FY03 Annual Technical Report for NCRDS State Cooperative Program

PENNSYLVANIAN BITUMINOUS COAL, NORTH-CENTRAL TEXAS: POTENTIAL FOR COALBED METHANE RESOURCE DEVELOPMENT

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Abstract

Most recent U.S. Geological Survey National Coal Resources Data System (NCRDS) activities completed for the State of Texas by the Bureau of Economic Geology (BEG) focused on Wilcox Group deep coal (lignite) resources, including *Defining coalbed methane exploration fairways in East-Central Texas* (Tyler and Scott, 1999) and *Deep-basin coal (lignite) in Wilcox Group, Sabine Uplift, East Texas: potential for unconventional coalbed methane resource development* (Kim and Ruppel, 2001). The major objectives of these projects were to provide high-quality, organized digital information and interpretations on the location, quality, and quantity of the coal to be mined in the Wilcox Group, Texas Gulf Coast area, during the next several decades to meet the needs of the region and the nation for reliable, low-cost, environmentally compatible energy.

The first commercial coalbed methane field in Texas, the Sacatosa coalbed methane field in Maverick County, was announced in 2001 by The Exploration Company. This field is currently being produced from bituminous coal and carbonaceous shale of the Upper Cretaceous Olmos Formation in the Maverick Basin. Although the Pennsylvanian bituminous coals of North-Central Texas are of a rank higher than that of Texas Gulf Coast lignites and are comparable to Olmos bituminous coals, very little current information exists on their occurrence, distribution, geological setting, or future potential for coalbed methane development. More detailed and updated information on the coal resource in this region is essential for inclusion in the NCRDS, utilizing digital databases of available data as well as digitized maps compiled in a Geographic Information System (GIS) platform.

The Pennsylvanian bituminous coals of North-Central Texas are of higher rank and thereby have higher Btu values than Texas Gulf Coast lignites. Moreover, they are also closer to the major energy user market of the Dallas-Fort Worth area. However, owing to their high sulfur/ash content and thin beds, commercial mining and potential for coalbed methane in these coals is limited.

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Introduction

Adequate energy supplies and efficient use of those supplies are critical to the economic well-being of a country. Affordable and reliable coal supplies are essential to national and local policy. Policy makers require a range of information on energy supply, as well as economic and environmental issues associated with that energy source and its use. Formation of an effective national energy policy and development of energy resources require that we understand the geology, distribution, quality, and size of the national energy endowment (U.S. Geological Survey, 2001).

Coal is an energy-producing commodity that is essential to the economic well-being of the world. The major use of coal in the United States is in production of electricity. Other uses are residential and commercial, including production of coke for the steel industry. The economic viability of a coal deposit depends on several factors, including overall quality and calorific value of the coal, mining costs, beneficiation costs, transportation to market, and costs of disposal of the waste products of use. Like any other nonrenewable economic resource, coal deposits are discovered and evaluated, exploited if they are economic, and abandoned once they can no longer be produced at a profit, even though much of the resource may remain in the ground. In a review of world energy resources, M. King Hubbert (1973) estimated that the coal resources of the United States and of the world will be depleted within 300 to 400 years. More recently, the Energy Information Administration (1995) estimated that the United States has enough coal to last 250 years. However, during the next few centuries, coal production rates will most likely decline as mining of thinner, deeper, and less desirable coal beds becomes necessary, although an overall decline in this nation's coal production is not anticipated for many years (U.S. Geological Survey, 1996).

Interest in coalbed methane, natural gas production from coals, has recently increased. Once considered an unconventional gas resource, with production enabled only through government incentives such as tax credits, coalbed methane has proved to be an economically viable resource even without governmental incentives. It continues to contribute an increasing share to the nation's domestic natural gas production. Interest in coal regions has been renewed as a result of potential coalbed methane resource development.

The U.S. Geological Survey's NCRDS provides a modern, versatile inventory of the location, quantity, quality, and availability of coal resources of the United States. The U.S. Geological Survey develops and maintains cooperative projects with the major coal-bearing states to build NCRDS stratigraphic, geochemical, and petrographic databases. The U.S. Geological Survey has funded 20 to 25 State Geological Surveys, representing 98 percent of U.S. coal production, to collect, evaluate, and correlate drill-hole, mine, and outcrop data; collect coal and related rock samples for analysis; encode and enter geologic and geochemical data into NCRDS; and access NCRDS databases and software to generate new maps, reports, and resource assessments within each state.

Texas ranks sixth in coal production in the United States. Most coal in the region is produced from the Wilcox (Paleocene-Eocene) Group and is used as fuel for mine-mouth electric-power-generating plants. Most recent State of Texas NCRDS activities completed by the Bureau of Economic Geology (BEG) focused on Wilcox Group deep coal (lignite), including *Defining coalbed methane exploration fairways in East-Central Texas* (Tyler and Scott, 1999) and *Deep-basin coal (lignite) in Wilcox Group, Sabine Uplift, East Texas: potential for unconventional coalbed methane resource development* (Kim and Ruppel, 2001). Major objectives of these projects were to provide high-quality, organized, digital information and interpretations on the location, quality, and quantity of coal to be mined in the Wilcox Group, Gulf Coast area, during the next several decades to meet the needs of the region and the nation for reliable, low-cost, environmentally compatible energy.

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Providing updated digital data on the Pennsylvanian bituminous coals of North-Central Texas and assessing their potential for future coalbed methane resource development are the major accomplishments of this current study. As a multiyear assessment, major accomplishments for FY02 and FY03 included digital compilation of major background regional data for Pennsylvanian depositional systems and major coal resources, such as the Strawn (Thurber) coals, as well as a comparison with current coalbed methane production from Olmos bituminous coals in the Maverick Basin. Moreover, analysis of other coal resources, such as the Canyon (Bridgeport) and Cisco (Newcastle) coals, as well as an overall future assessment of coalbed methane potential of the Pennsylvanian bituminous coals of North-Central Texas were completed.

Pennsylvanian Depositional Systems and Coal Resources in North-Central Texas

Pennsylvanian rocks of North-Central Texas are economically important energy resources for coal, oil, and natural gas. Deltaic and fluvial facies in the Strawn, Canyon, and Cisco Groups have historically been major coal-producing intervals. Studies with a particular emphasis on coal resources in these intervals were conducted by Mapel (1967) and Evans (1974).Several studies on facies interpretation and regional basin development of the Pennsylvanian in North-Central Texas were conducted by Dumble (1890), Tarr (1890), Cummins (1891), Drake (1893), Plummer and Moore (1921), Lee and others (1938), Cheney and Goss (1952), Turner (1957), Van Siclen (1958), Brown (1969), Wermund and Jenkins (1969, 1970), Galloway and Brown (1972, 1973), and Brown and others (1973).

The geologic history of North-Central Texas is closely tied to the tectonic development of the Fort Worth Basin, the eastern flank of the Midland Basin, and the Red River uplift–southern Oklahoma Mountains. The structural evolution of these basins and associated tectonic elements determined to a great extent the nature and distribution of principal basin-filling depositional elements of the Pennsylvanian (Brown and others, 1973). Middle and Upper Pennsylvanian rocks were deposited in dip-oriented, fluvial-deltaic facies tracts extending across basin margins onto shallow shelves and into deeper, basin-slope environments (Galloway and Brown, 1972; Brown and others, 1973).

Bituminous coal is found in three major regions of Texas: North-Central Texas (west of Fort Worth), South Texas (Eagle Pass and Santo Tomas), and West Texas (Eagle Spring, San Carlos, and Big Bend) (Figure 1). These coals are of a rank higher than that of the extensively

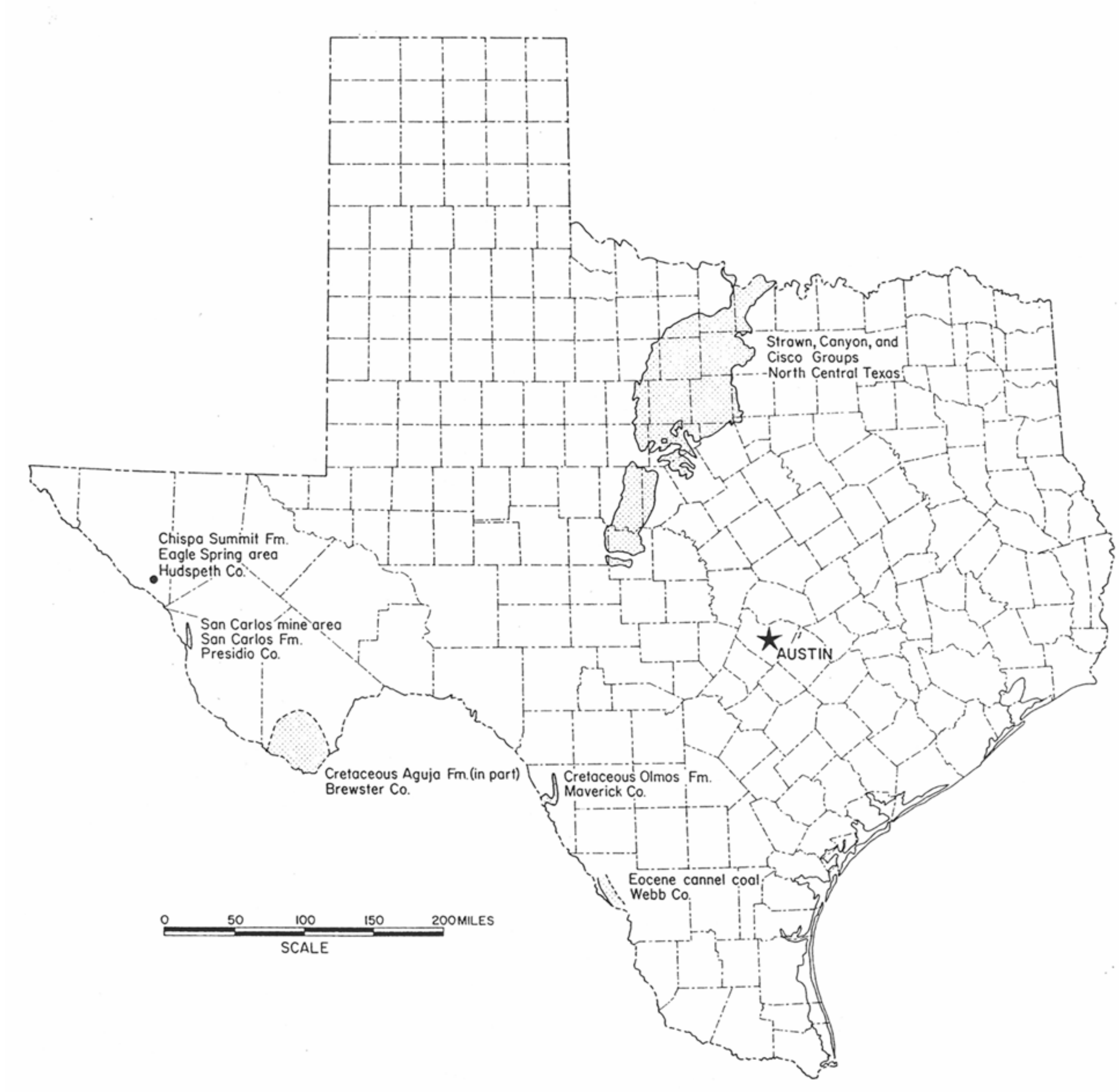

Figure 1. Location map of bituminous coal fields of Texas and generalized outcrop of coal-bearing strata (from Evans, 1974).

studied Texas Gulf Coast lignites and are characterized by relatively thin seams (<3 ft), high sulfur (>2 percent), and high ash (~15 percent). Extensive coal mining of these bituminous coals took place from the 1880's through the 1940's (Evans, 1974). However, with increasing competition from other energy sources such as oil and natural gas, production declined rapidly. Interest has recently been renewed by the search for alternative energy sources, such as coalbed methane, as increased energy demands have constrained domestic energy supplies of oil and natural gas.

Coal resources in North-Central Texas are closely related to, and can be predicted by, the depositional fabric of the basin fill. The spatial distribution and internal facies composition of the depositional systems that fill the basins of the region provide an important tool for understanding and predicting coal resources (Figure 2). For example, Strawn Group coals have both embayment and delta-plain origins. The distribution of coals outlines Pennsylvanian fluvial deltaic and associated interdeltaic embayments (Brown and others, 1973). Coal deposits originated on delta plains in swamps and marshes where organic material could grow, die, accumulate, and be preserved, as well as interdeltaic environments, such as lagoons and bays (Evans, 1974).

Pennsylvanian coals in North-Central Texas can be largely divided into Strawn (Thurber), Canyon (Bridgeport), and Cisco (Newcastle). The distribution and estimated resources of major Pennsylvanian coals in North-Central Texas have been calculated by the U.S. Geological Survey (Mapel, 1967) (Figure 3). Its estimates of coal resources in North-Central Texas indicate the presence of 5,371 million short tons of coal in beds 14 or more inches thick and under 3,000 ft or less of overburden. Strawn Group coals are the major Pennsylvanian coals in North-Central Texas in terms of resource, representing more than half (2,800 million short tons) of the total original inferred resources. Cisco Group coals represent another one-third (1,853 million short tons), and Canyon Group coals represent approximately 13 percent (718 million short tons) of the total original inferred resources (Mapel, 1967). Coal-distribution maps in North-Central Texas prepared by A. W. Cleaves in Brown and others (1973) reveal that contradictions exist with the U.S. Geological Survey's coal distribution maps (Figure 4). Reconciliation of such contradictions requires utilization of all available subsurface information and constitutes a useful restudy of North-Central Texas bituminous coal resources.

The major constraint to potential production of Pennsylvanian coals in North-Central Texas remains in the coal itself. Strawn, Canyon, and Cisco Group coals are generally no more than 30 inches thick, rarely reaching 36 inches in thickness. Poor coal quality characterized by high sulfur content, would prohibit direct combustion (Evans, 1974). Interest in the coalbed methane potential of these coals has recently increased because the coals have been considered an alternative energy source as a result of the considerable amounts of higher rank coal that exist as compared with the lower rank lignite resources of the Texas Gulf Coast and also as a result of environmental considerations. Geographic locations of potential coalbed methane areas are also favorable because of low population densities and nearby high-population markets such as Dallas-Fort Worth and Abilene.

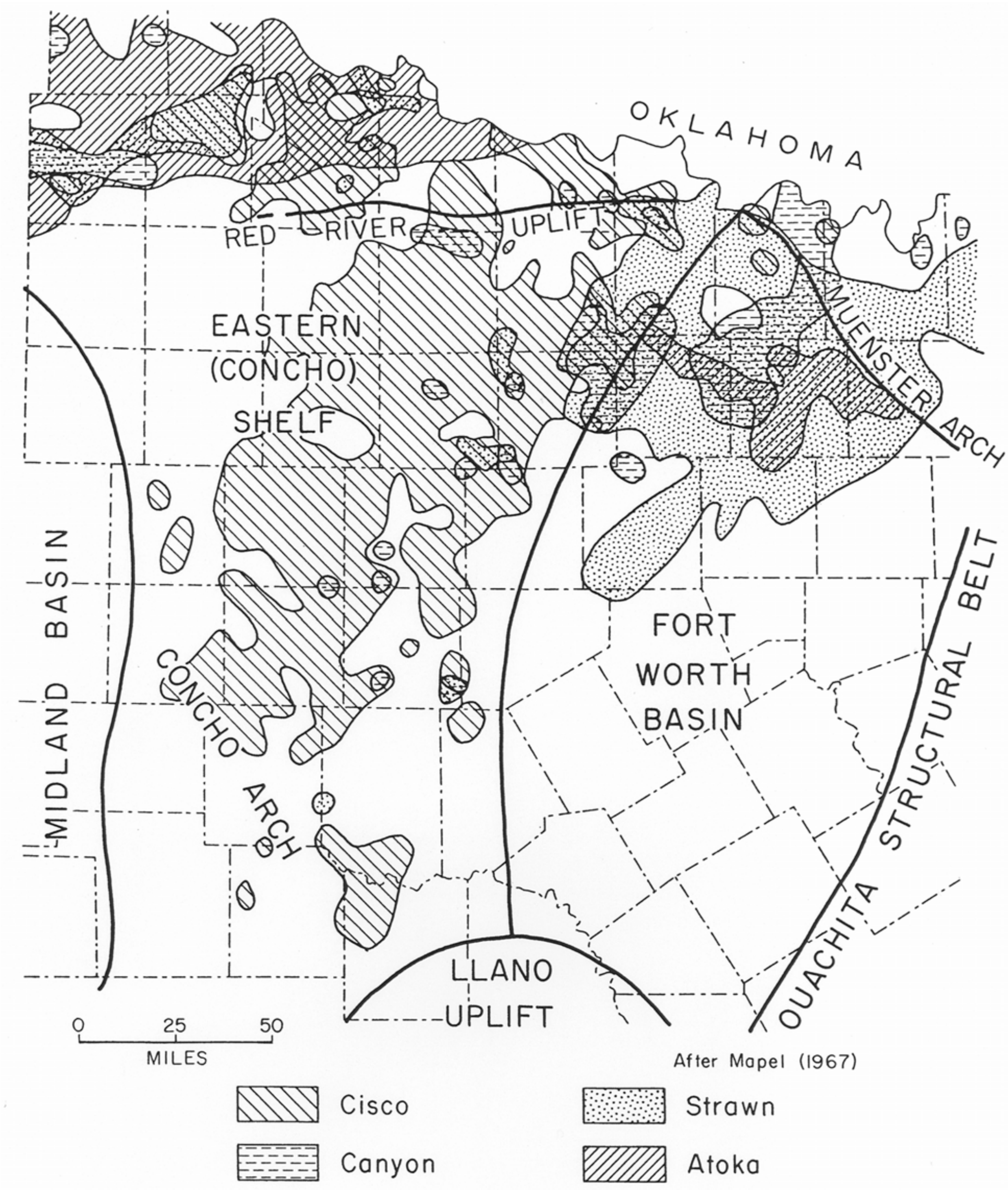

Figure 2. Distribution of Pennsylvanian coal deposits in North-Central Texas (from Brown and others, 1973, after Mapel, 1967).

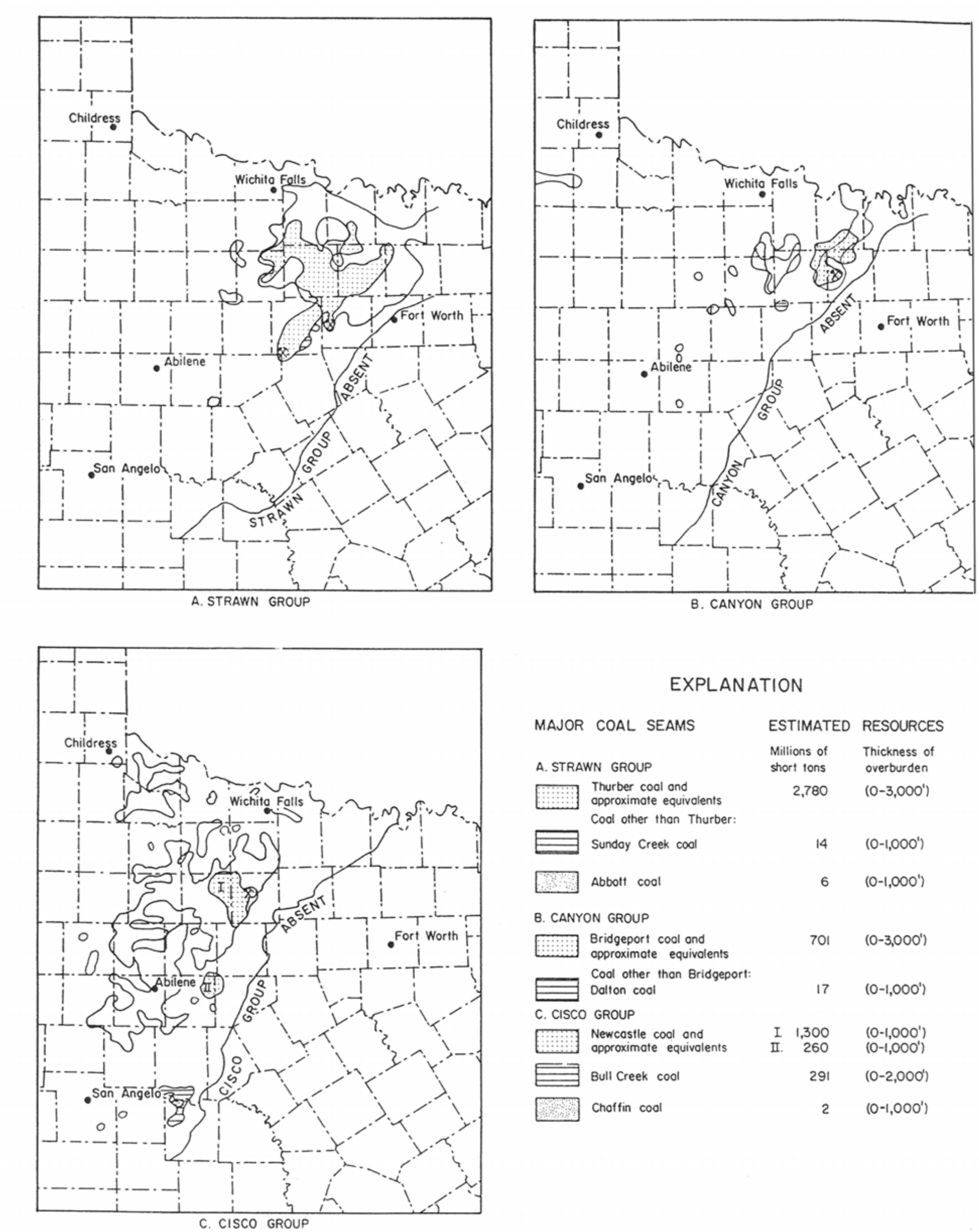

Figure 3. Distribution and estimated resources of major North-Central Texas bituminous coal seams (from Evans, 1974, after Mapel, 1967).

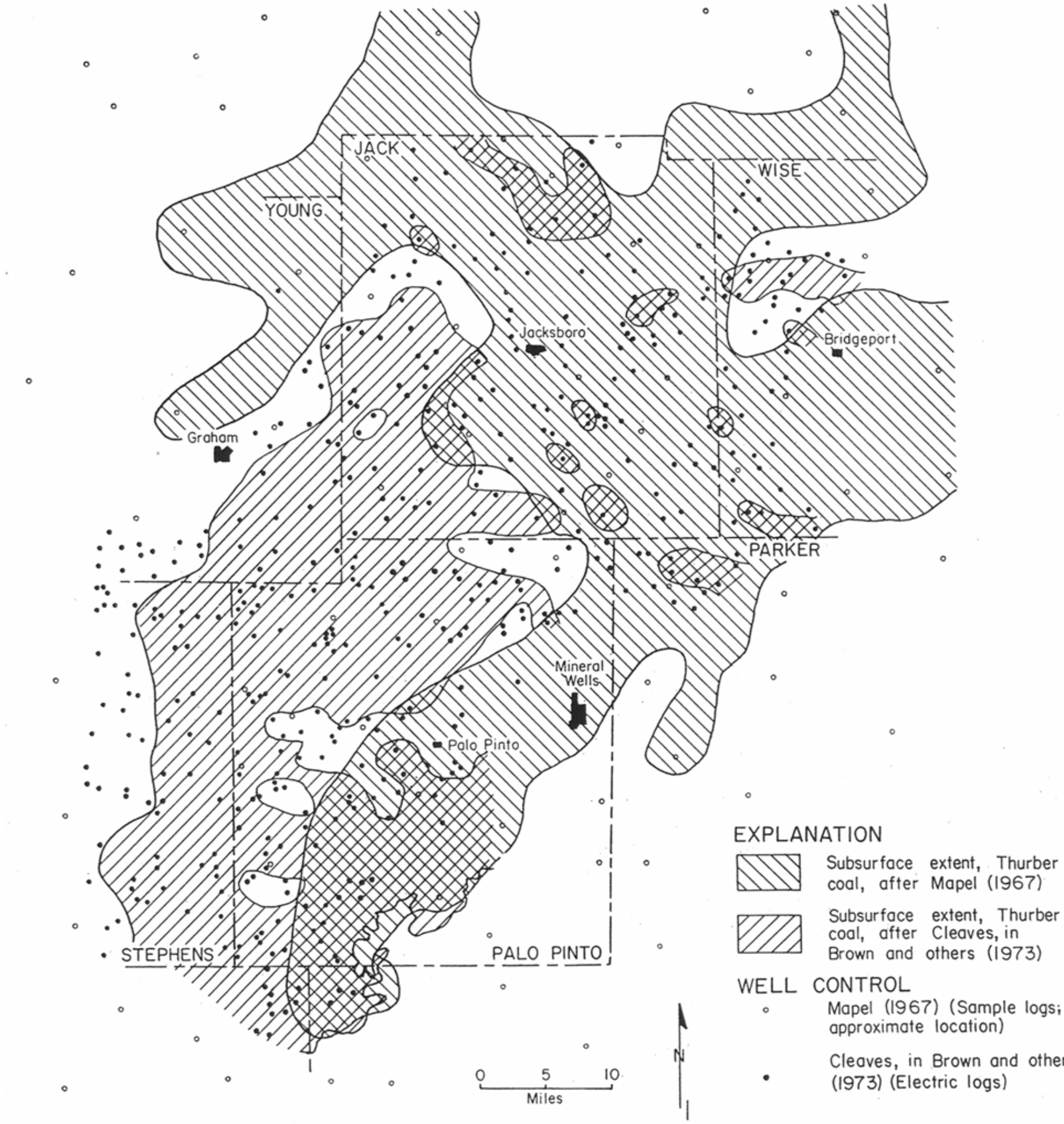

Figure 4. Subsurface distribution of Thurber coal, Strawn Group in North-Central Texas (from Evans, 1974, after Mapel, 1967, and Brown and others, 1973).

Strawn Group

The Strawn Group, mostly sandstone and shale, includes limestones and conglomerates as well. Where the Strawn Group is coal bearing, its thickness ranges from about 2,500 ft in southern Palo Pinto County to 4,500 ft in eastern Denton County. The Strawn Group thins abruptly along the trend of the Red River and Muenster arches (Mapel, 1967). Coal seams are restricted to the upper Strawn (Desmoinesian Series) units, which outcrop from northwestern Erath County across southeast Palo Pinto County into western Parker County. These units, as well as younger Canyon and Cisco Group units, dip gently northwest. Upper Strawn units comprise fluvial and deltaic depositional systems that extend westward from Ouachita foldbelt source areas (Brown and others, 1973). Coal was formed during several periods of delta progradation. Three coal seams are found in the upper Strawn Group: Sunday Creek, Thurber, and Abbott. The Sunday Creek coal bed is highly weathered, uniformly 18 to 22 inches thick, and outcrops along Sunday Creek southeast of Santo in Palo Pinto County. This coal is probably related to areally restricted delta-plain marshes of small interdeltaic embayments associated with Buck Creek Sandstone fluvial-deltaic systems (Plummer and Hornberger, 1935). Abbott coal, a minor seam 26 inches thick, impure and highly weathered, occurs in the middle Brazos River Formation interdistributary bay facies (Plummer and Hornberger, 1935; Brown and others, 1973). The major and most extensive Strawn Group coal deposit is the Thurber coal. It was extensively mined in northern Erath and southern Palo Pinto Counties from the late 1880's into the 1920's. The coal seams ranges from 12 to no more than 36 inches in thickness (Mapel, 1967). Thurber coal occurs about 200 ft stratigraphically below the Brazos River Formation. Thurber coal formed in an interdeltaic embayment south of major deltation sites in northern Palo Pinto and Jack Counties. Following delta abandonment, embayment sediments were partly reworked by marine processes and onlapped by marine deposition (Brown and others, 1973).

Canyon Group

The Canyon Group consists of ridge-forming beds of limestone separated by shale and sandstone. The Canyon Group reaches a maximum thickness of about 1,300 ft in Clay and Montague Counties, and thins from this area southwestward across North-Central Texas (Mapel, 1967). Several periods of northwestward delta progradation are recorded in the Canyon Group (Missouri Series). Contemporaneous with this clastic terrigenous clastic system were various carbonate systems (Brown and others, 1973). Thin, associated, delta-plain sediments were rarely preserved because marine processes easily reworked these units following delta abandonment. Two coal seams are found in the Canyon Group: Dalton and Bridgeport. The Dalton coal is the thickest coal occurrence (up to 10 ft) in North-Central Texas. This coal seam occurs in the lower Wolf Mountain Shale along the topographically prominent Merriman Limestone escarpment in northwest Palo Pinto County. Where exposed, the Dalton coal is highly weathered and impure (Evans, 1974). The Bridgeport coal is the major Canyon Group coal deposit. It is of good quality, 18 to 22 inches thick, and occurs 32 to 55 ft below the Willow Point Limestone, which forms the upper unit in the Palo Pinto Formation (Evans, 1974). The Bridgeport coal was extensively mined around Bridgeport, Wise County, from the early 1890's until 1943 (Stenzel and others, 1948).

Cisco Group

The Cisco Group consists of shale, lenticular sandstones, and many thin beds of limestone. The Cisco Group ranges in thickness from a maximum of 1,200 ft in the subsurface in northern Wichita and Wilbarger Counties, to about 350 ft in outcrops in Brown and Coleman Counties. Numerous fluvial-deltaic progradations fed by eastern source areas in the Ouachita foldbelt mark the Cisco Group (Virgil and Wolfcamp Series). Sites of organic accumulation were mainly interdeltaic embayment lateral to main delta trends. Upon delta abandonment, marine processes reworked portions of the interdeltaic sediments, with eventual limestone deposition onlapping former sites of delta-flank deposition (Brown and others, 1973). Many thin, discontinuous coal seams occur in the Cisco Group, particularly the Harpersville Formation. Four stratigraphic horizons contain coal seams in the Cisco Group: Chaffin, Bull Creek, Saddle Creek, and Newcastle. The Chaffin coal occurs as a 20-inch-thick seam immediately below the Chaffin Limestone of the Harpersville Formation. This coal was mined in the late 1880’s near Waldrip, McCulloch County. The Bull Creek coal, ranging from 12 to 30 inches in thickness and occurring 25 to 50 ft above the Chaffin Limestone, was mined in the late 1890’s in northern McCulloch and southern Coleman Counties. The Saddle Creek coal occurs in the Harpersville Formation just below the Saddle Creek Limestone. It is an impure coal, occurring locally in Young and Eastland Counties. The Newcastle coal is the major Cisco Group coal deposit. Ranging from 20 to more than 50 inches in thickness (Ledbetter, 1964), it was mined from 1908 into the early 1920’s near Newcastle, Young County. Coal seams at similar stratigraphic horizons, about 50 ft below Saddle Creek Limestone, are reported as far south in Eastland County (Plummer and others, 1949). Moreover, a persistent coal deposit occurring in the Cisco Group, but not a part of the Harpersville Formation, is exposed in Young and Jack Counties in a 2- to 17-inch-thick seam of impure coal just below the Blach Ranch Limestone in the Graham and Thrifty Formations (Brown, 1962).

Geochemical Analyses and Coal Quality

In outcrop the Pennsylvanian bituminous coals of North-Central Texas are highly weathered, impure, and fissile. Geochemical analyses in the form of proximate and ultimate analyses of Strawn, Canyon, and Cisco Group coals are reported in various references and are provided as a digital spreadsheet accompanying this report. Strawn Group coals, mainly Thurber coals, are fairly low in moisture (2 to 8 percent), high in ash (10 to 25 percent), high in sulfur (1.5 to 4 percent), and they rank as high-volatile B bituminous coal. Btu values (dry basis) range from 10,390 to 13,755 per pound of coal. Canyon Group (Bridgeport) coal is high in moisture (12 to 15 percent), high in ash (11 to 16 percent), high in sulfur (1.6 to 3.4 percent), and it ranks as high-volatile C bituminous or subbituminous A coal. Btu values (dry basis) range from 11,160 to 12,190 per pound of coal. Cisco Group coals show more variable results owing to analysis of several coal seams. Moisture ranges from 2 to 18 percent, and ash content and sulfur content (1.1 to 8.9 percent) are generally high. Btu values (dry basis) range from 10,213 to 12,709 per pound of coal. According to geochemical analysis, North-Central Texas bituminous coals range from subbituminous A to high-volatile B bituminous coal, with high ash and sulfur contents (Evans, 1974). A comparison of the geochemical characteristics of Texas bituminous coals in terms of moisture, volatile matter, fixed carbon ash, sulfur, and Btu values is given in Table 1, as well as in the digital spreadsheet.

Table 1. Summary of geochemical proximate analyses of Texas bituminous coals. All parameters listed represent values determined on "as received" basis and are expressed in weight-percent. (Evans, 1974).

		North-Central Texas Coal Seams				**Santo Tomas district**	**Eagle Pass**	**Big Bend**	**San Carlos**
		Strawn Group (mainly Thurber)	Canyon Group (Bridgeport)	Cisco Group (Newcastle)	Cisco Group (others)	Claiborne Group	Olmos Fm	Aguja Fm	San Carlos Fm
Moisture	Average	3.6	11.9	11.8	6.4	3.7	6.4	6.1	2.3
	Standard deviation	2.0	3.3	3.4	4.7	1.4	2.4	4.0	1.8
	No. of samples	25	15	8	27	44	38	12	11
Volatile matter	Average	33.9	32.6	35.3	36.5	45.6	33.2	30.4	37.8
	Standard deviation	3.2	1.1	1.2	4.6	4.0	3.4	12.6	10.6
	No. of samples	25	15	8	27	43	32	12	11
Fixed carbon	Average	47.1	42.2	38.7	43.0	36.4	42.0	48.4	38.0
	Standard deviation	5.5	4.7	6.1	6.3	3.6	6.5	21.7	14.5
	No. of samples	25	15	8	27	43	32	12	11
Ash	Average	15.2	13.5	14.3	13.8	14.2	18.4	15.1	21.8
	Standard deviation	6.1	2.0	4.5	5.8	6.0	6.6	8.3	19.3
	No. of samples	25	15	8	27	43	32	12	11
Sulfur	Average	2.4	2.1	3.3	3.7	2.2	1.4	1.4	0.8
	Standard deviation	0.9	0.5	0.7	2.1	0.8	0.4	0.7	0.5
	No. of samples	25	15	7	24	36	28	12	5
Btu's/lb	Average	11,641	10,038	9,565	9,980	11,640	10,682	10,064	10,056
	Standard deviation	736	414	336	459	1,125	1,262	2,154	1,935
	No. of samples	21	14	7	5	36	31	4	3

Bituminous Coals of the Cretaceous Olmos Formation in the Maverick Basin

The first commercial coalbed methane field in Texas, the Sacatosa coalbed methane field in Maverick County, is currently being produced from bituminous coal and carbonaceous shale near the base of the Upper Cretaceous Olmos Formation in the Maverick Basin, at depths less than 3,000 ft from multiple coal beds within the coal zone (20–30 ft). Preliminary data show that the coals are thin (<6 ft) and laterally discontinuous, and they host numerous rock and volcanic-ash partings. The basal coal zone thickens from 20 ft at the outcrop to about 90 ft near the eastern boundary of Maverick County, with maximum net coal thickness approximately 20 ft (Barker and others, 2002). Thickness, depth, and gas contents of the Olmos coals are similar to those of other U.S. productive coalbed methane plays and are compared in Table 2.

Table 2. Major coal characteristics of U.S. productive coalbed methane plays (Warwick and Barker, 2002).

Basin	Gas in place (Tcf)	Avg. prod. (Mcfd/well)	Coal rank	Typical net coal thickness (ft)	Typical gas content (scf/ton)	Completion depth (ft)
San Juan	84	2000	Hvb-Lvb	70	430	~2,600
Piceance	99	140		80	768	
Uinta	10	690	Sb-Hvb	24	400	
Powder River	40	250	Sb	75	30	~500
Raton			Hvb-Lvb	<10	200-500	~2,150
Black Warrior	20	100	Hvb-Lvb	25	350	
Central Appalachian	5	120	Hvb-Lvb	11	250	
Cherokee	6	100	Hvb	4	200	
Cook Inlet	230	None	Sb, Hvb-An	100	80 (Sb) 230 (Bit.)	
Central Texas			Sb-Hvb	<10	100-470	500-5,000
Gulf Coast Olmos		10-150	Hvb	7-80	0-300	500-1500

Initial exploration work in the Sacatosa coalbed methane field was a compilation of existing geophysical log data, which illustrate the general continuity and thickness of an upper Olmos coal zone. As an important analog to future coalbed methane resource development in other areas of Texas, similar review of geophysical log data, an essential starting point of any coalbed methane investigation, was undertaken for the Pennsylvanian bituminous coals in North-Central Texas. Geophysical logs in Palo Pinto and Stephens Counties with sonic or density curves were extracted and located from the geophysical log database maintained by the Bureau of Economic Geology. The top and base of the Strawn (Thurber) coal, as well as the coal thickness from a selective grouping of these logs, were compiled. However, only a few sonic/density logs were available regionally, and the major use of these data permitted verification of earlier studies. Results indicated

(1) Subsurface depth and downdip distribution of the Strawn (Thurber) coals in Palo Pinto and Stephens Counties as described in Brown and others (1973) are valid.
(2) Multiple coal seams suitable for coalbed methane potential are limited, most seams less than 3 ft.

(3) Caliper logs indicate that the Strawn (Thurber) underclay and much of the coal are washed out in most wells, invalidating use of sonic/density logs for coal-thickness determination.
(4) High ash content of coals is similar to that of Olmos Formation carbonaceous shales that grade laterally into coal.

Digital Maps and Spreadsheets for Inclusion in NCRDS

Modern technology applications and tools, such as digital GIS databases, can enhance the quality and usability of coal resource data. Digital GIS databases allow a wealth of information to be combined and compiled for a comprehensive look not only at coal resource tonnage but also at coal quality, coal distribution, overburden, land and coal ownership, minability, coalbed methane occurrence, hydrology, and the relationships among these data. All information used is geographically referenced and can be stored, manipulated, and analyzed digitally. The ability to compile many types of spatial data improves our understanding of coal occurrence to make new stratigraphic correlations and to integrate geologic and resource information (USGS, 2001).

The current NCRDS project's major accomplishments included gathering and compiling digitally regional background data of the Pennsylvanian bituminous coals of North-Central Texas. A variety of previously published studies from Dumble (1890), Plummer and Hornberger (1935), Mapel (1967), Brown and others (1973), Evans (1974), and Cleaves (1975) were mainly utilized. Data available from published studies were incorporated into an Environmental Systems Research Institute, Inc. (ESRI), ArcView GIS format for the user to readily present and analyze digital mapping data (Figure 5) in separate digital spreadsheets. An advantage of representing spatial data in an ArcView GIS format is the ability to view several themes overlaid atop one another to delineate possible interrelationships among the data. New maps may be created by overlaying different data themes. The data format is also readily available for inclusion in NCRDS and may provide valuable spatial data for delineating future potential coalbed methane production and development fairways. Major digital map data and associated GIS filenames are

Shallow gas wells in major fields: wellsxwell
Thurber coal distribution (USGS): figure 4_cdpl
Thickness of overburden (USGS): figure 6_cntr
Well control (USGS): figure 4_well
Depth below surface to Thurber coal: figure 30_cntr
Well control (BEG): figure 30_well
Dobbs Valley net sandstone: figure 27_cdpl
Upper Mingus Formation net sandstone: figure 28_cdpl
Brazos River Formation net sandstone: figure 29_cdpl
Palo Pinto Limestone contours: plate 3_cntr
Marble Falls Limestone contours: plate 4_cntr
Drill hole/shaft coal depths: plate7well
Mines, shafts, and measured sections: plate 1_well
Harpersville Formation: platcdpg
Wolf Mountain Shale: platwcdpg
Palo Pinto Formation: plathcdpg
Mingus Formation: plate1_pmtpg

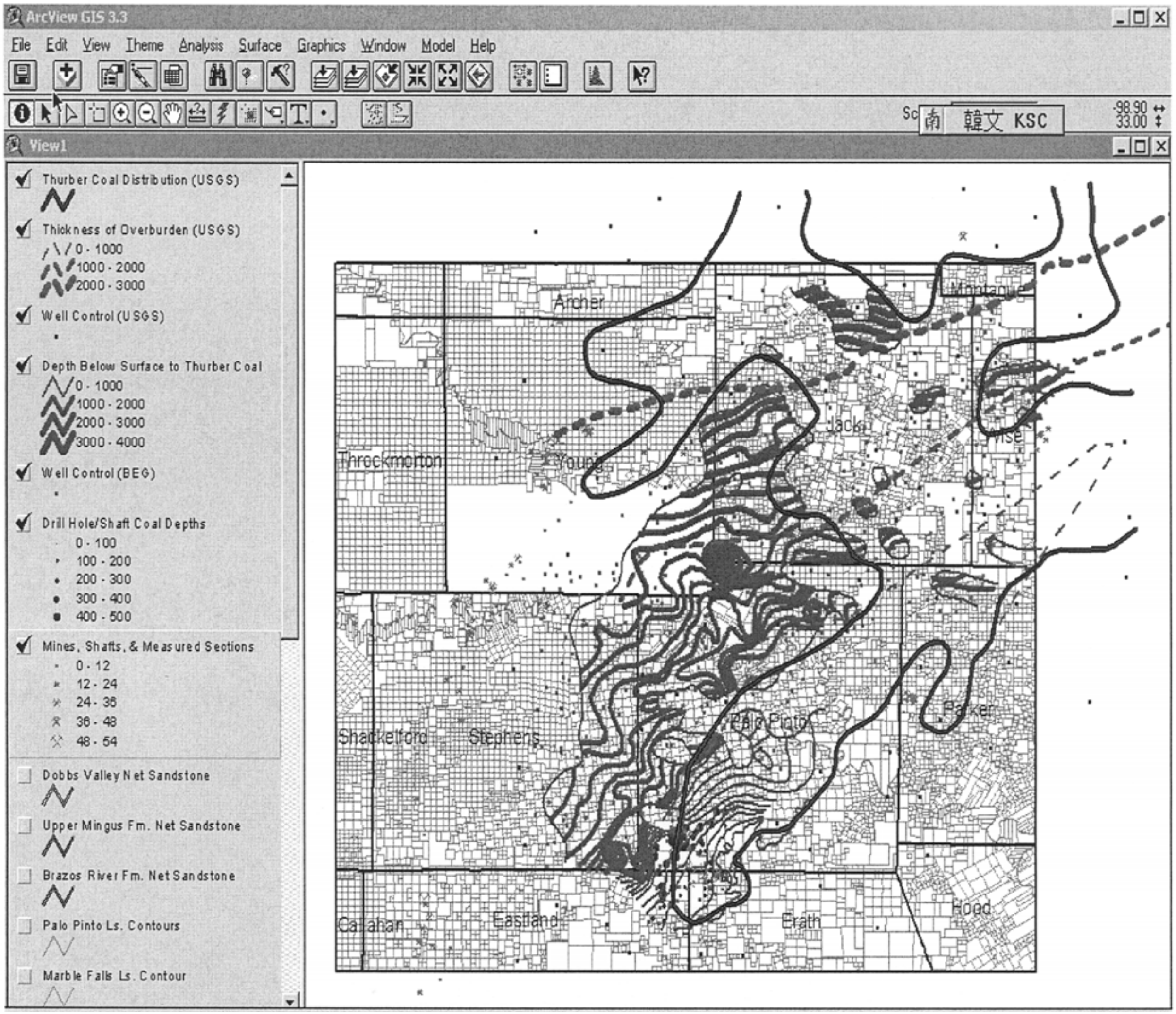

Figure 5. Example of representation of Pennsylvanian bituminous coal data in North-Central Texas utilizing Geographic Information System.

Locational digital data components and associated GIS filenames include:

Railroads: Nctxlrlrd
Roads: Nctxlrd
Minor water bodies: Nctxlpwat
Creeks: Nctxliwat
Major water bodies: Nctxapwat
Counties: Nctxacnty
Cities: Nctxacity
Abstracts: Nctxaabst

Geochemical analyses in the form of proximate and ultimate analyses of Strawn, Canyon, and Cisco Group coals that are reported in various references and a comparison of the geochemical characteristics of Texas bituminous coals in terms of moisture, volatile matter, fixed carbon ash, sulfur, and Btu values (Table 1) are also included as a digital spreadsheet.

Conclusions

The objective of this cooperative project between the Bureau of Economic Geology and the U.S. Geological Survey is to provide digital data for inclusion in the NCRDS and a preliminary assessment of the coalbed methane potential of coal-bearing seams of the Pennsylvanian bituminous coals of North-Central Texas. As a multiyear assessment, major accomplishments included digital compilation of major background regional data for Pennsylvanian depositional systems and major coal resources, as well as a comparison with current coalbed methane production from Olmos bituminous coals in the Maverick Basin. Digital spreadsheets of available geochemical analysis data, as well as digitized maps compiled in GIS platform have been compiled. Because the Pennsylvanian bituminous coals of North-Central Texas are of higher rank, they have higher Btu values than Texas Gulf Coast lignites. Moreover, they have an advantage of being closer to the major energy user market of the Dallas-Fort Worth area. According to the data compiled, possible potential for coalbed methane exists in corollary to the Olmos bituminous coals in the Maverick Basin in terms of coal rank; however, their high sulfur/ash content and thin beds will be major constraints to overcome.

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