the Bokoshe syncline, the Backbone anticline and the Backbone fault.

The Milton anticline is one of the more pronounced structural features in the area. It passes through the Bokoshe quadrangle from southwest to north-east and in all is approximately 30 miles (48 km) long (Knechtel, 1949). Rocks of the Atoka Formation crop out along its axis, and farther out on the limbs are

exposures of the Hartshorne and the McAlester Formations. The structure of the Milton anticline is essentially that of a great elongate asymmetrical dome, with the steeper limb on the southwest side. It does, however, include a number of minor flexures and faults (Knechtel, 1949).

The Bokoshe syncline is a large, basin-like structure roughly parallel to the Milton anticline through the Bokoshe quadrangle (Plate 1). It begins in Sec. 23 of T. 8 N., R. 23 E., and extends northeastward into Arkansas. The lowest point along its axis is west of the quadrangle, north of the town of Spiro. The structure plunges toward here from points of maximum structural altitude southeast of Bokoshe and north of Panola (Knechtel, 1949).

The Backbone anticline is about 30 miles (48 km) long, terminating in a westward-plunging nose in T. 8 N., R. 23 E., in the Bokoshe quadrangle. The anticline is broken along its crest by the Backbone fault, a thrust fault with a maximum displacement of more than 5000 feet (1525 m) (Knechtel, 1949). The Backbone anticline exposes the Atoka Formation at its core, and the Hartshorne and McAlester Formations farther out on the limbs.

COAL GEOLOGY

Several major coal beds have been identified in the Bokoshe quadrangle. They include in ascending order the Hartshorne coal bed and its lower and upper splits, and the Stigler (Lower McAlester) coal. Due to a lack of information on the latter, only the Hartshorne coals are mapped and discussed in detail in this report.

Hartshorne Coal Bed and Upper and Lower Splits

The Hartshorne coals occur at or near the top of the Hartshorne Sandstone

Formation. The split line for the Hartshorne coal bed runs from southwest to northeast through the quadrangle (Plate 4) and is somewhat erractic in the vicinity of the faults in Secs. 8 and 9 of T8N, R24E. The split line is defined in this report as the 1-foot interburden line (Plate 6). North of this line only one coal seam is present; south of it the seam is split into Upper and Lower Hartshorne coals. The structure on these coals is presented on Plate 5.

All three Hartshorne coals are found at the surface in this quadrangle. Along the north limb of the Milton anticline is an outcrop of the Hartshorne coal which has undergone extensive strip mining (Plate 1). South of this outcrop, and roughly parallel to it is another outcrop, of both a single and divided Hartshorne coal. Beds here dip to the south, toward the axis of the Bokoshe syncline. The Upper and Lower Hartshorne coals are also exposed along the Backbone anticline, in an outcrop interrupted by the Backbone fault.

The isopach map of the Hartshorne coals is shown on Plate 4. The Hartshorne coal is in general slightly thicker than either the upper or lower split, and measurements of it range 1 to 7 feet (0.3 to 2.1 m). Measurements of the Upper Hartshorne coal split range from 2 feet (0.6 m) to 4 feet (1.2 m). The Lower Hartshorne coal split is for the most part slightly thicker than its upper counterpart, measuring up to 5 feet (1.5 m) in several bore holes.

Both the Hartshorne and the Lower Hartshorne Coals have been mined in the Bokoshe quadrangle (Plate 1).

Stigler (Lower McAlester) Coal Bed

Knechtel has mapped the Stigler coal across the southeast and southwest corners of the Bokoshe quadrangle (Plate 1). However, no information on the seam was available, and it will not be discussed in this report.

Chemical Analyses of Coal

Chemical analyses were available for the Hartshorne and Lower Hartshorne coals in the 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 classified according to Fixed Carbon (FC), as determined on a dry, mineral-matter-free (mmf) basis. The "as received" FC values shown on Table 1 were converted to dry mmf FC figures according to the following formula (American Society for Testing and Materials, 1980):

$$\text{Dry mmf FC} = \frac{\text{As rec'd FC} - 0.15\ S}{[100 - (M + 1.08\ A + 0.55\ S)]} \times 100$$

where M = moisture, A= ash, S = sulfur

Based on the average Fixed Carbon values shown on Table 1, both the Hartshorne and Lower Hartshorne coals are classified as low volatile bituminuous coals, with the Hartshorne having an average 81% dry mmf Fixed Carbon and the Lower Hartshorne having an average 82% dry mmf Fixed Carbon.

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 Bokoshe 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.

Table 1. Average chemical analyses of coal beds in the Bokoshe quadrangle, Haskell and LeFlore Counties, Oklahoma

	HARTSHORNE COAL				LOWER SPLIT OF HARTSHORNE COAL		
ANALYSES %	FORM OF ANALYSIS	# OF SAMPLES	AVERAGE	RANGE	# OF SAMPLES	AVERAGE	RANGE
PROXIMATE							
Moisture	A	2	3.1	3.0- 3.2	2	2.7	2.5-2.8
Volatile Matter	A	2	18.3	17.3-19.2	2	17.4	17.0-17.7
	C	9	20.5	17.8-21.9	2	17.9	17.5-18.2
Fixed Carbon	A	2	73.7	71.1-76.3	2	72.95	72.9-73.0
	C	9	72.1	67-78.9	2	75.0	74.8-75.2
Ash	A	2	5.0	3.2-6.7	2	7.1	6.9-7.2
	C	9	7.1	3.3-11	2	7.3	7.1-7.4
ULTIMATE							
Sulfur	A	2	0.8	0.5-1.0	2	1.0	0.8-1.1
	C	9	3.4	0.6-5.8	2	1.0	0.8-1.1
Hydrogen	A	-	---	---	-	---	---
	C	-	---	---	-	---	---
Carbon	A	-	---	---	-	---	---
	C	-	---	---	-	---	---
Nitrogen	A	-	---	---	-	---	---
	C	-	---	---	-	---	---
Oxygen	A	-	---	---	-	---	---
	C	-	---	---	-	---	---
HEATING VALUE							
Calories	A	2	7,934	7,767- 8,100	2	7,757	7,735-7,778
	C	2	8,184	8,006- 8,361	2	7,968	7,960-7,975
Btu/lb.	A	2	14,280	13,980-14,580	2	13,965	13,930-14,000
	C	2	14,730	14,410-15,050	2	14,340	14,320-14,360

Form of Analyses: A = as received, C = moisture-free. To convert Btu/lb to Kj/kg, multiply by 2.324

Source of data: Knechtel, 1949 and USGS files.

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 specultative. 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 resources are those more than 3 miles (4.8 km) from the nearest measurement point.

Speculative resources are Undiscovered Resources that may occur in favorable areas where no discoveries have yet been made. There are no hypothetical

or speculative resources in this quadrangle.

Coal resources for the Hartshorne coal and its upper and lower splits were calculated using data obtained from their coal isopach maps (Plate 4). 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 the coal resouces in short tons. Coal resource tonnages were calculated for Identified Resources in the measured, indicated, and inferred categories for unleased Federal coal land. All coal beds thicker than 1 foot (0.305 m) that lie less than 3000 feet (915 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 on Plate 1) and therefore these narrow areas may in reality not even exist. For this 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 8 and 9 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 (915 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 subsurface-minable Reserve Base coal, and a recovery factor of 50 percent is applied toward subsurface-minable Reserve Base coal. No recovery factor is applicable 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 each section of the Federal coal lands on Plate 2. All values shown on Plate 2 are rounded to the nearest 10,000 short tons (9072 metric tons), and total approximately 40.49 million short tons (36.73 million metric tons) for the entire quadrangle. Reserve Base tonnages from the various development potential categories for surface and subsurface mining 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 ton 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. 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. There are no such areas on Federal coal land in the Bokoshe quadrangle.

The coal development potential for surface mining methods is shown on Plate 10. All tonage values are summarized in Table 2. 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, 4 percent is rated high, none is rated moderate, and 25 percent is rated low. The remaining Federal land (71 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 915 m) below the ground surface and have dips of 15° or less. Coal beds lying between 150 and 3,000 feet (46 and 915 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 short tons) in the Bokoshe quadrangle, Haskell and LeFlore Counties, Oklahoma

COAL BED	HIGH DEVELOPMENT POTENTIAL	MODERATE DEVELOPMENT POTENTIAL	LOW DEVELOPMENT POTENTIAL	TOTAL
Upper Hartshorne	90,000	50,000	640,000	780,000
Hartshorne	------	------	1,440,000	1,440,000
Lower Hartshorne	50,000	20,000	810,000	880,000
TOTAL	140,000	70,000	2,890,000	3,100,000

Table 3. Coal Reserve Base data for subsurface mining methods for Federal coal land (in short tons) in the Bokoshe quadrangle, Haskell and LeFlore Counties, Oklahoma

COAL BED	HIGH DEVELOPMENT POTENTIAL	MODERATE DEVELOPMENT POTENTIAL	LOW DEVELOPMENT POTENTIAL	TOTAL
Upper Hartshorne	7,320,000	1,680,000	-------	9,000,000
Hartshorne	18,640,000	--------	-------	18,640,000
Lower Hartshorne	8,090,000	1,660,000	-------	9,750,000
TOTAL	34,050	3,340	-------	37,390,000

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 915 m), respectively.

Areas where the coal data are absent or extremely limited between 150 and 3,000 feeet (46 to 915 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. There is no Federal coal land within the Bokoshe quadrangle that is assigned an unknown development potential.

The coal development potential for conventional subsurface mining methods is shown on plate 11. A summary of all tonnage values is presented in Table 3. Of the Federal land having a known development potential for conventional subsurface mining methods, 73 percent is rated high, 4 percent is rated moderate, and none is rated low. The remaining Federal land in the quadrangle (23 percent) is classified as having no development potential for conventional subsurface mining 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. 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. No Federal coal land in the Bokoshe quadrangle has a development potential for in-situ coal gasification.

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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
	NW SE	Location					x	USGS files, 1956, Evans	1550' FEL, 1512' FSL.
	Section 16	Overburden				x		Coal Co. Mine Map	
1	T 9 N | R 24 E	Coal Thickness				x			
	SE SW	Location					x	USGS files, 1956, Evans	1612' FWL, 2125' FSL.
	Section 16	Overburden				x		Coal Co. Mine Map	
2	T 9 N | R 24 E	Coal Thickness				x			
	SE SW	Location					x	USGS files, 1956, Evans	2640' from SE corner.
	Section 19	Overburden				x		Coal Co. Mine Map	
3	T 9 N | R 24 E	Coal Thickness				x			
	SW SE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 19	Overburden	-	-	-	-	-	#3	benches.
4	T 9 N | R 24 E	Coal Thickness			x				
	NW SW	Location					x	USGS files, 1956, Evans	1530' FSL, 40' FWL.
	Section 20	Overburden				x		Coal Co. Mine Map	
5	T 9 N | R 24 E	Coal Thickness				x			
	NW SW	Location					x	USGS files, 1956, Evans	
	Section 20	Overburden	-	-	-	-	-	Coal Co.	
6	T 9 N | R 24 E	Coal Thickness				x			
	NE SW	Location			x			Knechtel, 1949, Prospect	Upper and lower Hartshorne
	Section 20	Overburden			x			#4	benches.
7	T 9 N | R 24 E	Coal Thickness			x				
	SE NW	Location					x	USGS files, 1956, Evans	225' W, 206' N of center.
	Section 20	Overburden				x		Coal Co.	
8	T 9 N | R 24 E	Coal Thickness				x			
	SW NE	Location					x	Senate Document 390, 1910,	Knechtel, 1949, Bore Hole
	Section 20	Overburden				x		p. 69	#6.
9	T 9 N | R 24 E	Coal Thickness					x		
	SW NE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 20	Overburden	-	-	-	-	-	#5	benches.
10	T 9 N | R 24 E	Coal Thickness			x				
	NE NE	Location					x	USGS files, 1956, Evans	1150' FNL, 575' FEL.
	Section 20	Overburden				x		Coal Co. Mine Map	
11	T 9 N | R 24 E	Coal Thickness				x			

DATE POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SW NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 30	Overburden	-	-	-	-	-	#20	benches.
12	T 9 N | R 24 E	Coal Thickness			x				
	SW NW	Location					x	USGS files, 1956, Evans	1750' from NW corner.
	Section 30	Overburden				x		Coal Co. Mine Map	
13	T 9 N | R 24 E	Coal Thickness				x			
	SW NW	Location					x	USGS files, 1956, Evans	2150' from NW corner.
	Section 30	Overburden				x		Coal Co. Mine Map	
14	T 9 N | R 24 E	Coal Thickness				x			
	NE SE	Location					x	USGS files, 1956, Evans	2040' FSL, 1350' FEL.
	Section 25	Overburden				x		Coal Co. Mine Map	
15	T 9 N | R 23 E	Coal Thickness				x			
	NE SW	Location					x	Humble Oil and Refining,	KB is 11' above GL. Ind. -
	Section 25	Overburden				x		Kinsey #1, 1965	GR logs.
16	T 9 N | R 23 E	Coal Thickness							
	SE SW	Location					x	USGS files, 1956, Evans	2110' FWL, 100' FSL.
	Section 25	Overburden				x		Coal Co. Mine Map	
17	T 9 N | R 23 E	Coal Thickness				x			
	SE SW	Location					x	USGS files, 1956, Evans	1900 FWL, 280' FSL.
	Section 25	Overburden				x		Coal Co. Mine Map	
18	T 9 N | R 23 E	Coal Thickness				x			
	SW SE	Location					x	USGS core files, Evans	
	Section 35	Overburden					x	Coal Co.	
19	T 9 N | R 23 E	Coal Thickness					x		
	SW SE	Location					x	USGS files, 1956, Evans	915' W, 515' S of C-SE/4.
	Section 35	Overburden				x		Coal Co. Mine Map, Jung -	
20	T 9 N | R 23 E	Coal Thickness				x		#34	
	SW SE	Location					x	USGS core files, Evans	
	Section 35	Overburden					x	Coal Co. and Coal Co. Mine	
21	T 9 N | R 23 E	Coal Thickness					x	Map	
	NW SE	Location					x	USGS files, 1956, Evans	1780' FSL, 1550' FEL.
	Section 35	Overburden				x		Coal Co. Mine Map	
22	T 9 N | R 23 E	Coal Thickness				x			
	SE NE	Location					x	USGS files, 1956, Evans	375' W, 251' S of E 1/4
	Section 35	Overburden				x		Coal Co. Mine Map	corner.
23	T 9 N | R 23 E	Coal Thickness				x			
	NE SE	Location					x	USGS files, 1956, Evans	262' S, 40' W of E 1/4
	Section 35	Overburden				x		Coal Co. Mine Map	corner.
24	T 9 N | R 23 E	Coal Thickness				x			

DATE POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SE NE	Location					x	Senate Document 390, p. 68	
	Section 35	Overburden				x		1910, Bore Hole #33	
25	T 9 N | R 23 E	Coal Thickness					x		
	SW NW	Location					x	USGS files, 1956, Evans	1680' FNL, 540' FWL.
	Section 36	Overburden				x		Coal Co. Mine Map	
26	T 9 N | R 23 E	Coal Thickness				x			
	NW NW	Location					x	USGS files, 1956, Evans	1290' FWL, 650' FNL.
	Section 36	Overburden				x		Coal Co. Mine Map	
27	T 9 N | R 23 E	Coal Thickness				x			
	SW SE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 33	Overburden			x			#21	benches.
28	T 9 N | R 24 E	Coal Thickness			x				
	NE SE	Location			x			Knechtel, 1949, Bore Hole	
	Section 33	Overburden			x			#22	
29	T 9 N | R 24 E	Coal Thickness			x				
	NE SE	Location			x			Knechtel, 1949, Bore Hole	Interburden variable be-
	Section 33	Overburden	-	-	-	-	-	#23	tween 0 & 1.5 ft. 9"
30	T 9 N | R 24 E	Coal Thickness			x				assumed above.
	SW NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 34	Overburden			x			#24	benches.
31	T 9 N | R 24 E	Coal Thickness			x				
	SW NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower benches.
	Section 34	Overburden			x			#25	66" Net Hartshorne coal.
32	T 9 N | R 24 E	Coal Thickness			x				
	NE NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 34	Overburden			x			#26	benches.
33	T 9 N | R 24 E	Coal Thickness			x				
	NW NW	Location			x			USGS files, Bore Hole #4,	
	Section 2	Overburden			x			1952	
34	T 8 N | R 24 E	Coal Thickness			x				
	SW NE	Location					x	Pan American Petroleum	KB is 15' above BHO. Ind -
	Section 3	Overburden			x			Corporation, Lewis Unit #1	GR logs.
35	T 8 N | R 24 E	Coal Thickness	-	-	-	-	-	1967	
	SE SW	Location					x	USGS files, Bore Hole #5,	
	Section 3	Overburden					x	1952	
36	T 8 N | R 24 E	Coal Thickness					x		
	NW NW	Location				x		USGS files, 1913, Choctaw	750' FNL, 100' FWL.
	Section 3	Overburden	-	-	-	-	-	Coal and Coke Co., Mine #5	
37	T 8 N | R 24 E	Coal Thickness				x			

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SW NW	Location				x		USGS files, 1913, Choctaw	950' FNL, 100' FWL.
	Section 3	Overburden	-	-	-	-	-	Coal and Coke Co., Mine #5	
38	T 8 N | R 24 E	Coal Thickness				x			
	SW NW	Location				x		USGS files, 1915, Choctaw	230' FWL, 1320' FNL.
	Section 3	Overburden	-	-	-	-	-	Coal and Coke Co., Mine #3	
39	T 8 N | R 24 E	Coal Thickness				x			
	NW NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 3	Overburden			x			#2	benches.
40	T 8 N | R 24 E	Coal Thickness			x				
	NE NE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 4	Overburden			x			#3	benches.
41	T 8 N | R 24 E	Coal Thickness			x				
	SE NE	Location		x				Moose and Searle, 1929,	Grayson Bros. Mine, not
	Section 4	Overburden	-	-	-	-	-	p. 66-67, 2 Section mine	sure of exact location.
42	T 8 N | R 24 E	Coal Thickness		x				average	Spotted at mouth of mine.
	SE NE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 4	Overburden			x			#4	benches.
43	T 8 N | R 24 E	Coal Thickness			x				
	NW SE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 4	Overburden			x			#5	benches.
44	T 8 N | R 24 E	Coal Thickness			x				
	SE SE	Location					x	Moose and Searle, 1929,	235' N, 340' W, SE corner.
	Section 4	Overburden			x			p. 65-66, Section A	Rees smokeless coal, mine
45	T 8 N | R 24 E	Coal Thickness				x			No. 8.
	SE SE	Location					x	Moose and Searle, 1929,	370' N, 720' W, SE corner.
	Section 4	Overburden			x			p. 65-66, Section B	
46	T 8 N | R 24 E	Coal Thickness				x			
	SW SE	Location			x			Knechtel, 1949, Bore Hole	
	Section 4	Overburden			x			#6	
47	T 8 N | R 24 E	Coal Thickness			x				
	SW SE	Location	x					Fieldner et al, 1922,	Meas. 1700' along SE entry
	Section 4	Overburden				x		p. 221-222, slope mine #3	320 N, 680 E of S/4 corner.
48	T 8 N R 24 E	Coal Thickness				x			Upper and lower benches.
	NW NW	Location			x			Knechtel, 1949, Prospect	Upper and lower Hartshorne
	Section 2	Overburden	-	-	-	-	-	#1	benches.
49	T 8 N | R 23 E	Coal Thickness			x				
	NE NE	Location					x	USGS files, 1956, Evans	355' FEL, 305' FNL.
	Section 2	Overburden				x		Coal Co. Mine Map, Jung	
50	T 8 N | R 23 E	Coal Thickness				x		#33	

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NE NE	Location					x	USGS files, 1956, Bore	Also on Evans Coal Co. Mine
	Section 2	Overburden				x		Hole #AA-6	Map, 1956.
51	T 8 N | R 23 E	Coal Thickness					x		
	SE NE	Location					x	USGS files, 1956, Evans	1130 FEL, 1100 FNL.
	Section 2	Overburden				x		Coal Co. Mine Map, Jung -	
52	T 8 N | R 23 E	Coal Thickness				x		32B	
	SE NE	Location			x			Knechtel, 1949, Bore Hole	Upper and Lower Hartshorne
	Section 2	Overburden	-	-	-	-	-	#2	benches.
53	T 8 N | R 23 E	Coal Thickness			x				
	SW NE	Location					x	USGS files, 1956, Bore	Also Evans Coal Co. Mine
	Section 2	Overburden				x		Hole #AA-4	Map, 1956
54	T 8 N | R 23 E	Coal Thickness					x		
	SW NE	Location					x	USGS files, 1956, Evans	450' N, 80'E of C
	Section 2	Overburden				x		Coal Co. Mine Map, Jung -	
55	T 8 N | R 23 E	Coal Thickness				x		31	
	SE NW	Location					x	USGS files, 1956, Bore Hole	Also on Evans Coal Co. Mine
	Section 2	Overburden				x		#AA-5	Map, 1956
56	T 8 N | R 23 E	Coal Thickness					x		
	SE NW	Location			x			Knechtel, 1949, Bore Hole	Upper and Lower Hartshorne
	Section 2	Overburden	-	-	-	-	-	#3	benches.
57	T 8 N | R 23 E	Coal Thickness			x				
	NE SW	Location					x	USGS files, 1956, Evans	780'W, 70'S of C
	Section 2	Overburden				x		Coal Co., Mine Map, Jung -	
58	T 8 N | R 23 E	Coal Thickness				x		30C	
	NE SW	Location					x	USGS files, 1956, Evans	1110'W, 85'S of center
	Section 2	Overburden				x		Coal Co., Mine Map, Jung -	
59	T 8 N | R 23 E	Coal Thickness				x		30A	
	NW SW	Location					x	USGS files, 1956, Bore Hole	Also on Mine Map, 1956,
	Section 2	Overburden				x		#AA-6	Evans Coal Co.
60	T 8 N | R 23 E	Coal Thickness					x		
	NW SW	Location					x	USGS files, 1956, Evans	420'S, 2015'W of center
	Section 2	Overburden				x		Coal Co. Mine Map, Jung -	
61	T 8 N | R 23 E	Coal Thickness				x		29B	
	NW SW	Location					x	USGS files, 1956, Evans	595'E, 405'S of W 1/4
	Section 2	Overburden			x			Coal Co. Mine Map, Jung -	corner
62	T 8 N | R 23 E	Coal Thickness				x		29A	
	NW SW	Location			x			Knechtel, 1949, Prospect #4	Upper and Lower Hartshorne
	Section 2	Overburden	-	-	-	-	-		benches.
63	T 8 N | R 23 E	Coal Thickness			x				

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NE SE	Location					x	USGS files, 1956, Evans	130'W, 580'S of E/4 corner,
	Section 3	Overburden				x		Coal Co. Mine Map, Jung -	coal reported as only mark-
64	T 8 N | R 24 E	Coal Thickness				x		#28D	ings. Middle band reported.
	NE SE	Location					x	USGS files, 1956, Bore Hole	Also on Evans Coal Co.
	Section 3	Overburden					x	#AA-7.	Mine Map, 1956.
65	T 8 N | R 23 E	Coal Thickness					x		
	NE SE	Location			x			Knechtel, 1949, Prospect #5	Upper and Lower Hartshorne
	Section 3	Overburden	-	-	-	-	-		benches.
66	T 8 N | R 23 E	Coal Thickness			x				
	NE SE	Location					x	USGS files, 1956, Evans	820'S, 770'W of E/4 corner.
	Section 3	Overburden			x			Coal Co., Jung - #28A	
67	T 8 N | R 23 E	Coal Thickness				x			
	NE SE	Location					x	USGS files, 1956, Evans	1010'S, 765'W of E/4 corner
	Section 3	Overburden				x		Coal Co. Mine Map - Jung -	"only markings".
68	T 8 N | R 23 E	Coal Thickness				x		#28C	
	NW SE	Location				x		USGS files, 1956, Evans	1550' FSL, 1755 FEL (one of
	Section 3	Overburden				x		Coal Co. Mine Map	3 holes shown - not clear
69	T 8 N | R 23 E	Coal Thickness				x			which one).
	SW SE	Location			x			Knechtel, 1949, Bore Hole	Upper and Lower Hartshorne
	Section 3	Overburden	-	-	-	-	-	#6	benches.
70	T 8 N | R 23 E	Coal Thickness			x				
	NW SE	Location					x	USGS files, 1956, Evans	1330'N, 350'E of S/4
	Section 3	Overburden				x		Coal Co. Mine Map	corner.
71	T 8 N | R 23 E	Coal Thickness				x			
	NE SW	Location					x	USGS files, 1956, Evans	110'W, 1345'N of S/4
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	corner.
72	T 8 N | R 23 E	Coal Thickness				x		Hole #AA-9	
	SE SW	Location					x	USGS files, 1956, Evans	1170' FSL, 1905' FWL.
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	
73	T 8 N | R 23 E	Coal Thickness				x		Hole #H-26	
	SE SW	Location			x			Knechtel, 1949, Plate 2,	Upper and Lower Hartshorne
	Section 3	Overburden	-	-	-	-	-	Table 3, Bore Hole #7	benches.
74	T 8 N | R 23 E	Coal Thickness			x				
	SE SW	Location					x	USGS files, 1956, Evans	1560' FWL, 820' FSL.
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	
75	T 8 N | R 23 E	Coal Thickness				x		Hole #1-B	
	SW SW	Location					x	USGS files, 1956, Evans	775' FSL, 1325' FWL
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	
76	T 8 N | R 23 E	Coal Thickness				x		Hole #4-B	

DATE POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SW SW	Location					x	USGS files, 1956, Evans	1260' FWL, 1020' FSL.
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	
77	T 8 N | R 23 E	Coal Thickness				x		Hole #AA-10	
	SW SW	Location					x	USGS files, 1956, Evans	850' FWL, 840' FSL.
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	
78	T 8 N | R 23 E	Coal Thickness				x		Hole #H-25	
	SW SW	Location					x	USGS files, 1956, Evans	745' FWL, 655' FSL.
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	
79	T 8 N | R 23 E	Coal Thickness				x		Hole #5-B	
	SW SW	Location					x	USGS files, 1956, Evans	335' FWL, 600' FSL.
	Section 3	Overburden				x		Coal Co. Mine Map, Bore	
80	T 8 N | R 23 E	Coal Thickness				x		Hole #6-B	
	SW SW	Location			x			Knechtel, 1949, Slope Mine	Upper and Lower Hartshorne
	Section 10	Overburden	-	-	-	-	-	#24	benches.
81	T 8 N | R 23 E	Coal Thickness			x				
	SE SW	Location			x			Knechtel, 1949, Slope Mine	Upper and Lower Hartshorne
	Section 10	Overburden	-	-	-	-	-	#23	benches.
82	T 8 N | R 23 E	Coal Thickness			x				
	SW SE	Location			x			Knechtel, 1949, Slope Mine	
	Section 7	Overburden	-	-	-	-	-	#7	
83	T 8 N | R 24 E	Coal Thickness			x				
	SE SE	Location			x			Knechtel, 1949, Bore Hole	
	Section 7	Overburden	-	-	-	-	-	#8	
84	T 8 N | R 24 E	Coal Thickness			x				
	NE SW	Location			x			Knechtel, 1949, Slope Mine	
	Section 8	Overburden	-	-	-	-	-	#9	
85	T 8 N | R 24 E	Coal Thickness			x				
	NW SE	Location			x			Knechtel, 1949, Slope Mine	Interburden of 6' to 38'
	Section 8	Overburden	-	-	-	-	-	#10	feet reported.
86	T 8 N | R 24 E	Coal Thickness			x				
	NW SE	Location				x		USGS files, 1915, Bokoshe	1080'E, 765'S of center.
	Section 8	Overburden	-	-	-	-	-	Smokeless Coal Co. Mine #2	
87	T 8 N | R 24 E	Coal Thickness				x			
	NE SE	Location				x		USGS files, 1915, Bokoshe	150'W, 750'S of E/4
	Section 8	Overburden	-	-	-	-	-	Smokeless Coal Mine #1	corner.
88	T 8 N | R 24 E	Coal Thickness				x			
	NW SW	Location				x		USGS files (1915) Bokoshe	620'S, 720'W of W/4
	Section 9	Overburden	-	-	-	-	-	Smokeless Coal Co. Mine #1	corner.
89	T 8 N | R 24 E	Coal Thickness				x			

DATE POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SW NW	Location				x		USGS files, 1915, Bokoshe	900'E, of W/4 corner.
	Section 9	Overburden	-	-	-	-	-	Smokeless Coal Co. Mine #1	
90	T 8 N | R 24 E	Coal Thickness				x			
	NE NW	Location			x			Knechtel, 1949, Slope Mine	
	Section 9	Overburden			x			#34	
91	T 8 N | R 24 E	Coal Thickness			x				
	NW NE	Location				x		USGS files, 1931, Rees Coal	Middle Band reported for
	Section 9	Overburden	-	-	-	-	-	Co., Slope #8	interburden. 1370' FEL,
92	T 8 N | R 24 E	Coal Thickness				x			480' FNL.
	NE NE	Location				x		USGS files, 1931, Rees Coal	Middle Band reported for
	Section 9	Overburden	-	-	-	-	-	Co., Slope #8	interburden. 320' FNL,
93	T 8 N | R 24 E	Coal Thickness				x			280' FWL.
	NE NE	Location				x		USGS files, 1931, Rees Coal	Middle Band reported for
	Section 9	Overburden	-	-	-	-	-	Co., Slope #8	interburden. 445' FNL,
94	T 8 N | R 24 E	Coal Thickness				x			845 FEL.
	SW SW	Location					x	USGS files, Bore Hole #13,	6" of Middle Band noted in
	Section 10	Overburden					x	1952	UH.
95	T 8 N | R 24 E	Coal Thickness					x		
	SW SW	Location					x	USGS files, Bore Hole #14,	
	Section 10	Overburden					x	1952	
96	T 8 N | R 24 E	Coal Thickness					x		
	C of SL	Location				x		USGS files, Bore Hole #12,	No coal.
	Section 10	Overburden				x		1952	
97	T 8 N | R 24 E	Coal Thickness					x		
	SE SW	Location					x	USGS files, Bore Hole #18,	No coal. Very steep dip
	Section 10	Overburden					x	1952	and faulty section noted on
98	T 8 N | R 24 E	Coal Thickness					x		log.
	SE SW	Location					x	USGS files, Bore Hole #17,	
	Section 10	Overburden					x	1952	
99	T 8 N | R 24 E	Coal Thickness					x		
	NE SE	Location			x			USGS files, 1978, Spiro -	
	Section 10	Overburden			x			Bokoshe KRCRA map, Bore	
100	T 8 N | R 24 E	Coal Thickness			x			Hole #21	
	NE SE	Location			x			USGS files, 1978, Spiro -	
	Section 10	Overburden			x			Bokoshe KRCRA map, Bore	
101	T 8 N | R 24 E	Coal Thickness			x			Hole #22	
	NE SE	Location			x			USGS files, 1978, Spiro -	
	Section 10	Overburden			x			Bokoshe KRCRA map, Bore	
102	T 8 N | R 24 E	Coal Thickness			x			Hole #20	

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SE SE	Location			x			USGS files, 1978, Spiro -	No coal - hole too shallow.
	Section 10	Overburden	-	-	-	-	-	Bokoshe KRCRA map, Bore	
103	T 8 N | R 24 E	Coal Thickness	-	-	-	-	-	Hole #23	
	NE SE	Location			x			USGS files, 1978, Spiro -	
	Section 10	Overburden			x			Bokoshe KRCRA map, Bore	
104	T 8 N | R 24 E	Coal Thickness			x			Hole #18	
	NE SE	Location					x	USGS files, Bore Hole #16,	
	Section 10	Overburden					x	1952	
105	T 8 N | R 24 E	Coal Thickness					x		
	NE SE	Location			x			USGS files, 1978, Spiro -	
	Section 10	Overburden			x			Bokoshe KRCRA map, Bore	
106	T 8 N | R 24 E	Coal Thickness			x			Hole #19	
	NE SE	Location					x	USGS files, Bore Hole #15,	
	Section 10	Overburden					x	1952	
107	T 8 N | R 24 E	Coal Thickness					x		
	SW SW	Location			x			Knechtel, 1949, Bore Hole	
	Section 11	Overburden			x			#12	
108	T 8 N | R 24 E	Coal Thickness			x				
	SE SE	Location			x			Knechtel, 1949, Bore Hole	
	Section 15	Overburden			x			#33	
109	T 8 N | R 24 E	Coal Thickness			x				
	SE SE	Location		x				Knechtel, 1949, Bore Hole	
	Section 15	Overburden			x			#34	
110	T 8 N | R 24 E	Coal Thickness			x				
	SE SE	Location			x			Knechtel, 1949, p. 66,	No coal.
	Section 16	Overburden	-	-	-	-	-	Measured Section #11	
111	T 8 N | R 24 E	Coal Thickness	-	-	-	-	-		
	SW SE	Location			x			Knechtel, 1949, Bore Hole	
	Section 16	Overburden			x			#35	
112	T 8 N | R 24 E	Coal Thickness			x				
	SE SW	Location			x			Knechtel, 1949, Bore Hole	
	Section 16	Overburden			x			#36	
113	T 8 N | R 24 E	Coal Thickness			x				
	NW SW	Location			x			Knechtel, 1949, Bore Hole	Given as UH in Knechtel but
	Section 16	Overburden			x			#38	correlates as LH on map.
114	T 8 N | R 24 E	Coal Thickness			x				
	SW SW	Location			x			Knechtel, 1949, Bore Hole	
	Section 16	Overburden			x			#37	
115	T 8 N | R 24 E	Coal Thickness			x				

DATE POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	N/2 S/2 N/2	Location					x	Gose Petroleum Corporation,	Top of SS not logged. KB
	Section 17	Overburden		x				Lindenau #1, 1967	15' above GL-Ind., GR logs.
116	T 8 N | R 24 E	Coal Thickness	-	-	-	-	-		
	NE NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 18	Overburden	-	-	-	-	-	#39	benches.
117	T 8 N | R 24 E	Coal Thickness			x				
	NW NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 18	Overburden	-	-	-	-	-	#40	benches.
118	T 8 N | R 24 E	Coal Thickness			x				
	SW NW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 18	Overburden	-	-	-	-	-	#41	benches.
119	T 8 N | R 24 E	Coal Thickness			x				
	SE NE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 13	Overburden	-	-	-	-	-	#25	benches.
120	T 8 N | R 24 E	Coal Thickness			x				
	SW NE	Location			x			Knechtel, 1949, Slope Mine	Upper and lower Hartshorne
	Section 13	Overburden	-	-	-	-	-		benches.
121	T 8 N | R 23 E	Coal Thickness			x				
	NW SW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 13	Overburden	-	-	-	-	-	#27	benches.
122	T 8 N | R 23 E	Coal Thickness			x				
	SE SE	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 14	Overburden	-	-	-	-	-	#28	benches.
123	T 8 N | R 23 E	Coal Thickness			x				
	SE SW	Location			x			Knechtel, 1949, Bore Hole	Upper and lower Hartshorne
	Section 14	Overburden	-	-	-	-	-	#29	benches.
124	T 8 N | R 23 E	Coal Thickness			x				
	SW NW	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden	-	-	-	-	-	#33	
125	T 8 N | R 23 E	Coal Thickness			x				
	NW NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden	-	-	-	-	-	#34	
126	T 8 N | R 23 E	Coal Thickness			x				
	SW NE	Location					x	Pan American Petroleum	KB is 16.6' above GL (I-GR)
	Section 24	Overburden			x			Corporation, Tanksley Unit	log.
127	T 8 N | R 23 E	Coal Thickness	-	-	-	-	-	#1, 1966	
	NW NW	Location					x	Reserve O & G, Tolbert 21-1	KB is 14' above GL (I-GR)
	Section 21	Overburden			x			1977	log.
128	T 8 N | R 24 E	Coal Thickness	-	-	-	-	-		

DATE POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NW NW	Location					x	Oklahoma Department of	
	Section 21	Overburden					x	Mines files, Hole B-50,	
129	T 8 N | R 24 E	Coal Thickness					x	1979-1980	
	NW NW	Location					x	Oklahoma Department of	
	Section 21	Overburden					x	Mines files, Hole B-32,	
130	T 8 N | R 24 E	Coal Thickness					x	1979-1980	
	NE NW	Location			x			Knechtel, 1949, Bore Hole	
	Section 21	Overburden			x			#42	
131	T 8 N | R 24 E	Coal Thickness			x				
	NW NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 21	Overburden			x			#43	
132	T 8 N | R 24 E	Coal Thickness			x				
	NE NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 21	Overburden			x			#45	
133	T 8 N | R 24 E	Coal Thickness			x				
	NE NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 21	Overburden			x			#44	
134	T 8 N | R 24 E	Coal Thickness			x				
	NE NE	Location					x	Oklahoma Department of	3.5' LH coal is estimated.
	Section 21	Overburden					x	Mines files, Hole B-38,	
135	T 8 N | R 24 E	Coal Thickness				x		1979-1980	
	NW NW	Location					x	Oklahoma Department of	
	Section 22	Overburden				x		Mines files, Bore Hole	
136	T 8 N | R 24 E	Coal Thickness					x	B-39, Lease F-7, 1979-1980	
	NW NW	Location					x	Oklahoma Department of	
	Section 22	Overburden					x	Mines Files, Hole B-40,	
137	T 8 N | R 24 E	Coal Thickness					x	1979-1980	
	NW NW	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden			x			#47	
138	T 8 N | R 24 E	Coal Thickness			x				
	NW NW	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden			x			#46	
139	T 8 N | R 24 E	Coal Thickness			x				
	SW NW	Location			x			Knechtel, 1949, p. 66,	
	Section 22	Overburden			x			Measured Section #12	
140	T 8 N | R 24 E	Coal Thickness			x				
	NW NW	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden			x			#49	
141	T 8 N | R 24 E	Coal Thickness			x				

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	NW NW	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden			x			#48	
142	T 8 N | R 24 E	Coal Thickness			x				
	SE NW	Location					x	Senate Document #390, 1910,	Same as BH #50, Knechtel
	Section 22	Overburden					x	p. 68, Bore Hole #31	1944.
143	T 8 N | R 24 E	Coal Thickness					x		
	NE SW	Location					x	USGS files, 1953, Bore Hole	
	Section 22	Overburden					x	#H-2	
144	T 8 N | R 24 E	Coal Thickness					x		
	NE SW	Location					x	Pan American Petroleum	KB - 17.5' above GL. Gamma
	Section 22	Overburden				x		Corporation, Tolbert Unit	Induction log.
145	T 8 N | R 24 E	Coal Thickness		x				#1, 1967	
	NW NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden	-	-	-	-	-	#52	
146	T 8 N | R 24 E	Coal Thickness			x				
	NW NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden			x			#51	
147	T 8 N | R 24 E	Coal Thickness			x				
	NW NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden			x			#53	
148	T 8 N | R 24 E	Coal Thickness			x				
	NE NE	Location			x			Knechtel, 1949, Bore Hole	
	Section 22	Overburden			x			#54	
149	T 8 N | R 24 E	Coal Thickness			x				
	NE SW	Location					x	Sunray DX #1, Odis Kinsey	KB 15' above GL (IEL-GR/N)
	Section 27	Overburden				x		Unit, 1967	logs.
150	T 8 N | R 24 E	Coal Thickness		x					
	NW SE	Location					x	Sinclair Oil and Gas Co.	KB not given (I-SP) logs.
	Section 29	Overburden		x				Huddleston Unit #1, 1965	
151	T 8 N | R 24 E	Coal Thickness	-	-	-	-	-		
	SE NW	Location					x	Galaxy Oil, Bledsoe #1,	KB is 13' above GL? (log
	Section 26	Overburden		x				1969	hard to read) I-GR log.
152	T 8 N R 23 E	Coal Thickness	-	-	-	-	-		
	SW NE	Location					x	Pan American Petroleum	KB is 20.2' above GL (IE &
	Section 32	Overburden				x		Corporation, Cochran Unit	GR-Son. logs).
153	T 8 N | R 24 E	Coal Thickness		x				#1, 1964	
	SE NW	Location					x	Sunray DX Oil Company,	KB is 16' above GL. Log
	Section 33	Overburden				x		Marvin Watson Unit #1,	indicates only 1 Harts Coal
154	T 8 N | R 24 E	Coal Thickness		x				1965	(I-GR Dens.)

DATA POINT #	LOCATION	INCREASING RELIABILITY →	1	2	3	4	5	REFERENCE	NOTES/COMMENTS
	SE NW	Location					x	Sunray DX Oil Company,	KB is 18.5' below GL (I-GR,
	Section 34	Overburden				x		H.C. Molthan #1, 1966	FM Den) logs.
155	T 8 N | R 24 E	Coal Thickness		x					
	NW NW	Location					x	Dyco Petroleum Corporation,	KB is 15' above GL (I-GR)
	Section 35	Overburden				x		Helton #1, 1978	log.
156	T 8 N | R 24 E	Coal Thickness	-	-	-	-	-		

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
1-8-23	Dyco/#1 Stephens			NR	455		5505
	1420 FSL 2640 FWL	NR	NR	1228	455		1975
1-8-23	Stephens/#1 C. Blan					5100	6103
	2950 FSL 1790 FWL		NR	NR	510		1966
1-8-23	Samson/#1 Stroud			NR		2600	5804
	1790 FSL 1000 FWL of NW/4	NR	NR	NR	543		1978
2-8-23	Humble/#1 Reese			NR		2360	5947
	1933 FSL 2333 FWL	NR	NR	NR	516		1964
3-8-23	French & Walker/#1 Reese			1238			5975
	C N/2 SW SW	NR	NR	NR			1979
3-8-23	Humble/#1 Farmers Flag			NR		2370	6850
	SW NW SE	NR	NR	NR	856		1964
3-8-23	Headco/#1 McBee			NR		2484	6039
	1051 FSL 1320 FWL of NE/4	NR	NR	NR	1014		1977
10-8-23	LeFlore Gas/#1 W. W. Lowery			NR		2150	5790
	178 FSL 1756 FWL of NW/4	NR	NR	NR	1006		1963
11-8-23	Humble/#1 Reese-McBee			NR	465	1050	5485
	1815 FSL 825 FWL of SE/4	NR	NR	NR	465		1966
12-8-23	Humble/#1 Graham-McBee			NR		1150	5450
	2040 FSL 2440 FWL	NR	NR	NR	486		1965
13-8-23	Pan Am/#1 Star			NR	723	2150	5250
	1000'N of Center	NR	NR	NR	723		1966
14-8-23	Ark-Okla/#1 Phillips						5645
	SW SE NW		NR	NR	194		1951
14-8-23	Snee & Eberly/#1 Pruitt			NR			5701
	1690 FSL 2540 FWL	NR	NR	NR			1968

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
15-8-23	Stephens/#1 McBee Est.			NR	498	5000	6106
	2080 FSL 1880 FWL	NR	NR	NR	498		1967
22-8-23	Pan Am/#1 Besher			NR			5700
	150' N/C NW NW SE	NR	NR	NR	1402	2700	1966
23-8-23	Cimmaron/CPC 132 Tanksley			NR			5900
	CNE	NR	NR	NR			1979
23-8-23	Pan Am/#1 Bowen			NR		3300	5460
	NE NE SW	NR	NR	828	1198		1966
24-8-23	Pan Am/#1 Tanksley			NR	614	3270	5310
	980 N 710 E C/Section	C interval 615-1095	NR	NR	614		1966
24-8-23	Unit Drlg./#1-24 Tanksley			NR			5670
	1340 FNL 990 FWL of NW/4	NR	NR	NR			1979
25-8-23	Mustang/#1 Bledsoe			1010	1480	2300	7911
	CSE	NR	NR	1010	1480		1979
26-8-23	Galaxy/#1 Bledsoe			NR	558	1780	7315
	707 FSL 707 FEL of NE/4	NR	NR	NR	558		1969
27-8-23	Pan Am/#1 Teague			NR	1438	4300	6479
	493 FNL 743 FWL of C NW/4	NR	NR	NR	1438		1965
27-8-23	Calvert/#1 Teague			NR	1172		6215
	1320 FSL 1370 FWL of NW/4	NR	NR	917	1172		1974
36-8-23	Samson/#1 Ehrdhardt			NR			8301
	1980 FSL 10 FWL of NW/4	NR	NR	NR			1979
3-8-24	Pan Am/#1 Lewis				40		5500
	CSW NE		NR	784	40		1967
3-8-24	Snee & Eberly/#1 Tackett			NR			5030
	CNW	NR	NR	NR			1974
4-8-24	An-Son/#1 Burcham			NR	430		4955
	CSE NW	NR	NR	NR	430		1967
5-8-24	Snee & Eberly/#1 Hoffman			NR	881		5120
	300 FSL 2440 FWL of NW/4	NR	NR	NR	881		1966
6-8-24	Western/#1 Choate			NR			5525
	NW NE NW	NR	NR	NR	100		1943
6-8-24	King/#1-6 Lizzabell Reese			NR	553	950	5430
	200 FSL 1320 FWL	NR	NR	NR	553		1967
6-8-24	Aikman/#1 Bokoshe						5794
	CNW SE		NR	NR			1979

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
6-8-24	K & A/#1 Bokoshe			NR			5794
	660 FSL 1855 FWL of SE/4	NR					1979
6-8-24	King RBS						
	SE NW						
7-8-24	Pan Am/#1 Holmes			NR			7350
	NW SE	NR	NR	NR	598	598	1965
7-8-24	Headington/#1 Graham			NR			5210
	CSW	NR	NR	NR			1974
8-8-24	Pan Am/#1 Gilbert			NR	800*		5430
	1710 FNL 1650 FWL	NR	NR	NR	800*	800*	1964
9-8-24	Snee & Eberly/#1 Bokoshe			1128		1100*	4920
	SE NW	NR	NR	1128	407*		1965
9-8-24	Samson/#1 Braun			NR			5029
	1315 FSL 660 FWL of NW/4	NR	NR	NR			1979
10-8-24	Reserve/#10-1 S. J. Ray			NR			7502
	CSE	NR	NR	NR			1979
15-8-24	Ferguson/#1 Bean-Grubb			NR			7614
	CNW	NR	NR	NR			1978
15-8-24	Reserve/#15-1 A. Tackett			NR			10703
	C N/2 SW	NR	NR	NR			1978
16-8-24	Reserve/#16-1 L. Braked			NR		1001*	8000
	CSW SE	NR	NR	NR			1978
17-8-24	Gose/#1 Lindenau			NR	610		5647
	NE SE NW (950'N 20'W of C)	NR	NR	NR	610		1967
17-8-24	Hanover/#2 Lindenau			NR			7577
	660 FSL 1590 FWL of SE/4	NR	NR	NR			1978
18-8-24	Snee & Eberly/#1 Holmes			510			5353
	S/2 SW SE NW	NR	NR	NR			1969
19-8-24	Gose/#1 Tanksley			NR	781*		7800
	NE SE NW	NR	NR	NR	781*		1969
19-8-24	Reserve/#19-1 Doussett			NR			10725
	1670 1195 of SE/4	NR	NR	NR			1978
20-8-24	Reserve/#20-1 Hatter Farms			NR	1245*		7341
	820 FSL 1320 FWL of NW/4	NR	NR	NR	1245*		1977
21-8-24	Reserve/#21-1 Tolbert			NR	2000*	2000*	7171
	1630 FSL 660 FWL of NW/4	NR	NR	NR			1977

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
22-8-24	Pan Am/#1 Tolbert			NR			6500
	1980 FSL 1980 FWL	NR	NR	NR			1967
27-8-24	Sunray/#1 O. Kinsey			NR			7592
	1933 FSL 1933 FWL	NR	NR	NR			1967
28-8-24	Pan Am/#1 Fisher			NR		3450	6450
	1650 FSL 2515 FWL	NR	NR	NR	1727		1967
29-8-24	Sinclair/#1 Huddleston			NR			8100
	1113 FSL 708 FWL of SE/4	NR	934	NR			1965
29-8-24	Montgomery/#1-29 J. K. McBee			NR			8000
		NR	NR	NR			1978
29-8-24	Montgomery/#1-29 Broome			NR			6450
	CSE SE	NR	NR	NR			1977
30-8-24	Reserve/M. McBee #30-1			NR			7700
	CNE	NR					1978
21-9-23	Unit Drlg./#1-21 Poor Boy			NR	617		5700
	CNW	NR	NR	NR	617		1978
22-9-23	Stephens/#1 Gose			NR		4000	6220
	2030 FSL 3240 FWL, NW NW SE	NR	NR	NR	4000		1966
22-9-23	Texas O & G/#1 Kinsey			NR			5513
	W/2 NE NE	NR	NR	1592			1980
23-9-23	An-Son/#1 Adkison			NR	511	2650	5391
	707 FSL 707 FWL of NE/4	NR	NR	NR	511		1966
23-9-23	Samson/#1 Hayes			NR	475	2050*	5509
	CNE NE	NR	NR	NR	475		1977
24-9-23	LeFlore Co. G & E/#1 K. R. Harris			NR		2000	5840
	3450 FSL 1145 FWL	NR	NR	NR	602*		1962
25-9-23	Humble/#1 Kinsey			NR	462	750	6006
	NW SE SW	NR	NR	NR	462		1965
25-9-23	Hawkins/#1-25 Rabon						6200
	CNE NE		NR	NR			1980
26-9-23	An-Son/#1 Harris			NR	520*	3870	5785
	SE SE NW	NR	NR	960	520*		1966
27-9-23	Potts-Stephenson/#1-27 State			NR	1200	1564	6100
	CSW	NR	NR	NR	1200		1979
27-9-23	An-Son/#1 Wilson			NR	503*	2650	5720
	SE NW	NR	NR	NR	503*		1966

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
28-9-23	Dyco/#1 Loudermilk			NR	561	1900	6150
	CSE	NR	NR	NR	561		1977
34-9-23	Humble/#1 Evans			NR		1800	5440
	1000'S of Center	NR	NR	NR	626		1965
35-9-23	Stephens/T. F. Ritter			NR		4350	6184
	2440 FSL 2340 FWL	NR	NR	NR	578		1965
36-9-23	Stephens/#1 C. Jones			NR		1450	6092
	2165 FSL 2165 FWL	NR	NR	NR	590		1966
19-9-24							
20-9-24	West. OK. Gas./#1 G. W. Watkins			NR			5541
	NE NE SW	NR	NR	NR			1943
20-9-24							
21-9-24	West. OK/#1 Redwine			NR			5427
	C S/2 NE	NR	NR	NR			1943
21-9-24	Southern United/#1 Echols			NR			5427
	NW NW NE	NR	NR	NR			1943
22-9-24							
27-9-24							
27-9-24							
28-9-24	Western Okla./#1 W. E. Mills			NR			5265
	C W/2 SW SE	NR	NR	NR	129*		1941
28-9-24	Western Okla./#1 Hinton			NR			5282
	CNE SW	NR	NR	NR			1942
29-9-24	Western Okla./#1 McBee			NR			5240
	C S/2 SE NE	NR	NR	NR			1942
29-9-24	Western Okla./#1 Carpenter			NR			5050
	SW SW NE	NR	NR	NR	157*		1942
29-9-24	Western Okla./#1 Watkins						5541
	2500 FSL 2080 FWL		NR	NR			1943
30-9-24	Ark-Okla./#1 Rabon			NR			5545
	SW SW NE	NR	NR	NR	133*		1948

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
30-9-24	Pan Am/#1 Jones			NR	550*		5412
	1940 FSL 3340 FWL	NR	NR	NR			1961
31-9-24	Western Okla./#1 Price			NR			5525
	CNE SE	NR	NR	NR	129*		1942
31-9-24	Stephens/#1-31 Rabon			NR			3870
	915 FSL 790 FWL of NE/4	NR	NR	NR			1979
32-9-24	West Okla. Gas/#1 Stattham			NR			5201
	CEL SE NE	NR	NR	NR			1941
32-9-24							
33-9-24	Stephens/#2 Stratham			NR			5559
	300 FSL 2490 FWL of NW/4	NR	NR	NR			1974
33-9-24	Stephens/#1 Stratham						5205
	SE SE NE		NR	NR			1941
34-9-24	Samson/#1 Burrows			NR			5050
	CSW	NR	NR	NR			1978