RFP No. 87-214-0269

Part I. Technical Proposal

for

GEOLOGIC EVALUATION OF CRITICAL PRODUCTION PARAMETERS FOR COALBED METHANE RESOURCES

Submitted for evaluation by or on behalf of

Gas Research Institute

by

Bureau of Economic Geology
The University of Texas Austin
University Station, Box X
Austin, Texas 78713

Proposed Starting Date: May 15, 1987
Proposed Period of Performance: Twenty-four months
Requested Funding From GRI: $699,727
Total Project Cost: $818,261
Cost-Sharing: $118,534

Endorsements

Robert J. Finley
Principal Investigator
Bureau of Economic Geology
512/471-1534

Walter B. Ayers, Jr.
Project Director
Bureau of Economic Geology
512/471-1534

W. L. Fisher
Director
Bureau of Economic Geology
512/471-1534

ORIGINAL SIGNED BY
Stephen A. Monti
Vice Provost
The University of Texas at Austin
512/471-4363

March 1987

QAe7687

CONTENTS

Introduction and Summary 1
Objectives 3
Technical Discussion 3
Basins to be Studied 3
Black Warrior Basin 3
San Juan Basin and Piceance Creek Basin 5
Depositional System Controls on Coal Occurrence and Characteristics and Coalbed Methane Producibility 6
Geochemistry of Coalbed Gases 15
Hydrologic Controls on Gas Producibility 17
Structural and Fracture Analysis of Coal and Host Rocks 19
Schedule and Work Plan 21
Task and Subtask Descriptions 21
Task I. 21
Task II. 23
Task III. 24
Task IV. 26
Task V. 27
Task VI. 28
Task VII. 29
Potential Benefits of Proposed Research 29
Time Frame and Deliverables 29
Management Plan 31
References 33
Professional Summaries 39
Facilities and Capabilities Statements 127
Part II: Cost Plan ..... bound separately

FIGURES

Figure 1. Simsboro framework facies and the occurrence of lignite 8

Figure 2. Schematic cross section showing thick lower Calvert Bluff lignite 9

Figure 3. Relationship between coal seams and syndepositional framework facies; differential compaction at edges of sand bodies 9

Figure 4. Relationship between coal seams and depositional framework facies, Pottsville Formation, Black Warrior Basin 10

Figure 5. Fracture permeability in coal 12

Figure 6. Clastic dikes compartmentalize the Pittsburgh coal seam near Wheeling, West Virginia 14

Figure 7. Projected time distribution of work tasks and subtasks 30

INTRODUCTION AND SUMMARY

Coalbeds of the United States contain an estimated 200 to 800 Tcf of unconventional gas, much of which is in seams that are unminable or uneconomic (GRID, 1985). Early studies of coalbed methane by the U.S. Bureau of Mines were directed toward degasification in advance of underground coal mining (Rightmire, 1984). The increase in energy prices in the 1970's focused attention on coalbed methane as a potential resource, and subsequently several hundred wells have been drilled, primarily in the Black Warrior, San Juan, and Piceance Creek Basins.

The Gas Research Institute (GRI) has actively supported research aimed at developing the technology for economic production of coalbed methane. At the onset, well completions in coalbed reservoirs were a new and unperfected procedure that required innovative modification of established techniques. Therefore, earlier research efforts were directed toward the engineering problems associated with production, with less emphasis on geologic and hydrologic parameters that control coalbed methane occurrence and producibility. Knowledge of these geologic controls has been found, however, to be important to successful well completions and to development of regional exploration models.

Many geologic factors act in concert to determine the availability and producibility of coalbed methane. The depositional system, however, is the primary unifying factor controlling coal seam occurrence and continuity and the migration of fluids. Depositional systems build the platforms for peat (coal) accumulation, bound the coal seams, and affect the characteristics of coal and coalbed methane. In addition, the coarse-grained framework sandstones of depositional systems act as conduits for fluid flow. Fluid migration is also influenced by structure, through fault and fracture networks. Thus, an integrated study of sedimentology, hydrology, gas geochemistry, and fracture analysis is proposed for the Black Warrior and San Juan or Piceance Creek Basins.

The proposed study is divided into seven tasks; four are technical studies, two are cooperation and support, and one is documentation. The four technical studies are: depositional system controls on the occurrence, characteristics, and resources of

coalbed methane (Task I); geochemistry of coalbed gases (Task II); hydrologic controls on gas producibility (Task III); and structural and fracture analyses of coal and host rocks (Task IV).

Knowledge of the depositional systems of the sediments that host a coal seam is fundamental to exploration and development of coalbed methane. Coal seams do not extend unbroken across entire basins. They formed as peat swamps/marshes in areas of low energy, and they were bounded by high-energy systems such as rivers or barrier islands. As these bounding systems are approached, the peat (coal) splits and finally terminates. Therefore the geometry and size of the depositional system control the extent, thickness, orientation, and quality of a coal seam -- all of which bear upon gas resources and their recovery.

Geochemical studies are designed to document the origin and migration of coalbed gases. This cannot be done by carbon isotopic study of methane alone; it requires study of ethane, propane, and butane as well as hydrogen isotopic compositions of methane. Furthermore, an understanding of the relationship between coal quality and coalbed gas composition is necessary. From these studies, we hope to establish whether coalbed gases were generated in situ or migrated from deep basinal coal and/or marine shales.

The hydrology of the coal basin is important to exploitation of coalbed methane. If a coal seam is water saturated, it must be dewatered, often a costly operation, to allow desorption and production of coalbed methane. Trapping mechanisms may be elucidated by regional hydrologic analysis. Pressure-depth plots and potentiometric surface and salinity maps will indicate directions of fluid flow and may allow geographical division of the basin into areas of structural/stratigraphic traps and those of basin-centered traps. Moreover, hydraulic head, pressure gradient, and salinity may reflect permeability and water saturation.

Coal permeability is fracture controlled. Therefore, recovery of coalbed methane is dependent on structure, including the natural fracture systems (cleat). Whereas some studies have suggested a correlation between the dominant (face) cleat and regional jointing and lineaments, others have not. Additional fracture studies will be directed at clarifying the relationship between joints, faults, and cleats, and predicting cleat

orientation and density in areas where cleat readings cannot be obtained. In-situ stress will be evaluated to predict controls on hydraulic fracturing.

OBJECTIVES

The objectives of the proposed study are to analyze the depositional systems of coal and coal occurrence and characteristics, evaluate the origin, distribution, and composition of the coalbed methane, identify the hydrologic setting and trapping mechanisms, elucidate the structural controls, cleat orientation, and secondary controls on permeability, and finally, to integrate the conclusions from these tasks to develop an exploration model that will ensure optimum recovery of coalbed methane at the lowest possible cost.

TECHNICAL DISCUSSION

Basins to be Studied

Basins suggested for this study present diverse geological histories and reservoir conditions. Because the geologic settings of these basins have been reviewed in recent publications (Black Warrior - Hewitt, 1984; San Juan - Rice, 1983; Meissner, 1984; Piceance Creek - Merry and Larsen, 1982), we will summarize only salient differences of the basins and geologic parameters critical to the proposed research.

Black Warrior Basin

The Black Warrior Basin is a foreland basin that formed in late Paleozoic time. The primary coal-bearing interval in the basin is the Pottsville Formation, which is a southwestward-thickening wedge of sandstone, siltstone, mudstone, shale, and coal. The Pottsville Formation, more than 10,000 ft thick, has been informally subdivided on the basis of lithology, depositional environments, and characteristics of the coal seams. The lower Pottsville is composed of orthoquartzites, mudstones, and discontinuous coal seams interpreted as barrier bar, lagoonal, open bay, and marsh deposits (Ferm and Ehrlich, 1967; Hobday, 1974). The dominant depositional systems of the upper Pottsville, which is composed of litharenites, some orthoquartzites,

mudstones, and laterally continuous coal groups, reportedly are fluvial and deltaic (Benson, 1986). Most studies of the Pottsville discuss the outcrop. Only recently have there been attempts (Thomas and Womack, 1983; Sestak, 1984) to map Pottsville depositional systems regionally using subsurface data.

The boundary between the lower and upper Pottsville is placed below the lowermost laterally continuous coal interval, the Black Creek coal group. The upper Pottsville is further divided into seven informal coal groups, each containing two to six seams (Musgrove, 1982) that average less than 3 ft thick. The high- to low-volatile bituminous coals contain an estimated 10 Tcf of coalbed methane (Hewitt, 1984), most of which is in the upper Pottsville. Thomas and Hines (1984) reported that coalbed gas content generally increases with depth in the Black Warrior basin, which they attributed to maximum original depth of burial and to depositional environments. Completion in individual seams is generally uneconomic; therefore, the practice in the Black Warrior Basin is to complete coalbed methane wells in several coal seams or coal groups. GRI has actively supported research on multiseam completions at the Big Indian Creek (BIC) and Rock Creek sites.

Permeability of Pottsville coal seams in general exceeds permeability of the tightly cemented associated sandstones (GRI, 1985). Gas flow is primarily through the natural fractures of the coal (cleat) and host rocks (joints). Dominant direction of permeability in the coal is in the direction of the face cleat. Permeability ratio for face-to-butt cleat for the Pratt seam is 17:1 (GRI, 1986a). Because of their control on permeability, the orientations of jointing and cleat greatly impact the siting of wells and the producibility of coalbed methane. Recent studies (Murrie and others, 1976; Ward and others, 1984) reported on jointing and cleats in the Black Warrior Basin. Although jointing may be used to predict cleat orientation where direct measurements are impossible, the relationship between jointing and cleat is complex in some areas of the basin, suggesting multiple divergently ordered stress fields early in the basin's history and the need for additional studies.

Regional work is needed to clarify many geologic parameters controlling the producibility of coalbed methane in the Black Warrior Basin. Little is known about the trapping mechanisms. Also, the relationship between natural gas in Pennsylvanian sandstone reservoirs and methane gas in Pottsville coalbeds is unclear. The

depositional systems are poorly understood, and more importantly, there is disagreement about the direction or directions of basin fill (Graham and others, 1976; Phleger, 1981; Mack, 1982; Ehrlich, 1985). Without knowing the direction of fill and types of depositional systems, the explorationist cannot predict the occurrence, overall geometry, and continuity of coal seams. Without an understanding of regional migration of fluids (water or gas), prediction and interpretation of fluid anomalies are impossible. Additional studies of jointing, faulting, and cleat are necessary to improve predictions of methane producibility.

San Juan Basin and Piceance Creek Basin

The geologic settings of coalbed methane in the San Juan and Piceance Creek Basins have several similarities, and they differ markedly from the setting of the Black Warrior Basin. Therefore, the western basins will be discussed jointly. Whereas the Pottsville Formation records clastic fill of a subsiding foreland basin, the Cretaceous coal-bearing strata of the San Juan and Piceance Creek Basins were deposited on the western margin of the Cretaceous interior seaway; these Laramide basins formed subsequent to deposition of the major coal-bearing strata.

The thickest coal seams (commonly greater than 10 ft) in the San Juan and Piceance Creek Basins are in the lower parts of the terrestrial deposits of the Fruitland and Williams Fork Formations, respectively, and the coals overlie progradational Pictured Cliffs (San Juan Basin) and Rollins (Piceance Creek Basin) sandstones. As is the case in the Black Warrior Basin, the depositional settings of coal seams in these western basins are disputed. Although the depositional systems associated with the coals are most commonly interpreted as barrier-bar/strandplain, deltaic and fluvial systems are also suggested for both basins (Young, 1966; Fassett and Hinds, 1971; Collins, 1976; Flores and Erpenbeck, 1981).

The maturity of the coal seams in the San Juan and Piceance Creek Basins ranges from subbituminous to medium-volatile bituminous (Choate and others, 1984a; Meissner, 1984) and relates to depth of burial and proximity to areas of high heat flow associated with Cenozoic intrusive and extrusive igneous rocks of the San Juan Mountains that separate the basins; thermal maturity is greatest in the northern San Juan and southern Piceance Creek Basins.

Coal seams in these western basins are commonly more than 10 ft thick; aggregate thickness commonly exceeds 30 ft. Coalbed methane resources in the San Juan and Piceance Creek Basins are estimated at 31 Tcf and 30 to 110 Tcf, respectively. The Fruitland Formation coals of the San Juan Basin are as deep as 4,000 ft, and the Williams Fork Formation coals of the Piceance Creek Basin are as deep as 10,000 ft (Choate and others, 1984a; 1984b). In comparison, well completions in the Pottsville Formation are generally less than 2,500 ft deep. In the Black Warrior Basin, coalbed methane wells are completed in multiple, thin coal seams, and the associated sands are nonproductive because they have low porosities and permeabilities. However, in the western basins the completions are: (1) in individual thick seams; (2) open hole in several seams; or (3) in sandstones associated with the coal. Coalbed methane appears to have migrated into adjacent sandstones and, while most of the methane is in the center of the basins (gas-centered basins; Rose and others, 1984) some appears to have migrated updip to stratigraphic and structural traps. The primary obstacle to recovery of the coalbed methane of the Piceance Creek Basin is the lower permeability associated with the depth of occurrence. Whereas the Fruitland Formation is less than 4,000 ft deep in the San Juan Basin, 75 percent of the coal-bearing rocks of the Piceance Creek Basin are deeper than 3,000 ft (Choate and others, 1984a).

In summary, the depositional systems of the Fruitland and Williams Fork Formations are equivocal. Because depositional systems migrate, the depositional environments represented by a series of coal seams encountered in a vertical well bore should vary; mapping the depositional systems and coal occurrences will clarify the geometries, orientations, and depositional settings of the seams. Hydrologic and geochemical studies will clarify the origin and migration of gases, and fracture studies will support predictability of coalbed methane producibility from low-permeability coal seams, especially in the Piceance Creek Basin.

Depositional System Controls on Coal Occurrence and Characteristics and Coalbed Methane Producibility

Coal seams are facies or subsets of larger genetically related sedimentary units called depositional systems (Fisher and others, 1969). The depositional system controls the occurrence and greatly influences the quality of coal (McGowen, 1968;

Kaiser and others, 1978; Donaldson and others, 1979; Houseknecht and Iannacchione, 1982), and hence, resources of coalbed methane. Therefore, a goal in this study of depositional systems control on coal occurrence and gas producibility is to use data from geophysical well logs, core samples, and outcrops to interpret the depositional systems and develop exploration models for coalbed methane.

In the Black Warrior, San Juan, and Piceance Creek Basins, coal seams reportedly are facies of fluvial, deltaic, and barrier-bar/strandplain depositional systems. The skeletal facies of a depositional system, composed of the coarsest grained sediments and deposited by the highest energy processes acting within that system, is the framework facies. For example, distributary channel-fill sands are the framework facies of a delta. The barrier-bar/strandplain deposit and associated tidal-inlet sands form the framework facies of linear clastic shorelines. Sediments deposited marginal to the framework facies are collectively called nonframework facies; these facies represent many different environments of deposition. Common nonframework environments on deltas are the natural levee, crevasse splay, delta plain, lacustrine, swamp, and marsh. Nonframework facies of barrier-bar/strandplain systems are washover fans, tidal flats, lagoons, and marshes. Most commercial coal deposits in the world were deposited as nonframework facies of (1) ancient marine or lacustrine deltas; (2) the lower reaches of rivers feeding sediments to deltas; or (3) barrier-bar/strandplain systems, partly because these systems were deposited in subsiding coastal areas that ensured (1) the high water table required for organic accumulation and (2) the eventual burial and preservation of the peat.

The depositional system controls the regional extent, occurrence, geometry, thickness and quality of the coal seam (McGowen, 1968; Kaiser and others, 1978; Horne and others, 1978; Donaldson and others, 1979; Mancini, 1982; Ayers and Kaiser, 1984), which is both the source and host rock for coalbed methane. On a regional scale, the extent of a coal group is determined by the size of the platform built into the basin by the underlying depositional system (figs. 1 and 2). It is noteworthy that within a coal-bearing interval (coal group), individual seams are not of regional extent (figs. 3 and 4). Donaldson (1979) summarizes causes of coal-seam discontinuities. Coal seams (peat) formed in swamps and marshes marginal to, but isolated from, the high-energy framework facies. Therefore, the syndepositional

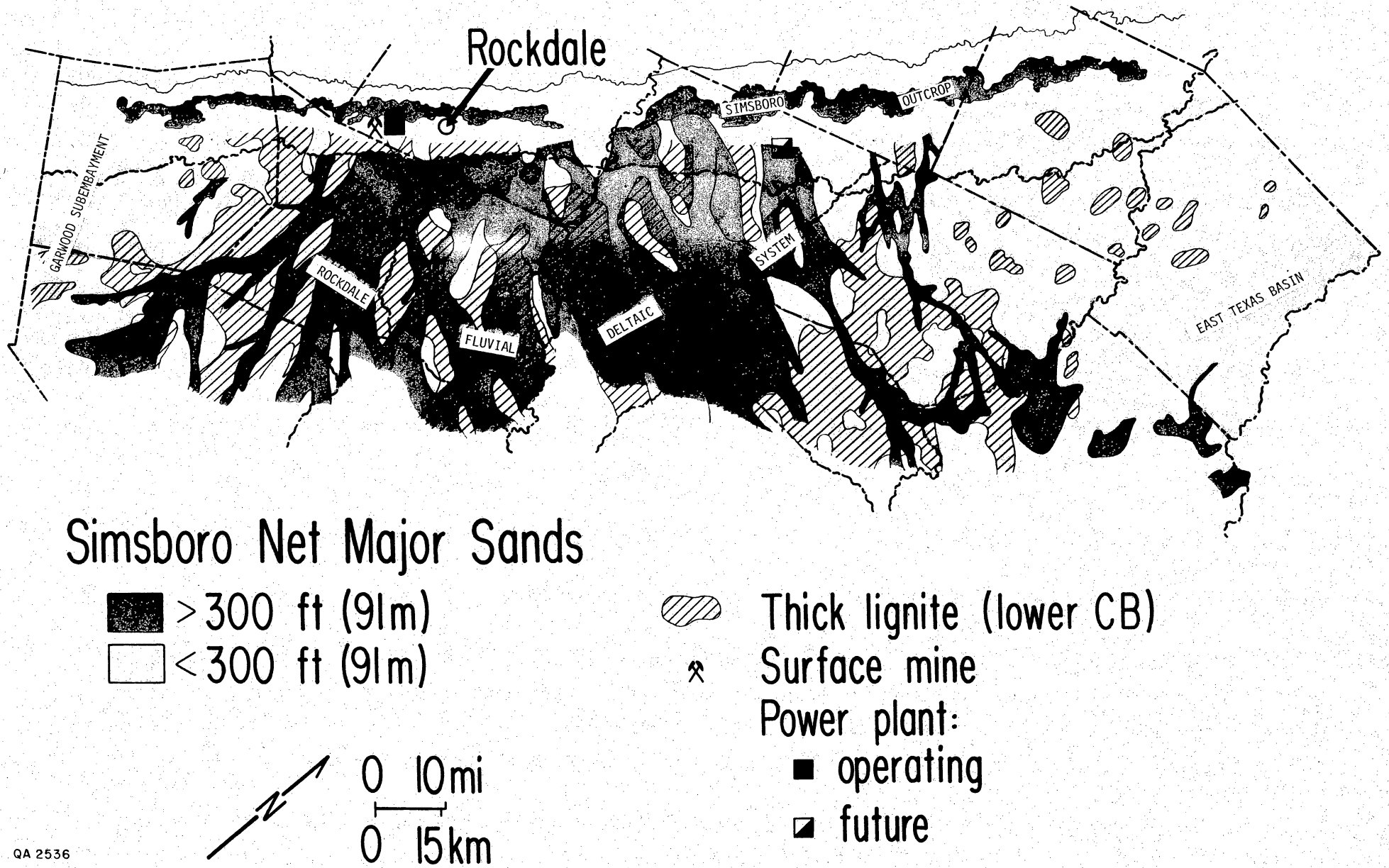

Figure 1. Simsboro framework facies and the occurrence of lignite. Extent of thick (greater than 5 ft) lignite in the lower Calvert Bluff Formation is controlled by the underlying Simsboro sands of the Rockdale fluvial-deltaic platform (modified from Ayers and others, 1986).

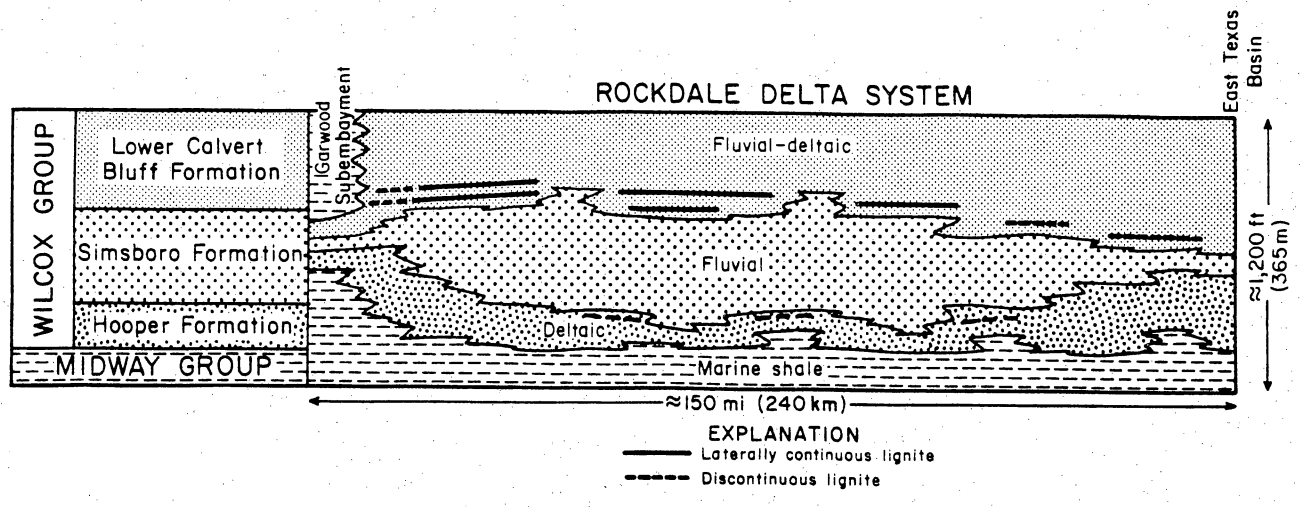

Figure 2. Schematic cross section showing thick lower Calvert Bluff lignite overlying fluvial-deltaic platform of Hooper and Simsboro Formations. Continuity of seams interrupted by channel-fill sandstones.

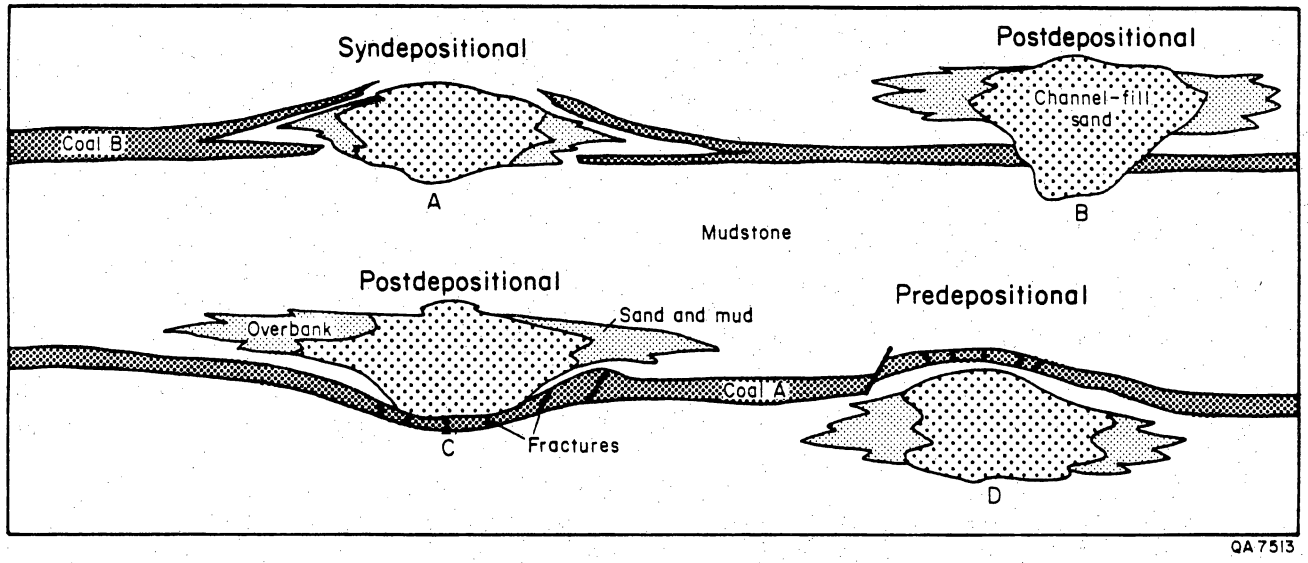

Figure 3. Relationship between coal seams and syndepositional framework facies; differential compaction at edges of sand bodies. Coal seam B splits and pinches out at interface with syndepositional framework facies, A; seam B was removed postdepositionally by framework facies, B. Coal seam A is folded and fractured under framework sandstone, C, and over framework sandstone, D; clastic dikes often fill fractures caused by differential compaction at the edges of sand bodies (concepts from Donaldson, 1979).

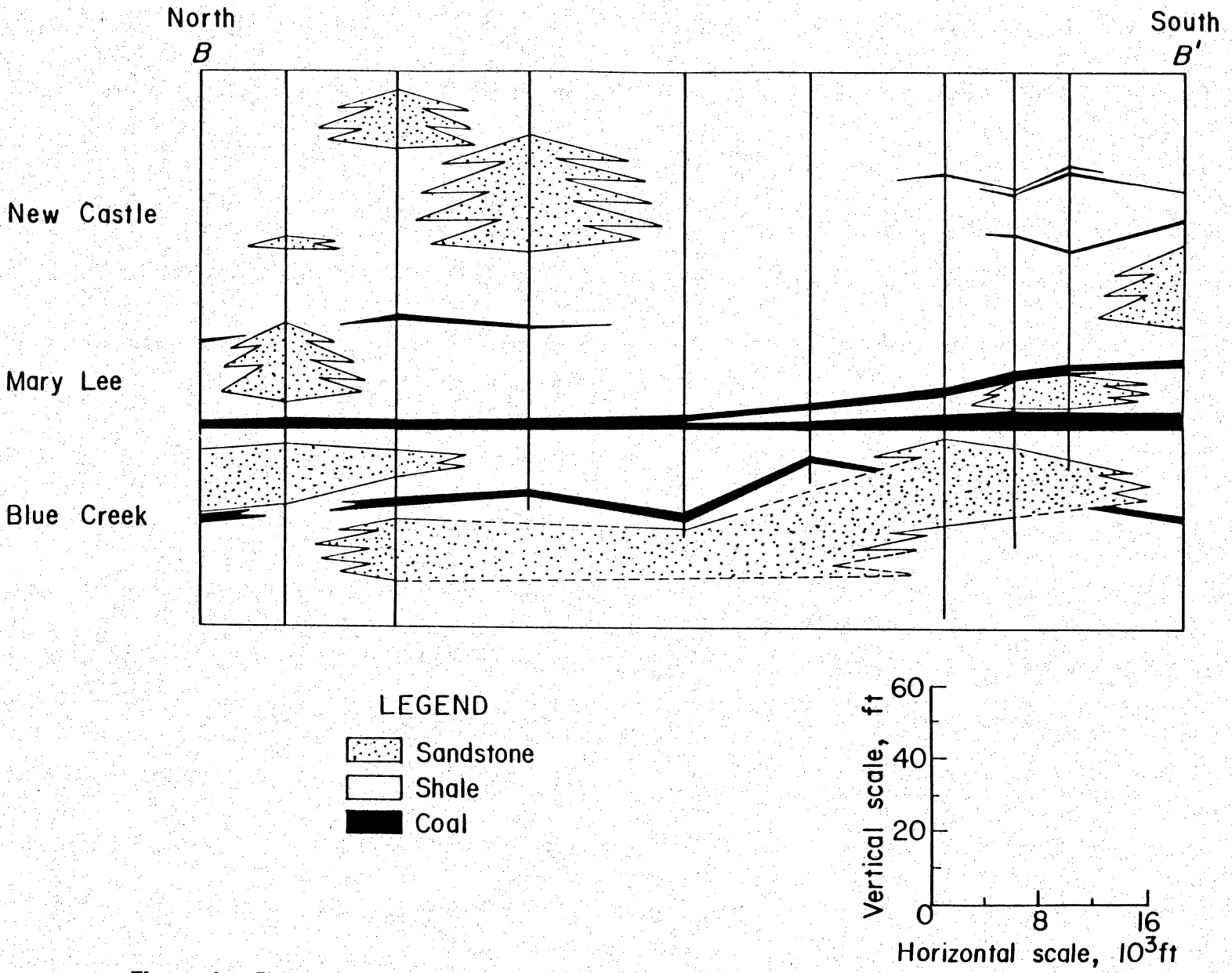

Figure 4. Relationship between coal seams and depositional framework facies, Pottsville Formation, Black Warrior Basin. Coal seams of the lower part of the upper Pottsville Formation split and pinch out near syndepositional framework facies (from Murrie and others, 1976).

framework facies bound coal seams on several sides and determine seam geometry, orientation, extent, quality, and ultimately the volume of the gas reservoir. The inorganic content of coal generally increases with proximity to syndepositional framework facies. Because gas molecules are adsorbed on organic molecules of the coal, coalbed methane content decreases with increasing inorganic content (Wyman, 1984).

Coal seams that formed in floodbasins marginal to rivers are bounded by dip-oriented channel-fill sands (fig. 3a), elongate in the paleodip direction, and limited by the size of the floodbasin. Delta-plain coals began as marshes marginal to an active delta distributary system and overspread the distributary upon delta lobe abandonment. They form extensive tabular coal seams overlying bifurcating (distributary) channel-fill sands. Barrier-bar/strandplain coals formed in filled lagoons, usually behind abandoned barrier systems, or on strandplains; therefore, they are elongate parallel to the ancient shoreline or along paleodepositional strike.

Sediments above and beneath a coal seam may also affect coalbed methane migration and producibility. For example, a fluvial system may switch its course on the floodplain and deposit channel-fill sands on a peat deposit (fig. 3c) or erode its channel into the peat (fig. 3b; Donaldson and others, 1979; Ayers, 1986a). If the coal and sand are water saturated, the porosity, permeability, and volume of the sand reservoir may determine the economic feasibility of depressurizing the communicated reservoirs to allow desorption and production of coalbed methane. Understanding the regional depositional systems should permit interpretation of the genesis of the sand body, its orientation, and an estimation of its volume. If a coal seam and a permeable, communicated sand have low water saturation or can be dewatered, production may be greatly enhanced by dual completion (Meissner, 1984; Wyman, 1984).

Finally, two untested ways exist in which sediments above or below a coal bed may influence coalbed methane producibility. Draping of brittle coal beds over or under framework facies due to differential compaction (fig. 3c and d) may cause a fracture system to develop (Donaldson, 1979; Houseknecht and Iannacchione, 1982). If this fracture system is sufficiently developed and if it intersects the regional face cleat of the coal at a high angle, it would be a natural exploration target (fig. 5). However, clastic dikes (clay veins in mining terminology; figs. 3 and 5) may militate against this exploration rationale. These vertical to subvertical clastic dikes occur at

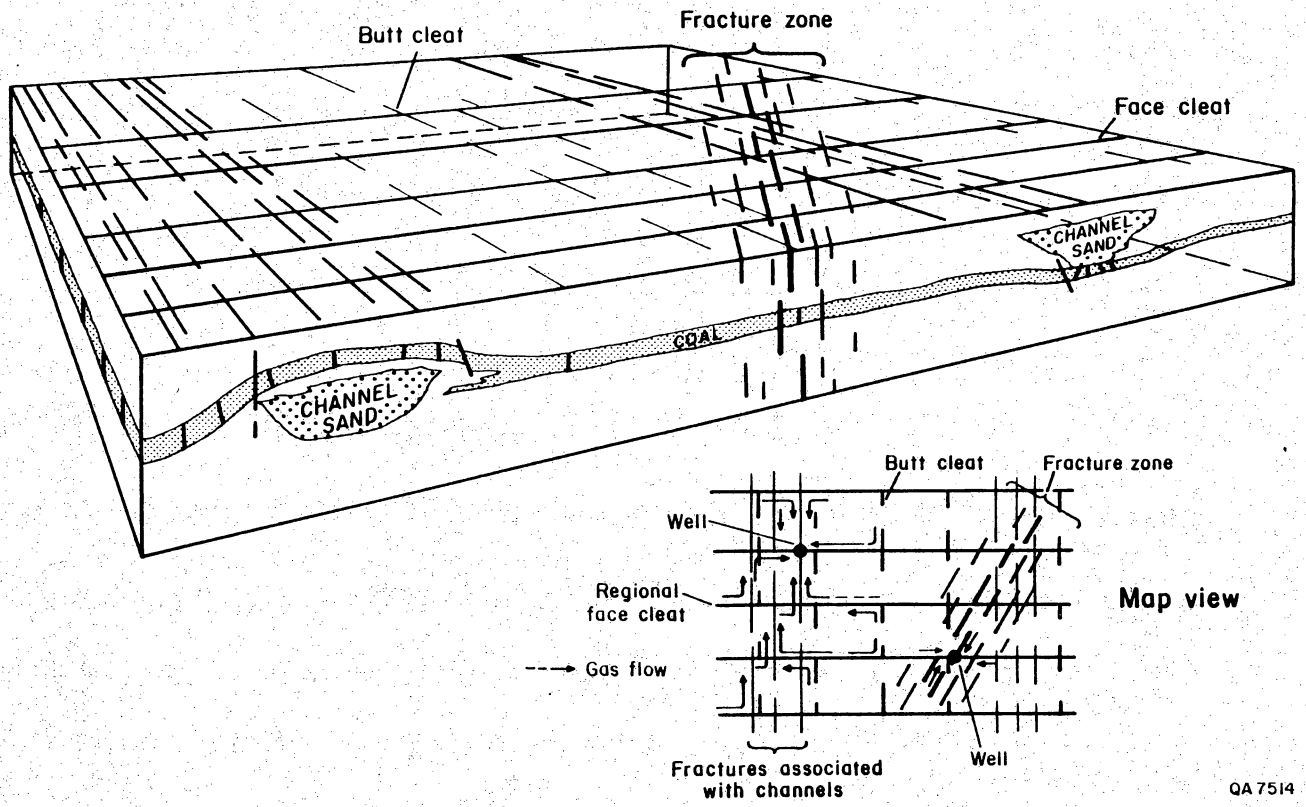

Figure 5. Fracture permeability in coal. Permeability in coal is best developed along it natural fractures, cleat, projected to top of block diagram. Exploration targets are secondary tectonic fracture zones or differential compaction fractures that intersect the face cleat at high angles.

boundaries between differentially compacting sediments, parallel to systematic structural trends, along regional cleats, or randomly (Kerns, 1970; Donaldson, 1979; Damburger and others, 1980), and may effectively compartmentalize gas reservoirs in the coal seam (fig. 6; Ulery and Molinda, 1984). Although locally common in parts of the Illinois (Damberger and others, 1980), Northern Appalachian (Donaldson and others, 1979), and Gulf Coast Basins (Ayers, 1986b), clastic dikes reportedly are uncommon in the basins under study. Their presence locally should not be discounted but would be difficult to establish from regional studies.

In the proposed research on depositional systems and their relationships to coal occurrence and characteristics, we will: (1) map the regional distribution of framework facies of selected coal-bearing intervals of each basin to classify the depositional systems; (2) map the coal seams to determine their geometries, thicknesses, and resources; (3) characterize coals by their physical and chemical properties; (4) develop a depositional model for coal on the basis of the relationship between the framework facies and coal occurrence, characteristics, and maturity; and (5) use the model to predict seam continuity and quality and to make resource estimates (Kaiser and others, 1980; Kaiser, 1982; Kaiser and others, 1986; Ayers and Kaiser, 1984; Ayers and Lewis, 1985; Ayers, 1986c). We will test the depositional model using a local study in an area with closely spaced well control and descriptions of the host sediments from cores, petrographic thin sections, and outcrops. The depositional model will be used, in concert with data from other phases of the study, to make recommendations on sites for coalbed methane test wells.

The proposed research in depositional systems and coal occurrence and characteristics will answer the following questions.

(1) What are the geometries, dimensions, and depositional environments of the framework sandstones?

(2) What are the geometries, trends, and dimensions of the coal seams? What are the depositional settings of the seams? Can seam continuity be predicted from the geometry of the framework sands? Is there a systematic change in depositional systems and coal occurrence and/or quality stratigraphically or regionally?

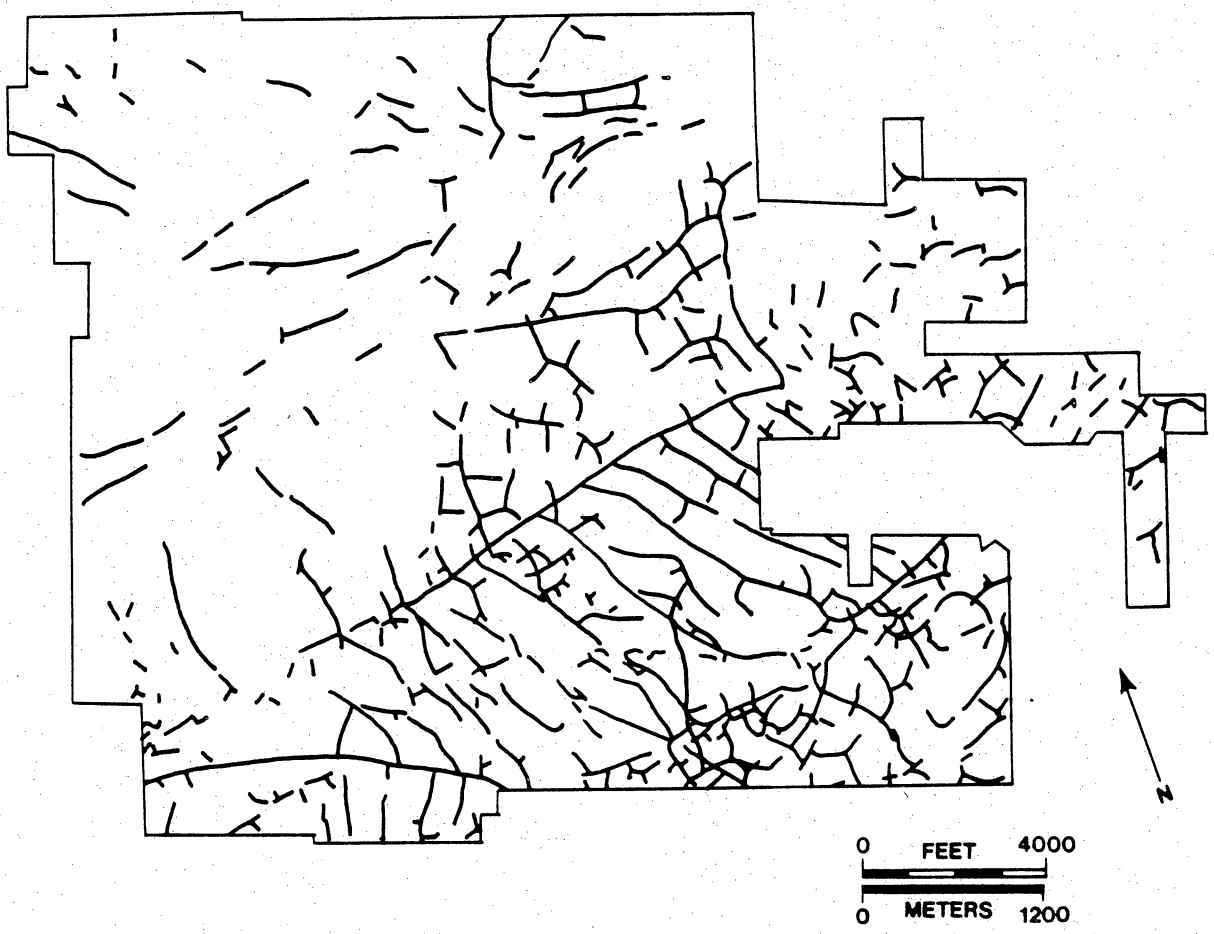

Figure 6. Clastic dikes compartmentalize the Pittsburgh coal seam near Wheeling, West Virginia (from Donaldson, 1979).

(3) Do permeable sandstones commonly adjoin coal? If so, what are the dimensions, geometries, and orientations of those sandstones?

(4) Can geologic features observed in a detailed study at the mine-site or outcrop level be predicted from the regional subsurface study so that the depositional model can be applied throughout the basin?

(5) Is there evidence from mine-site or outcrop of compaction-induced fractures or clastic dikes?

(6) What is the role of thermal history of a basin in the generation and migration of coalbed gas? What are coalbed methane resources? Can coal quality or coalbed methane content be predicted from well-log response or depositional setting? What is the thermal maturity and quality of the coal?

Geochemistry of Coalbed Gases

Natural gases are composed mainly of methane, ethane, propane, butane, and some nonhydrocarbon gases (mostly CO_2 and N_2) in different proportions. Natural gases of similar chemical composition may result from a number of factors such as: (1) similar organic source types; or (2) different organic source types and different stage of thermal maturity, distance of migration, or degree of biodegradation. Therefore, the chemical composition of a natural gas is insufficient to determine its origin and maturity. However, the origin, migration, and biodegradation of natural gases, including coalbed methane, can be resolved by isotopic analysis of gas samples. It is proposed to study the chemical compositions of natural gases and the isotopic compositions of individual gas components (methane, ethane, propane, and butane). From the analyses we expect to interpret the origin, thermal maturity, and effects of gas migration within coal beds (which may differ from effects of migration in organic-poor sandstones), evaluate relationships between production data and chemical and isotopic data, and develop a geochemical model that can be applied to other coal basins.

Since the 1960's the geochemical community has realized that additional information concerning the geochemistry of natural gases can be gained by analyzing the isotopic compositions of the gases. In the early attempts, which were reviewed by Fuex (1977), Stahl (1977), Schoell (1980), and Rice and Claypool (1981), the carbon isotopic composition of methane was determined. This approach resulted in an understanding of the general relationship between maturity and chemical composition,

and between maturity and isotopic compositions of natural gases. Immature, mature, and overmature gases are characterized by increasing ^{13}C concentrations in their methanes. Associated with this trend is a progressive change in chemical composition from dry gas (low C_{2+} content) to wet gas (high C_{2+} content) to dry gas. These relations allow distinction of methane that was generated by bacterial action on organic matter (biogenic methane) from methane that was generated by thermal cracking of organic matter (thermogenic methane). Furthermore, by comparing vitrinite reflectance of known gas sources to the carbon isotopic composition of the associated methane, it is sometimes possible to differentiate between gases generated from terrestrial (humic) and marine (sapropelic) organic sources. At equal maturities methane generated from terrestrially derived organic matter is isotopically more enriched in ^{13}C than methane generated from marine-derived organic matter.

Although this approach is commonly used and often helpful (Rice, 1983), the chemical and carbon isotopic compositions of methane are usually insufficient for a precise determination of gas maturity and migration. This may be due to (1) gas migration, which affects the chemical composition; (2) variation in the type and isotopic composition of the organic source; or (3) gas derived from multiple sources. For example, the gases in the Pictured Cliffs Formation of the San Juan Basin, which are believed to be sourced from the Fruitland Formation coals, are isotopically heavier and chemically drier than gases from the older and deeper Mesaverde Group (Rice, 1983). The approach of determining the chemical composition of the gas and the isotopic composition of the methane as applied by Rice (1983) is insufficient to establish whether the Pictured Cliffs gases migrated from deeper parts of the basin where the Fruitland Formation coals are more mature or whether the superjacent Fruitland coals are sufficiently mature to generate these gases.

James (1983) and Schoell (1983) have shown that determining the carbon isotopic compositions of methane, ethane, propane, and butane and the hydrogen isotopic composition of methane can further help to establish the maturity and origin of natural gases. Differences in the carbon isotopic compositions between methane and ethane, ethane and propane, and between propane and butane decrease with increasing maturity, irrespective of the type of organic source (James, 1983). By determining these differences, the maturity of the source can be established more precisely. By determining the hydrocarbon isotopic composition of methane and the carbon isotopic

composition of methane and ethane, better genetic characterization can be achieved, as well as better identification of migrated gases and gases from multiple sources (Schoell, 1983).

Most of the studies on the geochemistry of natural gases are based on samples taken from permeable, organic-poor reservoir rocks. This means that the studied samples represent gases that migrated various distances, in some cases miles. Because migration affects chemical composition of gases, some of the criteria developed in the above studies may not be applicable to coalbed gases because the effects of migration may differ in organic-rich and organic-poor rocks. No in-depth investigations of the geochemistry of coalbed gases are available. Determining the chemical and isotopic compositions of individual natural gas components, so successfully applied to conventional gases, should logically apply to coalbed gases.

The proposed chemical and isotopic studies are designed to enhance our understanding of the geochemistry of coalbed gases and answer the following questions.

(1) What is the chemical and isotopic character of coalbed gases?
(2) Can geochemical criteria developed for conventional gases be applied to coalbed gases?
(3) What is the relationship between coal quality and coalbed gas composition?
(4) What are the criteria that will allow determination of the origin of the gas, thermal maturity of the source bed, and identification of migrated gases within the coal bed?
(5) Can production data be related to chemical and isotopic composition of coalbed gases?
(6) What is the relationship, if any, between natural gas in sandstone reservoirs and methane in coalbeds?

Hydrologic Controls on Gas Producibility

The importance of reservoir hydrology to gas producibility is evident in the need to dewater saturated coal seams to stimulate gas desorption for commercial production. Fluid flow, pressure regime, and fluid chemical composition are suggested as possible hydrologic controls on the producibility of coalbed methane. To evaluate

their relative importance, regional data on hydraulic head, reservoir pressure, and fluid chemistry, will be collected and presented as potentiometric-surface maps, pressure-depth (P-D) plots, and salinity or hydrochemical maps (Kaiser and others, 1986).

In the basins under consideration, ground-water flow is expected to be from the basin rim, where recharge occurs, down the hydraulic gradient toward the basin center. The San Juan Basin is a gas-centered basin (Rose and others, 1984), and the trapping mechanism may be hydrodynamic, where basinward flow of groundwater and decreased permeability combine to trap the gas at the basin center (Gies, 1984). However, recent gas completions southwest of the deep basin suggest the presence of migrated gas in stratigraphic traps as well (Meissner, 1984; GRI, 1986b). In the Piceance Creek Basin, basin-centered trapping has been inferred in the deep basin; anticlinal traps are present at the basin margin (Brown and others, 1986). Little is known about trapping mechanisms of coalbed gas in the Black Warrior Basin. Clearly, trapping mechanisms differ, and they will influence the exploration rationale appropriate to each basin.

The updip water/gas contact in a gas-centered basin should approximate the depth where regional hydrostatic pressure equals that of the gas-saturated interval as shown on P-D plots (Davis, 1984). Updip of that contact, gas should be trapped structurally and stratigraphically. Thus, it may be possible to assess the geographical distribution of dominant trapping mechanisms in a basin using hydraulic head and pressure regime. P-D plots may also reveal whether coal seams are water- or gas-saturated, reflecting isolation or communication with the regional ground-water flow system. Seams that are hydrostatically isolated and contain only gas would predictably have low pressure gradients, for example, 0.055 to 0.065 psi/ft, versus 0.433 psi/ft for fresh-water saturation.

Aside from the possibility of hydrodynamic trapping of gas, reservoir hydraulics, head and pressure regime, as well as salinity may be directly correlatable with gas producibility. Analysis of vertical head should reveal the degree of communication between coal seams and associated sandstones, or the seam's degree of hydrologic isolation, where dissimilarity of heads indicates isolation. Furthermore, the amount of head on a coal seam and whether or not it is overpressured or underpressured may relate to gas producibility. Certainly, when the head on a producing coal seam is

lowered, production is much improved. Pressure gradient may be related to seam permeability, with low gradient reflecting low permeability suitable for the transmission of gas only.

Gas is trapped by adsorption on the coal matrix, and gas content increases as a nonlinear function of pressure; gas content may also be a function of salinity. As salinity increases there may be more competition between methane molecules and cations for adsorption sites and, consequently, reduced gas content or storage capacity.

The proposed research in hydrology is designed to answer the following questions.

(1) What is the relative importance of hydrodynamic (basin-centered) or structural/stratigraphic trapping of gas in the basins of question? How does exploration rationale depend on trapping mechanism?

(2) Are there hydrologic controls on gas producibility? Are those controls hydraulic head, pressure gradient, and salinity, or others? What is their relative importance? If important, are hydraulic head, pressure gradient relative to hydrostatic, and salinity predictors of gas producibility? Do they reflect the key variables of permeability and water saturation?

Structural and Fracture Analysis of Coal and Host Rocks

Natural fracture patterns and in situ stress, which profoundly influence the producibility of coalbed methane, differ greatly in the basins suggested for this study. Boreholes should be located to exploit the permeability anisotropy arising from coal bed fractures (cleat), and it is therefore important to be able to predict fracture orientation, as well as dimensions and overall architecture of the fracture system, in both coal and adjacent sedimentary rocks (fig. 5). In situ stresses must be known in order to anticipate the attitude and dimensions of fractures induced in coal and adjacent rocks during hydraulic fracture treatment for coalbed methane exploitation, and to predict the effects of fracturing and degasification on the mechanical stability of the coal-sedimentary rock system. Thus, a goal is to develop criteria for predicting fracture pattern and stress orientation and magnitude in coal seams and host rocks.

Fracture propagation in coal compared to fracture propagation in associated sedimentary rocks may occur at different times and as a result of different processes because the mechanical properties of coal and the evolution of coal properties with burial differ so markedly from the host sandstones and shales (Engelder, 1985). Fracture architecture (Hancock, 1985) in coal is therefore more difficult to predict than fracture architecture in host rocks, and the relationship between fracture patterns in host rocks may be an imperfect guide to patterns in coal.

The subsidence, uplift, and fault history of a basin influenced timing and mode of natural fracture propagation, and also influence present stresses. To facilitate transfer of research results to other basins, fracture characterization studies must be integrated with an understanding of the overall structural history of the basin. Furthermore, cleats commonly develop early in the diagenetic history of coal when differential compaction may play an important role in fracture localization (fig. 3); therefore structural studies should be conducted in concert with high-resolution stratigraphic and diagenetic studies.

The Black Warrior, San Juan, and Piceance Creek Basins are known to possess moderately complex structural histories and diverse fracture patterns appropriate for this comparative analysis. Various aspects of the fracture pattern and the structural history of the Black Warrior, San Juan and Piceance Creek Basins have recently been studied (Woodward and Callender, 1977; Ward and others, 1984; Verbeek and Grout, 1983, 1984; Bearden and Mancini, 1985; Lorenz, 1985), providing the necessary framework for the more focused and detailed studies that we propose. In the Piceance Creek Basin, for example, Laramide thrust faulting and Basin and Range extensional tectonics, as well as contemporary tectonic and topographically-induced stress, influence fracture patterns (Lorenz, 1985). At least two regionally significant fracture systems and various fracture sets of local development are present, and subsurface fracture patterns can differ from surface patterns (Verbeek and Grout, 1984).

The research proposed in structural geology is designed to answer the following questions.

(1) How do cleat patterns in coal vary with increasing structural complexity? What is the relationship between cleat. patterns and faults and folds? What needs to be known in order to successfully predict cleat patterns in structurally complex basins?

(2) Are fracture patterns in sedimentary rocks associated with coal beds useful for predicting cleat orientation? Can the variation between cleat orientation and fractures in host rock be predicted?

(3) Are surface fracture patterns useful for predicting fracture patterns at depth in coal? If fracture patterns in coal and host rock do not vary in the same way with depth, under what circumstances can surface structures be used to infer cleat patterns at depth?

(4) How important are tectonically induced fracture patterns compared to burial- and coalification-induced fractures? What is the in-situ state of stress in coal and associated sedimentary rocks in different structural settings in the basins? Are modern fractures an important factor in coal in areas of high present-day stresses?

(5) Is remote sensing a useful tool for predicting fracture anisotropy in coal beds?

(6) How does fracture architecture relate to gas producibility?

SCHEDULE AND WORK PLAN

Task and Subtask Descriptions

Task I. Depositional Systems Controls on Coal Occurrence and Characteristics and Coalbed Methane Producibility

Subtask 1. Acquisition of Data Base

The major source of data for delineating depositional systems is geophysical well logs. Because the Black Warrior, San Juan, and Piceance Creek Basins are mature petroleum provinces, many nonproprietary geophysical logs are available. The Alabama Geological Survey maintains a data file including logs of more than 2,100 oil, gas, and coalbed methane wells in the Black Warrior Basin. They also have a computerized data base that contains 7,000 data

points from which coal characterization maps can be made. The Bureau of Economic Geology has a set of all commercially available well logs for the Piceance Creek Basin, and logs for the San Juan Basin can be readily purchased from well-log libraries.

Subtask 2. Mapping Depositional Systems

The depositional systems will be delineated by mapping the geometries of the framework facies. After regional cross sections have been made, genetic sequences (such as the Mary Lee coal group of the Black Warrior Basin) will be identified and correlated. All remaining well logs will be correlated with those on the master cross sections. Data from the logs will be used to make structure, isopach, maximum sand, major sand, percent major sand, and log pattern maps for each genetic interval. From the maps we will identify the regional depositional systems. Subsequently, we will describe lithologies and sedimentary structures at outcrop, and sandstone composition, texture, and diagenesis will be described from cores and petrographic thin sections from selected areas that are critical to an interpretation of depositional systems, as determined from the regional maps.

Subtask 3. Delineation of Coal Parameters

For each genetic sequence, we will map the number of coal seams, the net thickness of coal, and maximum coal thickness to delineate coal seam occurrence, geometry, trend, and resources. Resistivity and natural gamma responses of the coal will be evaluated as regional indicators of water content, salinity, and inorganic content. Coals will be characterized by their physical and chemical properties, maceral content, and maturity. Because the quantity of methane generated by and stored in coal beds depends on thermal maturity, regional maps of thermal maturity in the basins will be updated with additional samples from critical areas. If practical, the burial history of the basins will be reconstructed.

Subtask 4. Depositional Models for Coal

Regional depositional models for coal seams will be developed on the basis of the geometry and orientation of coal seams and their occurrence within the

depositional systems delineated in Task I.2. The usefulness of the regional model to exploration, site selection, and interpretation local geology will be tested with a detailed study of a mine area using closely spaced control.

Task II. Geochemistry of Coalbed Gases

Subtask 1. Sample Collection and Laboratory Analysis

To select sampling sites, depth of gas production and available maturity data will be used to ensure sampling the widest range of depths and maturities. Major sources of data will be state agencies, data base companies, and individual operators. Gas samples will be analyzed from areas where less chemical and isotopic information is available, and in areas where the origin and migration distance are uncertain. To evaluate possible chemical and isotopical changes that may be induced by gas production, we propose to analyze the chemical and isotopic compositions of gases desorbed in the laboratory from representative coal samples. This will depend on operator cooperation and the availability of freshly cut coal cores that have been properly sampled and preserved. Laboratory analysis will involve determination of the chemical composition of produced and desorbed gas samples and of the stable carbon and hydrogen isotopic compositions of their individual components.

Subtask 2. Interpretation of Results

Chemical and isotopic data will be interpreted in light of coalbed maturity, coalbed organic and inorganic content, and in the context of the geologic, hydrologic, and structural setting. The degree of compatibility between those settings and the geochemical data will be used to evaluate the source and extent of migration of coalbed methane. The geochemical data will be tested for possible correlation with gas producibility by relating them to gas distribution and production. These geochemical data will be used to determine if there are any relationships between natural gas in sandstone reservoirs and methane in coalbeds.

Task III. Hydrologic Controls on Gas Producibility

Subtask 1. Evaluate Size and Reliability of Data Base

Major data sources will be state agencies, data base companies such as Petroleum Information Corporation, and individual operators. From the files of these organizations we will retrieve water-level and pressure data, and chemical analyses of formation waters for the major coal-bearing intervals of interest. Water levels may be actual static measurements or may be determined from geophysical log response. The primary source of pressure data will be drill-stem tests (DST). Anticipated secondary sources are bottom-hole pressures and surface shut-in pressures for dry gas wells. Gas production data will also be compiled and tabulated.

Pressure data will be screened and classified to eliminate data from improperly run tests, insufficient records, poorly calibrated or malfunctioning equipment, and misreported results. Screening will be based on test duration and agreement of final shut in pressure (FSIP) and initial shut in pressure (ISIP). The time criterion is particularly important in low-permeability strata where pressure equilibrium is attained slowly. Tests of too short a duration are of doubtful value. Pressure agreement will be used to eliminate tests that did not approach pressure equilibrium. Used together, these criteria should identify pressures that attained or approached equilibrium. The accuracy of chemical analyses will be checked by ionic balance. Analyses having an error greater than a few percent or an exact balance will be deleted.

Subtask 2. Evaluate Hydrostratigraphy

The goal of this subtask is to determine, for the coal-bearing intervals, the hydrostratigraphy in relation to rock stratigraphy. Water yield, pressure data, water levels, salinity, and R_w from geophysical log and/or chemical analyses will be posted on regional stratigraphic cross sections to identify and evaluate the continuity of aquifers and aquitards, and to assess the importance of coal seams as aquifers. Lateral change in pressure may reflect thermal maturation-migration phenomena when plotted against vitrinite reflectance and desorption characteristics.

Subtask 3. Prepare Hydrologic Maps and Pressure-Depth Plots

Pressures will be converted to equivalent fresh-water heads and combined with measured and log-derived water levels to prepare potentiometric-surface maps. Although equivalent fresh-water heads may be inexact, they are commonly used for representing heads in aquifers containing fluid of varying density where the prime concern is lateral flow of fluid (Bair and others, 1985). Raw head data will be used; smoothening by moving average or by kriging is not planned. To evaluate vertical flow, environmental, or brine, heads will be used. Their calculation requires some knowledge of fluid density, which will be assessed from chemical analyses.

Further insight into the potential for upward or downward vertical flow will be derived from the P-D plots, plotted as pressure versus depth and as pressure versus elevation. To minimize the effects of data scatter on the interpretation of these plots, plots will be constructed for areas in which lateral variations in head, structural dip, and surface topography are minimal (Orr and others, 1985). Salinities of waters from coals and sandstones will be mapped as total dissolved solids (TDS). Mapping of individual ionic species will be dictated by the availability of complete chemical analyses; it may be warranted in field-size studies. Comparison of hydrochemical and head mapping may be appropriate to assess possible extent of fracture flow.

Subtask 4. Interpretation and Synthesis of Data

Hydraulic head, pressure gradient, and salinity will be evaluated as hydrologic controls on producibility of coalbed methane by relating them to methane distribution and production. Their relative importance will be assessed.

Ground-water circulation in the major coal-bearing intervals will be interpreted from the horizontal and vertical head distribution and from P-D plots. Cross-sectional modeling may be selectively used in investigating and characterizing vertical flow between coals and sandstones. Pressure gradients in the gas-saturated intervals will be compared with the hydrostatic gradients to infer underpressuring and overpressuring and the updip extent of basin-centered

gas. In other words, P-D plots will be used to help interpret flow direction and infer basinal trapping mechanisms.

Basinward changes in salinity are of prime interest, particularly down the hydraulic gradient in areas of change in the head gradient, which may reflect permeability changes, and at the updip limit of basin-centered gas. The degree of the correlation will indicate the usefulness of salinity mapping in unraveling ground-water circulation. Moreover, we should be able to test the assertion of Law and others (1983) that coal-derived waters are fresh relative to other formation waters.

To integrate hydrology and geology, mapped hydrologic trends will be related to sand-body geometry, structure, and fracture architecture by comparing head and salinity maps with maximum-sand maps, maps of the resistivity of the maximum sandstone (Ayers and Lewis, 1985), structure maps, and maps of fracture patterns. If coals are more permeable than sands, as in the Black Warrior Basin, coals may serve to focus flow.

Task IV. Fracture Analysis of Coal and Host Rocks

Subtask 1. Surface and subsurface structural and fracture analysis

The published literature will be reviewed to assess the availability of structure-contour maps and cross sections for the coal-bearing interval of the basin. Structure-contour maps will be prepared for those basins lacking published maps. Regional structural elements (folds and faults) and fracture patterns will be delineated using structure maps and remote-sensing studies. On the basis of these data, areas for detailed structural and fracture analysis will be selected. In these areas analysis will include the microtectonic techniques of Angelier (1983) and Etchecopar and others (1981) for stress tensor determination and stress history, or paleostress analysis to improve our understanding of fracture patterns. Outcrop studies will be devoted to examining the relation of cleat to fractures in host rocks and sampling of fractured coal, sandstone, and shale for laboratory study of microstructures and fabrics. The intent is to produce detailed fracture architecture maps of key areas.

Subsurface fracture analysis will be performed mainly on oriented core using macro- and microtectonic techniques to analyze fracture density, orientation, morphology and history. Oriented core may be available through industry cooperation in a program of cooperative wells. Obviously, the extent of our subsurface studies will be dictated by the availability of core.

Subtask 2. Current In-Situ Stress State

Analysis of in-situ stress will depend mainly on published and industry data. Stress state is usually determined through mini-hydraulic fracturing in the well bore or by analysis of long-spaced sonic logs. The former might be done at selected cooperative wells in conjunction with operator hydraulic fracturing operations, whereas the latter will depend on the availability of sonic logs.

Subtask 3. Interpretation and Application of Fracture Analysis

Results of the surface analysis will be related to the regional structural elements and tested for compatibility with the analyses of paleo-stress, subsurface fracturing, and modern stress state. Fracture architecture as a control on gas producibility will be tested by relating it to gas production and distribution in each basin.

Task V. Assessment of Cooperative Research Opportunities in Industry Wells

Opportunities may arise in conjunction with current industry activity in coalbed methane resource areas to collect data that advance our understanding of coalbed gas production mechanisms. Such data may include core, well logs, desorption test results, and water samples. As part of this project, these data would be sought and analyzed to meet the objectives defined in previous tasks. Data collection could be supported on-site by project staff, primarily subcontractor geologic survey staff, such as the Colorado Geological Survey, which has the capability to preserve coal samples for later desorption testing. Local knowledge of coalbed methane resource development on the part of the Geological Survey of Alabama and the Colorado Geological Survey would be combined with monitoring of planned activity to identify cooperative data collection opportunities. Although financial support for coring and new, or more

extensive, well logging suites is not a part of this proposal, efforts will be made to offer analytical and interpretive support that might encourage operators to collect data where specific needs are identified during the proposed research.

A further component of cooperative research opportunities may arise in multiresource basins, such as the Piceance Creek and San Juan Basins, where coalbed methane resources are in stratigraphic proximity to low-permeability gas sandstones. Because other Gas Research Institute supply programs address tight gas sandstone resources, it would be feasible to coordinate cooperative well opportunities between those programs in the evaluation of coalbed gas production mechanisms. Operator contacts that have been established on behalf of GRI in tight gas sandstone programs would be a starting point for further potential collaborative efforts.

Task VI. Support of Engineering and Economic Analyses

The geology of gas-rich coalbeds and the character of surrounding sandstones form the physical framework for coalbed methane production. However, in addition to coalbed geology, engineering considerations and economic limitations determine the viability of developing the resource potential of coalbed methane as part of the U.S. domestic gas supply. It is recognized that other technical contractors to GRI may require input on the geologic framework to develop optimum engineering practices and to perform economic analyses on regional and national levels. The task of supporting these other efforts will be carried out in a timely manner as part of the proposed research to ensure that these other technical efforts fully benefit from results of the geologic studies. In addition, engineering information, such as well drilling and completion techniques, and production data available from other GRI contractors and coalbed operators will be related to the geologic history, depositional systems, reservoir characteristics, coal quality, and gas content information derived from this study.

Task VII. Documentation

Throughout the contract period, representative maps, cross sections, and other displays will be selected for drafting and reproduction, and, with appropriate text, will be included in quarterly reports, in articles in the "Quarterly Review of Methane from Coal Seams Technology," and in documentation for GRI program managers and advisory boards. Topical reports (at least two during the contract period) will be prepared, as agreed upon by GRI and the Bureau of Economic Geology. An annual technical report at the end of the first year of study and a final technical report at the end of the two-year Phase I program will be prepared. Outside papers and presentations will be prepared for appropriate forums, such as the SPE/GRI/DOE Unconventional Gas Technology Symposia and Annual Meetings of the American Association of Petroleum Geologists.

POTENTIAL BENEFITS OF PROPOSED RESEARCH

Although an estimated 500 Tcf of coalbed methane exist in the continental United States, these resources are less than fully exploited because the technology required for exploitation is in its infancy; geologic controls on occurrence and producibility are poorly known. The goals of this study are to identify the geologic parameters controlling coalbed methane occurrence and producibility and to integrate the findings, formulating exploration models for two basins. Benefits of the models will be reduced cost of exploration and optimized production by guiding future exploration efforts. Successful exploration and production of this under-utilized resource will result in an assured supply of natural gas at reasonable cost.

TIME FRAME AND DELIVERABLES

The period of proposed research is from May 15, 1987, to May 15, 1989. Expected time distribution of tasks is illustrated in figure 7, including the time frame of documentation (Task VII). The primary deliverable during the first year will be an annual report; topical reports will be generated in the second year on topics to be agreed upon by the Bureau and GRI. Such reports could either address a technical aspect of the proposed research, such as the depositional systems framework,

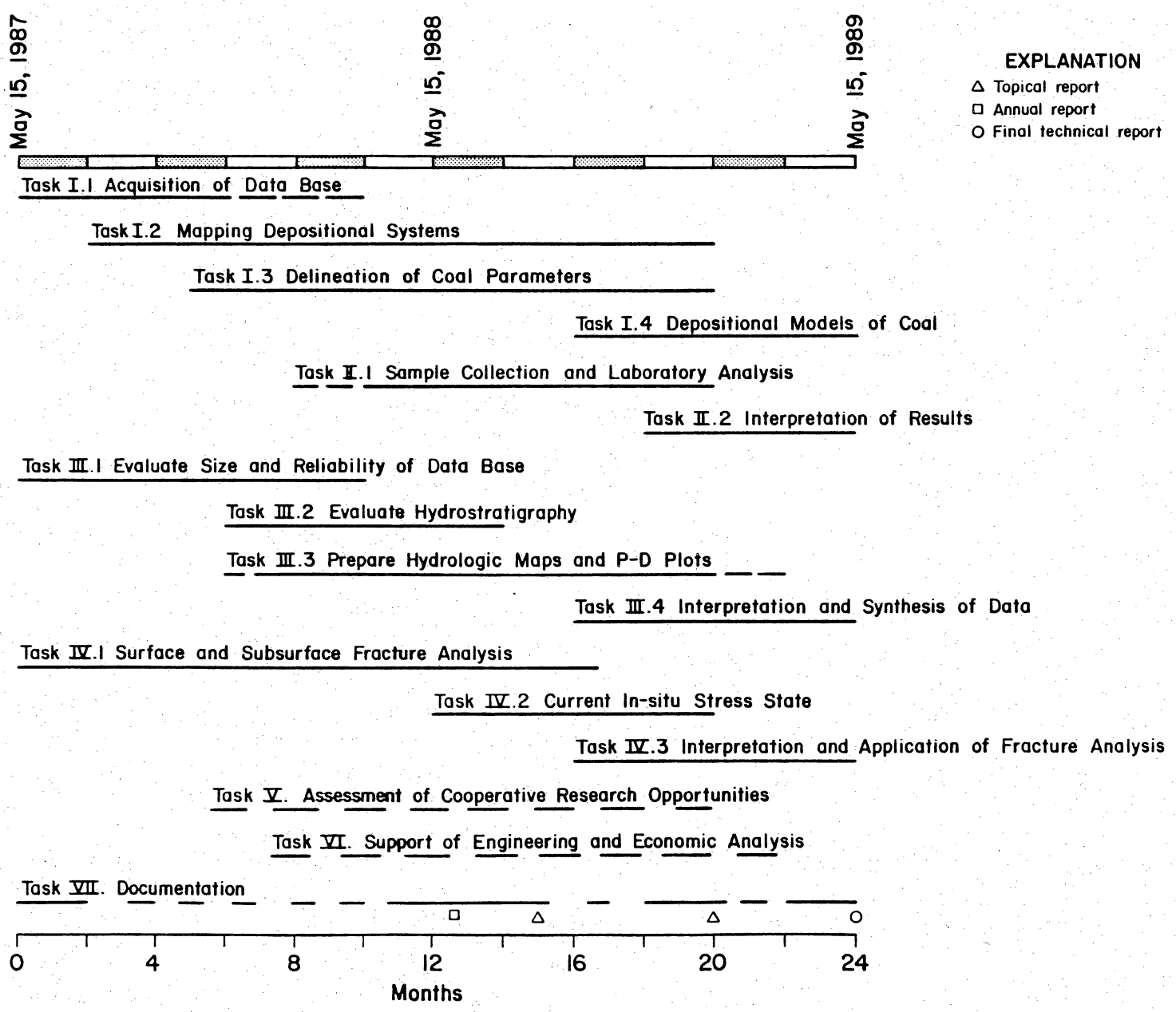

Figure 7. Projected time distribution of work tasks and subtasks.

hydrostratigraphy, or fracture analysis across both basins, or could focus more closely on one basin. At least two topical reports will be written and submitted (fig. 7). The Bureau of Economic Geology would have primary responsibility for report preparation to GRI specifications using the contributions of subcontractors. Additional documentation will be in the form of outside publications and within the publication series of the state geological surveys involved in this proposed investigation.

Full consultation will be maintained with GRI and other contractors involved in coalbed methane research with respect to reporting requirements. The work plan will remain flexible to make adjustments as the work progresses and additional information is derived. New insights could potentially suggest revisions of the timing of the topical reports. The Bureau will coordinate all subcontractor contributions to monthly and quarterly reports.

MANAGEMENT PLAN

The project will be managed by the administrative organization of the Bureau of Economic Geology (BEG), Dr. W. L. Fisher, Director. Dr. R. J. Finley, BEG, will provide technical supervision and will spend 10 percent time on the project. Dr. Finley serves as Program Director for Gas Resources for the Bureau. Dr. W. B. Ayers, Jr., will act as project manager and will spend 100 percent time on the project. The subcontract with the Colorado Geological Survey will be supervised by Mr. L. R. Ladwig, Chief of the Mineral Fuels Section. The subcontract with the Geological Survey of Alabama and the Department of Geology at the University of Alabama will be supervised by Mr. Gary V. Wilson, Assistant State Oil and Gas Supervisor and Chief of the Geology Division, Geological Survey of Alabama/State Oil and Gas Board.

Interaction with closely related research on tight gas sandstones will be maintained by Dr. Finley. Currently, this research overlaps coalbed methane resource areas in the Piceance Creek Basin of Colorado. Should future emphasis in tight gas sandstones and coalbed methane shift and subsequently coincide in another basin, such as the San Juan Basin of New Mexico, support and coordination will be developed with the appropriate state geological agency, such as the New Mexico Bureau of Mines & Mineral Resources, for central and southern San Juan Basin.

Coordination with GRI will be through monthly and quarterly progress reports, topical and annual reports, and through contractors' meetings and periodic reports to advisory boards, as GRI may request. Statements of the facilities and capabilities of the Bureau of Economic Geology and the Geological Survey of Alabama are attached.

REFERENCES

Angelier, J., 1983, Analyses qualitatives et quantitatives des populations de jeux de failles: Bulletin de la Societe Geologique de France, v. 5, p. 661-672.

Ayers, W.B., Jr., 1986a, Sedimentologic controls on lignite quality and mining, Sandow lignite mine, lower Calvert Bluff Formation, east-central Texas, in Finkelman, R.B., and Casagrande, D.J., eds., Geology of Gulf Coast lignite: Environmental and Coal Associates, guidebook for Geological Society of America, 1986 Annual Meeting, Coal Geology Division field trip, p. 40-53.

_____ 1986b, Geology of San Miguel lignite mine, Jackson Group, South Texas, in Finkelman, R.B., and Casagrande, D.J., eds., Geology of Gulf Coast lignite: Environmental and Coal Associates, guidebook for Geological Society of America, 1986 Annual Meeting, Coal Geology Division, p. 54-61.

_____ 1986c, Coal resources of the Tongue River Member, Fort Union Formation (Paleocene), Powder River Basin, Wyoming and Montana: Geological Survey of Wyoming, Report of Investigations No. 35, 22 p.

Ayers, W.B., Jr., and Kaiser, W.R., 1984, Lacustrine-interdeltaic coal in the Fort Union Formation (Palaeocene), Powder River Basin, Wyoming and Montana, U.S.A., in Rahmani, R.A., and Flores, R.M., Geology of coal and coal-bearing sediments: International Association of Sedimentologists Special Publication No. 7, p. 61-84.

Ayers, W.B., Jr., and Lewis, A.H., 1985, The Wilcox Group and Carrizo Sand (Paleogene) in east-central Texas: depositional systems and deep-basin lignite: The University of Texas at Austin, Bureau of Economic Geology Special Publication, 19 p.

Ayers, W.B., Jr., Lewis, A.H., and Collins, G.F., 1986, Resistivity, lignite, and lithofacies mapping of the Wilcox Group, east-central Texas, in Kaiser, W.R., and others, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication 1986, p. 31-50.

Bair, E.S., O'Donnell, T.P., and Picking, L.W., 1985, Potentiometric mapping from incomplete drill-stem test data: Palo Duro Basin area, Texas and New Mexico: Ground Water, v. 23, p. 198-211.

Bearden, B.L., and Mancini, E.A., 1985, Petroleum geology of Carter sandstone (Upper Mississippian), Black Warrior Basin, Alabama: American Association of Petroleum Geologists Bulletin, v. 69, p. 361-377.

Benson, D.J., 1982, Depositional environments of coal-bearing strata in the Warrior basin, in Rheams, L. J., and Benson, D. J., eds., Depositional setting of the Pottsville Formation in the Black Warrior Basin: Alabama Geological Society Guidebook, 19th annual field trip, p. 15-26.

Brown, C.A., Smagala, T.M., and Haefele, G.R., 1986, Southern Piceance Basin model-Cozzette, Corcoran, and Rollins sandstones, in Spencer, C.W., and Mast, R.F., eds., Geology of tight gas reservoirs: American Association of Petroleum Geologists Studies in Geology No. 24, p. 207-219.

Choate, R., Jurich, D., and Saulnier, G.J., Jr., 1984a, Geologic overview, coal deposits, and potential for methane recovery from coals, Piceance Basin - Colorado, in Rightmire, C.T., Eddy, G.G., and Kirr, J.N., eds., Coalbed methane resources of the United States: American Association of Petroleum Geologists Studies in Geology No. 17, p. 223-251.

Choate, R., Lent, J., and Rightmire, C.T., 1984b, Upper Cretaceous geology, coal, and the potential for methane recovery from coalbeds in San Juan Basin - Colorado and New Mexico, in Rightmire, C.T., Eddy, G.E., and Kirr, J.N., eds., Coalbed methane resources of the United States: American Association of Petroleum Geologists Studies in Geology No. 17, p. 185-222.

Collins, B.A., 1976, Coal deposits of the Carbondale, Grand Hogback, and southern Danforth Hills coal fields, eastern Piceance Basin, Colorado: Colorado School of Mines Quarterly, v. 71, no. 1, 138 p.

Damberger, H.H., Nelson, W.J., and Krausse, H.-F., 1980, Effect of geology on roof stability in room-and-pillar mines in the Herrin (No. 6) coal of Illinois: Illinois State Geological Survey Reprint 1980 P, p. 14-32.

Davis, T.B., 1984, Subsurface pressure profiles in gas-saturated basins, in Masters, J.A., ed., Elmworth - case study of a deep basin gas field: American Association of Petroleum Geologists Memoir 38, p. 189-203.

Donaldson, A.C., 1979, Origin of coal seam discontinuities, in Donaldson, A.C., Presley, M.W., and Renton, J.J., eds., Carboniferous coal guidebook: West Virginia Geological and Economic Survey Bulletin B-37-1, p. 102-132.

Donaldson, A.C., Presley, M.W., and Renton, J.J., 1979, Carboniferous coal guidebook: West Virginia Geological and Economic Survey Bulletin B-37-1, 301 p.

Ehrlich, R., 1965, the geologic evolution of the Black Warrior detrital basin: Louisiana State University, Ph.D. dissertation, 62 p.

Engelder, T., 1985, Loading paths to joint propagation during a tectonic cycle: an example from the Appalachian Plateau: Journal of Structural Geology, v. 7, p. 459-476.

Etchecopar, A., Vasseur, G., and Daignieres, M., 1981, An inverse problem in microtectonics for determination of stress tensors from fault striation analysis: Journal of Structural Geology, v. 3, p. 51-65.

Fassett, J.E., and Hinds, J.S., 1971, Geology and fuel resources of the Fruitland Formation and Kirkland Shale of the San Juan Basin, New Mexico and Colorado: U.S. Geological Survey Professional Paper 676, 76 p.

Ferm, J.C., and Erhlich, R., 1967, Petrology and stratigraphy of the Alabama coal fields, in Ferm, J.C., and others, A field guide to Carboniferous detrital rocks in

Northern Alabama: Geological Society of America, Coal Division, 1967 field trip: University, Alabama, Alabama Geological Society, p. 11-15.

Fisher, W.L., Brown, L.F., Jr., Scott, A.J., and McGowen, J.H., 1969, Delta systems in the exploration for oil and gas: The University of Texas at Austin, Bureau of Economic Geology Research Colloquium, 212 p.

Flores, R.M., and Erpenbeck, M.F., 1981, Differentiation of delta front and barrier lithofacies of the Upper Cretaceous Pictured Cliffs Sandstone, southwestern San Juan Basin, New Mexico: Mountain Geologist, v. 18, p. 23-24.

Fuex, A.N., 1977, The use of stable carbon isotopes in hydrocarbon exploration: Journal of Geochemical Exploration, v. 7, p. 155-188.

Gies, R.M., 1984, Case history for a major Alberta deep basin gas trap: the Cadomin Formation, in Masters, J.A., ed., Elmworth - case study of a deep basin gas field: American Association of Petroleum Geologists Memoir 38, p. 115-140.

Graham, S.A., Ingersoll, R.V., and Dickenson, W.R., 1976, Common provenance for the lithic grains in Carboniferous sandstones from Ouachita Mountains and Black Warrior Basin: Journal of Sedimentary Petrology, v. 46, p. 620-632.

GRI, 1985, Multiple coal seam project: Gas Research Institute, Quarterly Review of Methane from Coal Seams Technology, v. 3, no. 1, p. 34-41.

GRI, 1986a, Multiple coal seam project: Gas Research Institute, Quarterly Review of Methane from Coal Seams Technology, v. 3, no. 3 and 4, p. 32-37.

GRI, 1986b, San Juan Basin, Colorado and New Mexico: Gas Research Institute, Quarterly Review of Methane from Coal Seams Technology, v. 3, no. 3 and 4, p. 15-20.

GRID, 1985, Coalbed methane - coming of age as an energy resource: Gas Research Institute Digest, v. 8, no. 1, p. 5-13.

Hancock, P.L., 1985, Brittle microtectonics: principles and practice: Journal of Structural Geology, v. 7, p. 437-457.

Hewitt, J.L., 1984, Geologic overview, coal, and coalbed methane resources of the Warrior Basin - Alabama and Mississippi, in Rightmire, C.T., Eddy, G.E., and Kirr, J.N., eds., Coalbed methane resources of the United States: American Association of Petroleum Geologists Studies in Geology No. 17, p. 73-104.

Hobday, D.K., 1974, Beach- and barrier-island facies in the upper Carboniferous of Northern Alabama, in Briggs, Garrett, ed., Carboniferous of the Southeastern United States: Geological Society of America Special Paper 148, p. 209-224.

Horne, J.C., Ferm, J.C., Caruccio, F.T., and Baganz, B.P., 1978, Depositional models in coal exploration and mine planning in Appalachian region: American Association of Petroleum Geologists Bulletin, v. 62, p. 2379-2411.

Houseknecht, D.W., and Iannacchione, A.T., 1982, Anticipating facies-related coal mining problems in Hartshorne Formation, Arkoma Basin: American Association of Petroleum Geologists Bulletin, v. 66, p. 923-946.

James, A.T., 1983, Correlation of natural gas by use of carbon isotopic distribution between hydrocarbon components: American Association of Petroleum Geologists Bulletin, v. 67, p. 1167-1191.

Kaiser, W.R., Jackson, M.L.W., and Collins, G.F., 1986, Geology of deep-basin lignite in the Wilcox Group, Sabine Uplift area, in Kaiser, W.R., and others, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, p. 11-20.

Kaiser, W.R., and others, 1986, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, 182 p.

Kaiser, W.R., 1982, Lignite depositional models, Texas Eocene: a regional approach to coal geology, in Schobert, H.H., comp., Proceedings, Basic Coal Science Workshop: U.S. Department of Energy, Grand Forks Energy Technology Center, p. 9-67.

Kaiser, W.R., Ayers, W.B., Jr., and LaBrie, L.W., 1980, Lignite resources in Texas: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 104, 52 p.

Kaiser, W.R., Johnston, J.E., and Bach, W.N., 1978, Sandbody geometry and the occurrence of lignite in the Eocene of Texas: The University of Texas at Austin, Bureau of Economic Geology Circular 78-4, 19 p.

Kerns, E.G., Jr., 1970, Clay dikes in the Pittsburgh coal of southwestern Greene County, Pennsylvania: West Virginia University, Master's thesis, 48 p.

Law, B.E., Hatch, J.R., Kukal, G.C., and Keighin, C.W., 1983, Geologic implications of coal dewatering: American Association of Petroleum Geologists Bulletin, v. 67, p. 2255-2260.

Lorenz, J.C., 1985, Tectonic and stress histories of the Piceance Creek Basin and the MWX Site, from 75 million years ago to the present: Preliminary Report, Sandia 84-2603, UC-92, 50 p.

Mack, G.H., 1982, Composition of Carboniferous sandstones in the Black Warrior basin, Alabama: implications on plate tectonic setting, in Thomas, W. A., and Neathory, T. L., eds., Appalachian Thrust Belt in Alabama: tectonics and sedimentation: Geological Society of America Guidebook, 1982 field trip, p. 67-74.

Mancini, E.A., 1982, Determination of an exploration model for prospecting for lignite in the Alabama coastal plain: University Alabama School of Mines and Energy Development, Research Report 17, 29 p.

McGowen, J.H., 1968, Utilization of depositional models in exploration for nonmetallic minerals, in Brown, L.F., Jr., ed., Proceedings, Fourth forum on geology of industrial minerals: The University of Texas at Austin, Bureau of Economic Geology, p. 157-174.

Meissner, F.F., 1984, Cretaceous and lower Tertiary coals as sources for gas accumulation in the Rocky Mountain area, in Woodward, J., Meissner, F.F., and Clayton, J.L., eds., Hydrocarbon source rocks of the Greater Rocky Mountain Region: Rocky Mountain Association of Geologists, p. 401-431.

Merry, R.K., and Larsen, V.E., 1982, Geologic investigation of the methane potential of western U.S. coal beds: Colorado School of Mines Research Institute, GRI-80/0180, 147 p.

Murrie, G.W., Diamond, W.P., and Lambert, S.W., 1976, Geology of the Mary Lee group of coalbeds, Black Warrior Coal Basin, Alabama: U.S. Bureau of Mines Report of Investigations 8189, 42 p.

Musgrove, C.G., 1982, Stratigraphy of the coal deposits in the Warrior Basin, in Rheams, L.J., and Benson, D.J., eds., Depositional setting of the Pottsville Formation in the Black Warrior Basin: Alabama Geological Society, guidebook, 19th Annual field trip, p. 9-14.

Orr, E.D., Kreitler, C.W., and Senger, R.K., 1985, Investigation of underpressuring in the Deep-Basin Brine aquifer, Palo Duro Basin, Texas: The University of Texas at Austin, Bureau of Economic Geology Geological Circular 85-1, 44 p.

Phleger, F.B., 1981, Benthic foraminiferids as indicators or organic production in marginal marine areas, in Schafer & Thomas, eds., First International Symposium on Benthonic Foraminifera of Continental Margins, Part A, Ecology and Biology: Maritime Sediments Special Publication No. 1, p. 107-117.

Rice, D.D., 1983, Relation of natural gas composition to thermal maturity and source rock type in San Juan Basin, northwestern New Mexico and southwestern Colorado: American Association of Petroleum Geologists Bulletin, v. 67, p. 1199-1218.

Rice, D.D., and Claypool, G. E., 1981, Generation, accumulation, and resource potential of biogenic gas: American Association of Petroleum Geologists Bulletin, v. 65, p. 5-25.

Rightmire, R.T., 1984, Coalbed methane resource, in Coalbed methane resources of the United States: American Association of Petroleum Geologists Studies in Geology No. 17, p. 1-13.

Rose, P.R., Everett, J.R., and Merin, I.S., 1984, Possible basin centered gas accumulation, Raton Basin, Colorado: Oil and Gas Journal, v. 82, p. 190-197.

Schoell, M., 1980, The hydrogen and carbon isotopic composition of methane from natural gases of various origins: Geochimica et Cosmochimica Acta, v. 67, p. 1176-1191.

Schoell, M., 1983, Genetic characterization of natural gases: American Association of Petroleum Geologists Bulletin, v. 67, p. 2225-2238.

Sestak, H.M., 1984, Stratigraphy and depositional environments of the Pennsylvanian Pottsville Formation in the Black Warrior Basin: Alabama and Mississippi: The University of Alabama, Master's thesis, 184 p.

Stahl, W.J., 1977, Carbon and nitrogen isotopes in hydrocarbon research and exploration: Chemical Geology, v. 20, p. 121-149.

Thomas, W.A., and Womack, S.H., 1983, Coal stratigraphy of the deeper part of the Black Warrior basin in Alabama: Gulf Coast Association of Geological Societies Transactions, v. 33, p. 439-446.

Thomas, W.A., and Hines, R.A., 1985, Primary geologic controls on coalbed methane content: University of Alabama School of Mines and Energy Development, 20 p.

Ulery, J.P., and Molinda, G.M., 1984, Influence of overlying strata on methane emissions in a northern West Virginia coal mine: U.S. Bureau of Mines Report of Investigations 8879, 14 p.

Verbeek, E.R., and Grout, M.A., 1983, Fracture history of the northern Piceance Creek Basin, northwestern Colorado, in Gary, J.H., ed., Proceedings, 16th Oil Shale Symposium, Golden, Colorado: Colorado School of Mines Press, p. 26-44.

_____ 1984, Prediction of subsurface fracture patterns from surface studies of joints--an example from the Piceance Creek Basin, Colorado, in Spencer, C.W., and Keighin, C.W., eds., Geologic studies in support of the U.S. Department of Energy's Multiwell Experiment, Garfield County, Colorado: USGS Open-File Report 84-757, p. 75-86.

Ward, W.E., II, Drahovzal, J., and Evans, F.E., Jr., 1984, Fracture analysis in a selected area of the Warrior Basin, Alabama: Tuscaloosa, Alabama, Geological Survey of Alabama Circular 111, 78 p.

Woodard, L.A., and Callender, J.F., 1977, Tectonic framework of the San Juan Basin: New Mexico Geological Society Field Conference, San Juan Basin III, guidebook No. 28, p. 209-212.

Wyman, R.E., 1984 Gas resources in Elmworth coal seams, in Masters, J.A., ed., Elmworth - case study of a deep basin gas field: American Association of Petroleum Geologists Memoir 38, p. 173-187.

Young, R.G., 1966, Stratigraphy of coal-bearing rocks of the Book Cliffs, Utah-Colorado, in central Utah coals: Utah Geological and Mineral Survey Bulletin 80, p. 7-20.

PROFESSIONAL SUMMARIES

Robert J. Finley

Professional Summary

January 1987

PERSONAL

Born April 14, 1947, New York, New York; married to former Sandra Jean Whitcomb, two children.

Business address: The University of Texas at Austin
Bureau of Economic Geology
University Station, Box X
Austin, Texas 78713
512-471-7721

Home address: 2603 Barkwood Drive
Austin, Texas 78748
512-282-6409

ACADEMIC BACKGROUND

B.S. Geology, City College, The City University of New York, 1967
M.S. Geology, Syracuse University, 1969
Ph.D. Geology, University of South Carolina, 1975

AREAS OF EXPERTISE

A. Sedimentology, especially clastic depositional systems and characterization of hydrocarbon reservoirs
B. Remote sensing, including applications to hydrocarbon and mineral exploration
C. Coastal processes, primarily inlet processes and coastal landforms
D. Geomorphology of semiarid environments

PROFESSIONAL WORK EXPERIENCE

A. Present Position: Research Scientist, Bureau of Economic Geology, The University of Texas at Austin (September 1978 - present); Energy Resources Program Coordinator (January 1985 - present).

Depositional systems analysis of low-permeability gas sandstones including the relation of geological and engineering characteristics; natural gas resources in Texas; program development and administration in energy research; geological remote sensing involving image interpretation and digital image processing; geomorphic and shallow subsurface (stratigraphic) studies applied to the long-term isolation of nuclear waste in bedded salt.

B. Research Scientist Associate, Bureau of Economic Geology, The University of Texas at Austin (August 1975 - September 1978).

Geomorphic studies related to nuclear waste isolation; development and application of remote sensing techniques for coastal land resource mapping.

C. Consultant, Computech Energy and Exploration, Dallas, Texas (June 1980 -July 1982).

Interpretation of Landsat imagery for hydrocarbon exploration applications.

D. Field Investigator, U.S. Army Corps of Engineers, Buffalo, New York (Summer 1974).

Conduct seismic investigation on Lake Erie (New York waters), using EG&G Uniboom Sub-Bottom Profiler.

E. Graduate Teaching Assistant, University of South Carolina (Fall 1972 -Spring 1975); Dr. Frank Caruccio, supervisor.

Teach environmental geology labs; coordinate and develop lab exercises; write lab manual; responsible for operation of lab facilities.

F. Field Assistant, University of South Carolina (May 1973); Dr. A. Conrad Newmann, supervisor.

Assist Dr. Newmann and fellow graduate student during cruise on R/V Calanus (C7319) to study carbonates of Little Bahama Bank.

G. Geologist, Exploration Department, Chevron Oil Company, Houston, Texas (August 1969 - June 1971); Mr. Don McLaren, supervisor.

Subsurface mapping of carbonates in the East Texas Basin and Gulf sand/shale sequences; evaluation of existing fields.

PROFESSIONAL SOCIETIES

American Association of Petroleum Geologists
Society of Petroleum Engineers
International Association of Sedimentologists
Society of Economic Paleontologists and Mineralogists
Gulf Coast Section, SEPM
American Society of Photogrammetry and Remote Sensing
Sigma Xi

AWARDS AND HONORARY SOCIETIES

National Science Foundation Traineeship, Syracuse University, 1967-1969
Ward Medal in Geology, City College, The City University of New York, 1967
New York State Regents Scholarship, The City University of New York, 1963-1967

COMMITTEE ACTIVITIES

Chairman, American Association of Petroleum Geologists Committee on Development Geology, 1986-87

Texas Natural Resources Information System Task Force, Bureau of Economic Geology Alternate Representative, 1983-present
Remote Sensing and Cartographic Committee, Texas Natural Resources Information System Task Force, 1977-present
Austin Environmental Board, 1977-1981; Board Vice-Chairperson, 1978-1979; Chairman, Environmental Review Committee, 1980-1981
Texas Mapping Advisory Committee, Alternate Member, 1977, 1978

PUBLICATIONS

Books, Manuals

Finley, R. J., 1976, Hydraulics and dynamics, North Inlet, South Carolina, 1974-75, Coastal Engineering Research Center: U.S. Army Corps of Engineers, General Investigation of Tidal Inlets Series No. 10, 188 p.

Caruccio, F. T., Finley, R. J., and Hine, A. C., 1974, Environmental geology lab manual: University of South Carolina, Department of Geology, 53 p.

Reports, Monographs, Brochures, Pamphlets, Bulletins

Finley, R. J., and Jackson, M. L. W., 1986, Fuel supplies and prices, 1985-2000, in Baughman, M. L., and others, Cogeneration in Texas: The University of Texas at Austin, Center for Energy Studies Research Report No. 16, p. 35-52.

Fisher, W. L., and Finley, R. J., 1986, Recent production trends and outlook for future oil and gas supplies in Texas: The University of Texas at Austin, Bureau of Economic Geology Geological Circular 86-4.

Gustavson, T. C., and Finley, R. J., 1985, Late Cenozoic geomorphic evolution of the Texas Panhandle and northeastern New Mexico--case studies of structural control of regional drainage development: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 148, 42 p.

Finley, R. J., 1984, Geology and engineering characteristics of selected low-permeability gas sandstones: a national survey: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 138, 220 p.

Simpkins, W. W., Gustavson, T. C., and Finley, R. J., 1982, Erosion process studies in the Texas Panhandle--analysis of a two-year data record, p. 168-175, in Gustavson, T. C., Bassett, R. L., Budnik, R., Finley, R. J., Goldstein, A. G., McGowen, J. H., Roedder, E., Ruppel, S. C., Baumgardner, R. W., Jr., Bentley, M. E., Dutton, S. P., Fogg, G. E., Hovorka, S. D., McGookey, D. A., Ramondetta, P. J., Simpkins, W. W., Smith, D., Smith, D. A., Duncan, E. A., Griffin, J. A., Merritt, R. M., and Naiman, E. R., Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste isolation feasibility studies (1981): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 82-7, 212 p.

Finley, R. J., 1981, A 10-year storm: its effects and relationship to age-dated alluvial stratigraphy, Randall County, Texas Panhandle, p. 138-143, in Gustavson, T. C., Bassett, R. L., Finley, R. J., Goldstein, A. G., Handford, C. R., McGowen, J. H., Presley, M. W., Baumgardner, R. W., Jr., Bentley, M. E., Dutton, S. P., Griffin, J. A., Hoadley, A. D., Howard, R. C., McGookey, D. A., McGillis, K. A., Palmer, D. P., Ramondetta, P. J., Roedder, E., Simpkins, W. W., and Wiggins, W. D., Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste isolation feasibility studies (1980): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 81-3, 173 p.

Finley, R. J., and Baumgardner, R. W., Jr., 1981, Sedimentology and basin morphometry of the Little Red River Basin: insights into retreat of the Eastern Caprock Escarpment, Texas Panhandle, p. 148-151, in Gustavson, T. C., and others, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste isolation feasibility studies (1980): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 81-3, 173 p.

Finley, R. J., and Gustavson, T. C., 1981, Lineament analysis based on Landsat imagery, Texas Panhandle: The University of Texas at Austin, Bureau of Economic Geology Geological Circular 81-5, 37 p.

Finley, R. J., and Howard, R. C., 1981, Slope process monitoring and data analysis, Texas Panhandle, p. 144-147, in Gustavson, T. C., and others, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste isolation feasibility studies (1980): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 81-3, 173 p.

Finley, R. J., 1980, Climatic analysis, p. 52-57, in Gustavson, T. C., Presley, M. W., Handford, C. R., Finley, R. J., Dutton, S. P., Baumgardner, R. W., Jr., McGillis, K. A., and Simpkins, W. W., Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste isolation feasibility studies (1979): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 80-7, 99 p.

Finley, R. J., 1980, Landsat analysis of surface linear elements, p. 92-95, in Gustavson, T. C., and others, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste isolation feasibility studies (1979): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 80-7, 99 p.

Finley, R. J., and Gustavson, T. C., 1980, Climatic controls on erosion in the Rolling Plains and along the Caprock Escarpment of the Texas Panhandle: The University of Texas at Austin, Bureau of Economic Geology Geological Circular 80-11, 50 p.

Finley, R. J., and Gustavson, T. C., 1980, Slope erosion mechanisms, p. 58-62, in Gustavson, T. C., and others, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste

isolation feasibility studies (1979): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 80-7, 99 p.

Gustavson, T. C., Finley, R. J., and Baumgardner, R. W., Jr., 1980, Preliminary rates of slope retreat and salt dissolution along the eastern Caprock Escarpment of the Southern High Plains and in the Canadian River Valley, p. 76-82, in Gustavson, T. C., and others, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle, a report on the progress of nuclear waste isolation feasibility studies (1979): The University of Texas at Austin, Bureau of Economic Geology Geological Circular 80-7, 99 p.

Gustavson, T. C., Finley, R. J., and McGillis, K. A., 1980, Regional salt dissolution in the Anadarko, Dalhart, and Palo Duro Basins of the Texas Panhandle: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 106, 40 p.

Baumgardner, R. W., Jr., and Finley, R. J., 1980, Definition of optimum ISOCLS parameters for RSIS interactive data analysis, Texas Coastal Applications Test Site: Austin, Texas Natural Resources Information System, 18 p.

Finley, R. J., and Baumgardner, R. W., Jr., 1980, Data collection plan for geological remote sensing in the volcanic terrain of Trans-Pecos Texas, ASVT Test Site 5: Austin, Texas Natural Resources Information System, 22 p.

Finley, R. J., and Baumgardner, R. W., Jr., 1980, Data collection plan for remote sensing in the Panhandle of Texas, ASVT Test Site 2: Austin, Texas Natural Resources Information System, 20 p.

Finley, R. J., and Baumgardner, R. W., Jr., 1980, Outline of basic procedures for Remote Sensing Information Subsystem (RSIS) analysis of Landsat data: Austin, Texas Natural Resources Information System, 14 p. plus appendices.

Dutton, S. P., Finley, R. J., Galloway, W. E., Gustavson, T. C., Handford, C. R., and Presley, M. W., 1979, Geology and geohydrology of the Palo Duro Basin, Texas Panhandle: The University of Texas at Austin, Bureau of Economic Geology Geological Circular 79-1, 99 p.

Finley, R. J., 1979, Economic evaluation plan for remote sensing information subsystem products, Texas Natural Resources Inventory and Monitoring System, Applications System Verification and Transfer: Austin, Texas Natural Resources Information System, 10 p. (revised and updated, 1981).

Finley, R. J., 1979, Landsat analysis of the Texas Coastal Zone: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations 93, 75 p.

Finley, R. J., 1979, Remote sensing data collection plan, Texas Natural Resources Inventory and Monitoring System, Applications System Veri-

fication and Transfer: Austin, Texas Natural Resources Information System, 56 p. (revised and updated, 1981).

Finley, R. J., 1979, Test plan for Remote Sensing Information Subsystem (RSIS) products, Coastal Applications Test Site: Austin, Texas Natural Resources Information System, 46 p.

Finley, R. J., and Baumgardner, R. W., Jr., 1979, Annotated bibliography of techniques for image enhancement and interpretation in remote sensing: Austin, Texas Natural Resources Information System, 45 p.

Finley, R. J., Caran, S. C., and Hupp, W. H., 1979, Delineation and environmental geologic evaluation of abandoned coal mines in North-Central Texas: A report to the Texas Railroad Commission, Surface Mining and Reclamation Division, 283 p.

Finley, R. J., and Hupp, W. H., 1979, A feasibility study for mapping abandoned coal mining areas in Young County, Texas: a report of the Texas Railroad Commission, Surface Mining and Reclamation Division, 18 p.

Galloway, W. E., Finley, R. J., and Henry, C. D., 1979, South Texas uranium province, geologic perspective: The University of Texas at Austin, Bureau of Economic Geology Guidebook 18, 81 p.

Finley, R. J., 1978, Evaluating the environmental geology map, Environmental Geologic Atlas of the Texas Coastal Zone: The University of Texas at Austin, Bureau of Economic Geology Research Note 11, 26 p.

Finley, R. J., and Humphries, S. M., 1976, Morphologic development of North Inlet, South Carolina, in Hayes, M. O., and Kana, T. W., eds., Terrigenous clastic depositional environments: American Association of Petroleum Geologists Field Course and University of South Carolina, Department of Geology Technical Report No. 11-CRD, p. II-172–II-184.

Articles

Dutton, S. P., and Finley, R. J., 1986, Depositional and diagenetic controls on reservoir quality in tight sandstones of the Travis Peak (Hosston) Formation, East Texas: Proceedings, 1986 Society of Petroleum Engineers/U.S. Department of Energy/Gas Research Institute Joint Symposium on Unconventional Gas Technology, Louisville, Kentucky, SPE Paper No. 15220, p. 153-162.

Fisher, W. L., and Finley, R. J., 1986, Texas still has big hydrocarbon resource base: Oil and Gas Journal, v. 84, no. 22, p. 57-69.

Fracasso, M. A., Finley, R. J., and Dutton, S. P., 1986, Subregional stratigraphic relations, diagenesis, and reservoir quality of Travis Peak tight gas sandstones, Sabine Uplift area, Texas: Society of Petroleum Engineers, East Texas regional meeting, SPE 14666, p. 133-142.

Whitehead, W. S., Hunt, E. R., Finley, R. J., and Holditch, S. A., 1986, In-situ stresses: a comparison between log-derived values and actual field-

measured values in the Travis Peak Formation of East Texas: Proceedings, 1986 Society of Petroleum Engineers/U.S. Department of Energy/Gas Research Institute Joint Symposium on Unconventional Gas Technology, Louisville, Kentucky, SPE Paper No. 15209, p. 19-34.

Finley, R. J., 1985, Developments in gas reservoir research with application to tight sandstones: The Interstate Oil Compact Commission Committee Bulletin, v. 27, no. 1, p. 47-53.

Finley, R. J., 1985, Reservoir properties and gas productivity of the Corcoran and Cozzette tight sandstones, Colorado: Society of Petroleum Engineers/Department of Energy 13852, p. 33-45.

Lin, Z. S., and Finley, R. J., 1985, Reservoir engineering properties and production characteristics of selected tight gas fields, Travis Peak Formation, East Texas Basin: Society of Petroleum Engineers/Department of Energy 13901, p. 509-522.

Saucier, A. E., Finley, R. J., and Dutton, S. P., 1985, The Travis Peak (Hosston) Formation of East Texas and North Louisiana: Proceedings, 1985 Society of Petroleum Engineers/Department of Energy Joint Symposium on Low Permeability Reservoirs, Denver, Colorado, SPE/DOE Paper No. 13850, p. 15-22.

Saucier, A. E., and Finley, R. J., 1984, The Travis Peak/Hosston Formation of East Texas and North Louisiana--a laboratory for tight gas technology development: Gas Research Institute, In Focus--Tight Gas Sands, v. 1, no. 1, p. 15-25.

Finley, R. J., and Gustavson, T. C., 1983, Geomorphic effects of a 10-year storm on a small drainage basin in the Texas Panhandle: Earth Surface Processes and Landforms, v. 8, p. 63-77.

Finley, R. J., and O'Shea, P. A., 1983, Geologic and engineering analysis of blanket-geometry tight gas sandstones: Society of Petroleum Engineers and U.S. Department of Energy, Joint symposium on low permeability gas reservoirs, SPE/DOE Publication No. 11607, p. 73-80.

Finley, R. J., Price, J. G., and Henry, C. D., 1983, Remote sensing and mineral resource evaluation in Trans-Pecos Texas, in A report on the TNRIS/NASA joint project to establish a Texas Natural Resources Inventory and Monitoring System: Proceedings of Project Review Conference, Texas Natural Resources Information System and National Aeronautics and Space Administration, TNRIS-036, p. 107-116.

Gustavson, T. C., Finley, R. J., and Baumgardner, R. W., Jr., 1981, Retreat of the Caprock Escarpment and denudation of the Rolling Plains in the Texas Panhandle: Bulletin of the Association of Engineering Geologists, v. 18, no. 4, p. 413-422.

Finley, R. J., McCulloch, S., and Harwood, P., 1981, Landsat classification of coastal wetlands in Texas, in Deutsch, M., Weisnet, D. R., and Rango, A.,

eds., Satellite hydrology: American Water Resource Association, p. 453-462.

Finley, R. J., and Baumgardner, R. W., Jr., 1980, Interpretation of surface-water circulation, Aransas Pass, Texas, using Landsat imagery: Remote Sensing of Environment, v. 10, p. 3-22.

Finley, R. J., Baumgardner, R. W., Jr., and Gustavson, T. C., 1980, Erosion in state parks [of the Texas Panhandle]: Discovery, v. 5, no. 2, p. 12-15.

Woodruff, C. M., Jr., Gustavson, T. C., and Finley, R. J., 1979, Playas and draws on the Llano Estacado--Tentative findings based on geomorphic mapping of a test area in Texas: Texas Journal of Science, v. 31, no. 3, p. 213-223.

Nummedal, D., and Finley, R. J., 1978, Wind-generated longshore currents: Proceedings, 16th Coastal Engineering Conference, Hamburg, West Germany: American Society of Civil Engineers, p. 1428-1438.

Finley, R. J., 1978, Ebb-tidal delta morphology and sediment supply in relation to seasonal wave energy flux, North Inlet, South Carolina: Journal of Sedimentary Petrology, v. 48, no. 1, p. 227-238.

Finley, R. J., 1978, An evaluation of ongoing change affecting environmental geologic mapping in the Texas Coastal Zone, in Wiley, M. L., ed., Estuarine interactions: New York, Academic Press, p. 75-92.

Hine, A. C., Finley, R. J., and Hayes, M. O., 1978, Tidal current deposits, in Fairbridge, R. W., and Bourgeois, Joanne, eds., The encyclopedia of sedimentology: Stroudsburg, Pennsylvania, Dowden, Hutchinson and Ross, p. 795-798.

Finley, R. J., 1976, Interpretation of unenhanced Landsat imagery for wetland and land use delineation in the Texas Coastal Zone: Gulf Coast Association of Geological Societies Transactions, v. 26, p. 279-297.

Finley, R. J., 1975, Hydrodynamics and tidal deltas of North Inlet, South Carolina, in Cronin, L. E., ed., Estuarine research, v. 2, geology and engineering: New York, Academic Press, p. 277-291.

Finley, R. J., 1972, Geologic process investigations of a beach-inlet-channel complex, North Inlet, South Carolina: Maritime Sediments, v. 8, no. 2, p. 65-67.

Abstracts

Finley, R. J., and Ladwig, L. R., 1985, Depositional systems of a tight gas-productive barrier-strandplain sequence: Corcoran and Cozzette Sandstones, northwest Colorado: American Association of Petroleum Geologists Bulletin, v. 69, no. 2, p. 255.

Finley, R. J., 1984, A national comparison of depositional systems and productivity of tight gas sandstones with special reference to the Wilcox

of South Texas (abs.): Bulletin of the South Texas Geological Society, v. 24, no. 7, p. 7.

Finley, R. J., Seni, S. J., Tyler, Noel, and Lin, Z. S., 1984, Depositional systems and productive characteristics of major low-permeability gas sandstones in Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 68, no. 4, p. 476.

Finley, R. J., 1983, Comparison of depositional systems and reservoir characteristics of selected blanket-geometry tight gas sandstones (abs.): American Association of Petroleum Geologists Bulletin, v. 67, no. 3, p. 460-461.

Finley, R. J., and Hallam, S. L., 1982, High-resistivity shale cap rock: an indicator of leached secondary porosity? (abs.): International Association of Sedimentologists, 11th International Congress on Sedimentology, abstract volume, p. 120.

Finley, R. J., Price, J. G., and Henry, C. D., 1982, Detection and analysis of supergene alteration at Red Hill, Chinati Mountains, Trans-Pecos Texas, using Landsat data (abs.): Fort Worth, Texas Christian University and Environmental Research Institute of Michigan, International Symposium on Remote Sensing of Environment, Remote Sensing for Exploration Geology Conference, Summaries, p. 169-170.

Gustavson, T. C., and Finley, R. J., 1982, Geomorphic development of eastern New Mexico and the Texas Panhandle: a product of subsidence due to regional dissolution of Upper Permian salts (abs.): Geological Society of America, Abstracts with Programs, v. 14, no. 7, p. 504.

Simpkins, W. W., Finley, R. J., and Gustavson, T. C., 1982, Rates of erosion in a semi-arid environment: analysis of a two-year data record in the Texas Panhandle (abs.): Geological Society of America, Abstracts with Programs, v. 14, no. 3, p. 136.

Finley, R. J., and Galloway, W. E., 1981, Genetic stratigraphy of uranium host facies, Tordilla Sandstone Member, Upper Jackson Group, Panna Maria, Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 65, no. 4, p. 759-760.

Gustavson, T. C., Finley, R. J., and Baumgardner, R. W., Jr., 1980, Rates of geologic processes in the Texas Panhandle affecting the integrity of underground nuclear waste repositories (abs.): Association of Engineering Geologists, 1980 Annual Meeting, Program and Abstracts, p. 24-25.

Gustavson, T. C., and Finley, R. J., 1980, Rates of geomorphic processes in selected areas of the Rolling Plains and Southern High Plains, Texas Panhandle (abs.): The Geological Society of America, Abstracts with Programs, v. 12, no. 7, p. 439.

Finley, R. J., and Baumgardner, R. W., Jr., 1980, Fluvial morphology of the Little Red River and erosion of the Caprock Escarpment, Briscoe and

Hall Counties, Texas (abs.): Geological Society of America, South-Central Section, Abstracts with Programs, v. 12, no. 1, p. 3.

Gustavson, T. C., Finley, R. J., Morabito, J. R., and Presley, M. W., 1979, Regional salt dissolution and subsidence, Texas Panhandle (abs.): Geological Society of America, Abstracts with Programs, v. 11, no. 2, p. 147-148.

Finley, R. J., and Gustavson, T. C., 1979, Geomorphic effects of a major storm on an instrumented drainage basin in the Texas Panhandle (abs.): Geological Society of America, Abstracts with Programs, v. 11, no. 7, p. 426.

Gustavson, T. C., and Finley, R. J., 1979, Timing and rates of regional dissolution of bedded salt in the Texas Panhandle (abs.): Geological Society of America, Abstracts with Programs, v. 11, no. 7, p. 436.

Presley, M. W., Gustavson, T. C., Galloway, W. E., Finley, R. J., Handford, C. R., Dutton, S. P., and McGillis, K. A., 1979, Palo Duro Basin analysis (abs.): American Association of Petroleum Geologists Annual Meeting, Houston, Texas.

Finley, R. J., 1978, Classification of Texas coastal environments from photointerpretation of Landsat imagery--symposium on geological applications of satellite remote sensing (abs.): Geological Society of America Abstracts with Programs, v. 10, p. 401.

Gustavson, T. C., Finley, R. J., Morabito, J. R., and Presley, M. W., 1978, Structural controls of drainage development on the Southern High Plains and Rolling Plains of the Texas Panhandle (abs.): Geological Society of America Abstracts with Programs, v. 10, p. 413.

Gustavson, T. C., Finley, R. J., and Woodruff, C. M., 1978, Geomorphic studies applied to the evaluation of potential nuclear waste isolation sites (abs.): Geological Society of America, South-Central Section, Abstracts with Programs, Spring 1978 Annual Meeting, Tulsa, Oklahoma.

Finley, R. J., 1975, Inlet shoal and shoreline development in relation to seasonal wave energy flux, North Inlet, South Carolina (abs.): Geological Society of America Abstracts with Programs, Fall 1975 Annual Meeting, Salt Lake City, Utah.

Chapters, Sections

Finley, R. J., and Tyler, Noel, 1986, Geological characterization of sandstone reservoirs, in Lake, L. W., and Carroll, H. W., eds., Reservoir characterization: Orlando, Academic Press, p. 1-38.

Contract Reports

Lin, Z. S., and Finley, R. J., 1986, Comparative engineering field studies and gas resources of the Travis Peak Formation, East Texas Basin: The University of Texas at Austin, Bureau of Economic Geology, topical

report prepared for the Gas Research Institute under contract no. 5082-211-0708, 96 p.

Finley, R. J., Dutton, S. P., Lin, Z. S., and Saucier, A. E., 1985, The Travis Peak (Hosston) Formation: Geologic framework, core studies, and engineering field analysis: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for Gas Research Institute under contract no. 5082-211-0708, 233 p.

Garrett, C. M., Jr., Hocott, C. R., Finley, R. J., and Galloway, W. E., 1985, Analysis of negative revisions to natural gas reserves in Texas: The University of Texas at Austin, Bureau of Economic Geology, report prepared for Gas Research Institute under contract no. 5083-800-0908, 106 p.

Finley, R. J., 1983, Distribution and possible diagenetic origin of high-resistivity cap rock shale, Frio Formation, Texas Gulf Coast, in Morton, R. A., and others, Consolidation of geologic studies of geopressured geothermal resources in Texas: The University of Texas at Austin, Bureau of Economic Geology, 1982 annual report prepared for U.S. Department of Energy, Division of Geothermal Energy, under contract no. DE-AC08-79ET27111, p. 173-195.

Finley, R. J., Garrett, C. M., Jr., Han, J. H., Lin, Z. S., Saucier, A. E., Seni, S. J., and Tyler, Noel, 1983, Geologic analysis of primary and secondary tight gas sand objectives, Phase A--Selective investigation of six stratigraphic units; Phase B--Initial studies: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for Gas Research Institute under contract no. 5082-211-0708, 334 p.

Finley, R. J., Price, J. G., and Henry, C. D., 1983, Remote sensing and mineral resource evaluation in Trans-Pecos Texas: The University of Texas at Austin, Bureau of Economic Geology, report prepared for Texas Natural Resources Information System under contract no. IAC(80-81)-1935, 9 p.

Gustavson, T. C., and Finley, R. J., 1983, Late Cenozoic geomorphic evolution of the Texas Panhandle and northeastern New Mexico--case studies of structural controls of regional drainage development: The University of Texas at Austin, Bureau of Economic Geology, draft final report prepared for U.S. Department of Energy under contract no. DE-AC97-83WM46651.

Morton, R. A., Ewing, T. E., Kaiser, W. R., and Finley, R. J., 1983, Consolidation of geologic studies of geopressured/geothermal resources in Texas: The University of Texas at Austin, Bureau of Economic Geology, 1982 annual report prepared for U.S. Department of Energy, under contract no. DE-AC08-79ET27111, 195 p.

Finley, R. J., 1982, Geology and engineering characteristics of selected low-permeability gas sands: a survey: The University of Texas at Austin, Bureau of Economic Geology, report prepared for CER Corporation and Gas Research Institute under contract no. GRI-BEG-SC-111-81, 329 p.

Finley, R. J., 1982, A preliminary assessment of high-resistivity cap rock shale in the Frio Formation of the Texas Gulf Coast: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Department of Energy, Division of Geothermal Energy, under contract no. DE-AC08-79ET27111, 28 p.

Finley, R. J., and Han, J. H., 1982, Analysis of low-permeability gas sands suitable for future research programs: The University of Texas at Austin, Bureau of Economic Geology, report prepared for CER Corporation and Gas Research Institute under contract no. GRI-BEG-SC-112-82, 53 p.

Schmedes, K. E., Baumgardner, R. W., Jr., and Finley, R. J., 1982, Remote sensing of the Coastal Applications Test Site--Test Site 1: economic and accuracy evaluation of mapping techniques: The University of Texas at Austin, Bureau of Economic Geology, report prepared for Texas Natural Resources Information System under contract no. IAC(80-81)-1935, 107 p.

Finley, R. J., and Baumgardner, R. W., Jr., 1981, Test plan for Remote Sensing Information Subsystem products: test sites 2 and 5 (High Plains and Trans-Pecos Texas): The University of Texas at Austin, Bureau of Economic Geology, report prepared for Texas Natural Resources Information System under contract no. IAC(80-81)-1935, 32 p.

Finley, R. J., Ledbetter, J. O., and Wermund, E. G., 1981, The feasibility of locating a Texas salt test facility: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Department of Energy under contract no. DE-AC97-80ET46617, 171 p.

Harwood, P., Finley, R. J., McCulloch, S., Malin, P. A., and Schell, J. A., 1977, Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas Coastal Zone: Goddard Space Flight Center, Type III final report prepared under contract no. NAS5-20986, 240 p.

Finley, R. J., 1973, Tidal inlet morphology and hydrodynamics of North Inlet, South Carolina: U.S. Army Corps of Engineers, final report prepared under contract no. DACW72-72-C-0032, 98 p.

THESIS

Sedimentology and shore processes on South Beach, Martha's Vineyard, Massachusetts: Syracuse, New York, Syracuse University, M.S. thesis, 197 p., 1969.

DISSERTATION

Morphologic development and dynamic processes at a barrier island inlet, North Inlet, South Carolina: Columbia, South Carolina, University of South Carolina, Ph.D. dissertation, 271 p., 1975.

SPECIAL LECTURING

Workshops

Co-Instructor, "Tight Gas Sandstone Core Workshop," for The University of Texas at Austin, Continuing Engineering Education Division, 1986

Co-Instructor, "Core Workshop: Travis Peak (Hosston) Formation, East Texas," for the Shreveport Geological Society, 1985

Geological Societies and Conferences

"Innovations in Geologic Reservoir Research: Future Directions in Gas Supply," to the Gas Research Institute Board of Directors and Joint Advisory Council, Chicago, Illinois, 1985.

"Regional Depositional Framework, Reservoir Character, and Rock Properties of the Travis Peak (Hosston) Formation, East Texas," to the East Texas Geological Society, Tyler, Texas, 1985.

"Geological Basis of Reservoir Characterization," keynote address for the Geological and Petrophysical Basis session of the Reservoir Characterization Conference, sponsored by National Institute for Petroleum and Energy Research, Dallas, Texas, 1985.

"Depositional Framework, Reservoir Character, and Rock Properties of the Travis Peak (Hosston) Formation, East Texas Basin," July 1985 to the Dallas Geological Society, September 1985 to the Friends of the Mesozoic, Houston, Texas, and November 1985 to the Shreveport Geological Society.

Texas Natural Resources Information System

Co-Instructor, "Digital Image Processing Workshop," 1984.

Instructor, "Landsat Image Interpretation Short Course," 1981.

Co-Instructor, "Fundamentals of Remote Sensing," 1979.

Society of Petroleum Engineers

Lecturer, "Environment of deposition as a factor in reservoir properties of tight gas sandstones," presented to Bryan/College Station Study Group, Gulf Coast Section, 1984.

Field Trips

Co-Leader, "Gulf Coast Uranium," Corpus Christi Geological Society annual field trip, 1980.

Co-Leader, "South Texas Uranium Province," American Association of Petroleum Geologists, Energy Minerals Division, national convention, Houston, Texas, 1979.

MISCELLANEOUS ACTIVITIES OF A PROFESSIONAL NATURE

Thesis Committees

Susan L. Thompson thesis committee--"Ferron Sandstone Member of the Mancos Shale: A Turonian mixed-energy deltaic system," M.A. thesis: Austin, Texas, The University of Texas at Austin, 1985.

Jon R. Jones thesis committee--"Reservoir characterization of Mesaverde (Campanian) bed load fluvial meanderbelt sandstones, northwestern Colorado," M.S. thesis: Austin, Texas, The University of Texas at Austin, 1984.

Richard J. Stancliffe thesis committee--"Vertically stacked barrier island systems, Sego Sandstone (Campanian), northwest Colorado," M.A. thesis: Austin, Texas, The University of Texas at Austin, 1984.

Stephen W. Speer thesis committee--"Clastic depositional systems of the Lower Permian Abo Formation, south-central New Mexico," M.S. thesis: Austin, Texas, The University of Texas at Austin, 1983.

Marcie D. Machenberg thesis committee--"Sand dune migration in Monahans Sandhills State Park, Texas," M.S. thesis: Austin, Texas, The University of Texas at Austin, 1982.

Remote Sensing

Invited participant, Regional Conference on the Operational Land Remote Sensing Program, sponsored by the National Oceanic and Atmospheric Administration and the Texas Natural Resources Information System, 1981.

Invited participant, Final Review, National Aeronautics and Space Administration/Bureau of Land Management Joint Remote Sensing Project, Johnson Space Center, Houston, Texas, 1980.

ERNEST ANTHONY MANCINI

PROFESSIONAL RESUME

PERSONAL DATA

Born:	February 27, 1947, Reading, Pennsylvania
Home Address:	1503 Briarcliff, Northport, Alabama 35476
	Phone: (205) 339-4262
Business Address:	Geological Survey of Alabama/
	State Oil and Gas Board
	P.O. Box O
	Tuscaloosa, Alabama 35486
	Phone: (205) 349-2852
Married:	Marilyn E. Lee, 1969, Two children

EDUCATION

Doctor of Philosophy in Geology, Texas A&M University, College Station, Texas, December, 1974, Specialty in Paleoecology.
Master of Science in Zoology, Southern Illinois University, Carbondale, Illinois, June, 1972, Specialty in Vertebrate Paleontology.
Bachelor of Science in Biology, Albright College, Reading, Pennsylvania, June, 1969, Specialty in Vertebrate Ecology.

POSITIONS HELD

State Geologist and Oil and Gas Supervisor, 1982-Present.
Professor, Geology, University of Alabama, 1984-Present.
Associate Professor, Geology, University of Alabama, 1979-84.
Assistant Professor, Geology, University of Alabama, 1976-79.
Petroleum Geologist, Mineral Resources Institute, University of Alabama, 1976-78.
Petroleum Exploration Geologist, Cities Service Company, Denver, Colorado, 1974-76.
Field Geologist, Cities Service Company, Port Moller Area, Alaska, 1975.
Well-Site Geologist, Cities Service Company, Cook Inlet, Alaska, 1975.
Research Assistant, Invertebrate Paleontology, Texas A&M University, 1973-74.
Teaching Assistant, Geology, Texas A&M University, 1972-73.
Teaching Assistant, Vertebrate Zoology, Southern Illinois University, 1971-72.

AREAS OF EXPERTISE

Sedimentary Basin Analysis
Stratigraphy
Biostratigraphy
Environments of Deposition

RESEARCH EXPERIENCE

Regional geologic framework of the Eastern Gulf Coastal Plain and Eastern Gulf of Mexico area
Basin Analysis of the Mississippi Interior Salt Basin

Stratigraphy and environments of deposition of Mississipian and Pennsylvanian strata of the Black Warrior Basin
Depositional systems and lignite resources of the Midway and Wilcox Groups in Mississippi, Alabama and western Tennessee
Biostratigraphy, stratigraphy, and paleoenvironments of the Upper Cretaceous and Paleogene of the Eastern Gulf Coastal Plain
Assessment of geologic factors controlling the economic recovery of Alabama lignites

EXPERIENCE

Vice-Chairman, U.S. Department of the Interior, Outer Continental Shelf Policy Advisory Board Committee, 1986-88.
Secretary-Treasurer, Association of American State Geologists, 1986-88.
Co-Chairman, Petroleum Geology Session, Gulf Coast Association of Geological Societies Annual Meeting, 1986.
Co-Leader, Energy Minerals of Northwestern Alabama Field Trip, Energy Minerals Division, American Association of Petroleum Geologists, 1986.
Co-Leader, Upper Cretaceous Field Trip, Southeastern-South-Central Sections, Geological Society of America, 1986.
Co-Chairman, Cretaceous Session, Southeastern-South-Central Sections, Geological Society of America, 1986.
Co-Principal Investigator for the U.S. Department of the Interior Minerals Management Service sponsored project, "Regional Geologic Framework and Petroleum Geology of Miocene Sediments of Alabama Coastal Waters Area and Adjacent Federal Waters Area," 1985-87.
Editor, Association of American State Geologists Journal, 1984-86.
Co-Chairman, Paleontology Session, Southeastern Section, Geological Society of America, 1985.
President, Gulf Coast Section, Society of Economic Paleontologists and Mineralogists, 1984-85.
Co-Chairman, Cretaceous-Tertiary Boundary Symposium, South-Central Section, Geological Society of America, 1984.
Co-Chairman, Paleontology Session, Southeastern-North-Central Sections, Geological Society of America, 1984.
Co-Principal Investigator for the U.S. Department of the Interior Minerals Management Service sponsored project, "Regional Jurassic Geologic Framework Study of Alabama Coastal Waters Area and Adjacent Federal Waters Area," 1983-85.
Co-Leader, Upper Cretaceous Lithostratigraphy and Biostratigraphy in Northeast Mississippi, Southwest Tennessee and Northwest Alabama Shelf Chalks and Coastal Clastics Field Trip, Gulf Coast Section, Society of Economic Paleontologists and Mineralogists, 1983.
Co-Chairman, Microfossils of the Gulf, Caribbean, and Eastern Coastal Plain, Southeastern Section, Geological Society of America, 1983.
Co-Chairman, Petroleum Geology Session, Gulf Coast Association of Geological Societies Annual Meeting, 1982.
Co-Leader, Upper Cretaceous in the Lower Mississippi Embayment of Tennessee and Mississippi Lithostratigraphy and Biostratigraphy Field Trip, Geological Society of America Annual Meeting, 1982.
Chairman, Coal Geology Division Symposium: Gulf Coast Lignites, Geological Society of America Annual Meeting, 1982.
Chairman, Energy in Alabama Conference, 1982.
Co-Leader, Paleogene of Alabama Field Trip, International Geological Correlation Program Field Trip, 1982.

Co-Chairman, Symposium on the Adaptive Strategies of Shallow Water Faunas, Southeastern-Northeastern Geological Society of America Annual Meeting, 1982.

Principal Investigator for the Alabama School of Mines and Energy Development sponsored project, "Assessment of the Economic Potential of the Tertiary Lignites of Alabama," 1981-82.

Co-Principal Investigator for the Department of Interior, Office of Surface Mining sponsored project, "An Evaluation of the Engineering Properties and Lignite Resources of the Wilcox Group (Lower Eocene) in Mississippi, west Tennessee and Alabama," 1981-82.

Chairman, Conference on the Petroleum Geology of Alabama, 1981.

Co-Chairman, Core Workshop on Petroleum Producing Reservoirs in Alabama, 1981.

Co-Leader, Black Warrior Basin Field Trip, Conference on the Petroleum Geology of Alabama, 1981.

Co-Chairman, Stratigraphy Session, Southeastern Geological Society of America Annual Meeting, 1981.

President, Alabama Geological Society, 1980-81.

Principal Investigator for the Alabama School of Mines and Energy Development sponsored project, "Assessment of the Economic Potential of the Tertiary Lignites of Southeast Alabama," 1980-81.

Co-Principal Investigator for the Department of Interior, Office of Surface Mining sponsored project, "Depositional Systems and Lignite Resources of the Naheola Formation and Wilcox Group in Mississippi, Alabama and Tennessee," 1980-81.

Coordinator, American Association of Petroleum Geologists Lecturers, University of Alabama, 1979-81.

Coordinator, North American Cenomanian Map Project, International Geological Correlation Project, 1979-81.

Participant, International Geological Congress, 1980.

Chairman, Coal and Lignite Geology Session, Southeastern Geological Society of America Annual Meeting, 1980.

Co-Chairman, Petroleum Geology Session, Gulf Coast Association of Geological Societies Annual Meeting, 1980.

Principal Investigator for the Department of Interior, Office of Surface Mining sponsored project, "Assessment of Geologic Factors Controlling the Economic Recovery of Alabama Deep-Basin Lignite," 1979-80.

Principal Investigator for the U.S. Geological Survey sponsored project, "Elevation Data for Upper Cretaceous Strata along the Tennessee-Tombigbee Waterway, western Alabama and eastern Mississippi," 1979-80.

Representative, northern Alabama, Gulf Coast Association of Geological Societies, 1979-80.

Co-Principal Investigator for the Department of Energy sponsored project, "Assessment of the Geothermal/Geopressure Potential of the Gulf Coastal Plain of Alabama," 1978-79.

Principal Investigator for the Alabama School of Mines and Energy Development sponsored project, "Determination of an Exploration Model for Prospecting for Lignite in the Alabama Coastal Plain," 1978-79.

Organizer, Mineral and Petroleum Resources Curriculum Program for Geologists, University of Alabama, 1978-79.

Research Scientist for the U.S. Geological Survey sponsored project, "Upper Cretaceous Geology of the Tennessee-Tombigbee Waterway, western Alabama and eastern Mississippi," 1978-79.

Principal Investigator for the Alabama State Oil and Gas Board sponsored project, "Determination of the Environments of Deposition of the Upper Jurassic Carbonates in South Alabama," 1977-78.

Principal Investigator for the Alabama Mineral Resources Institute sponsored project, "Upper Cretaceous Sandstone Environment Interpretation for Enhanced Petroleum Exploration in Alabama," 1977-78.
Coordinator, Proposal Writing for Fossil Fuels Research Projects, Mineral Resources Institute, 1977-78.
Onshore Petroleum Exploration Geologist, Alaska Peninsula Area, Alaska, Cities Service, 1976-77.
Offshore Petroleum Exploration Geologist, Bering Sea, Cities Service, 1975-76.
Coordinator, Biostratigraphic and Paleoenvironmental Data for Offshore California Lease Sale, Cities Service, 1974-75.
Field Geologist, Stratigraphic Mapping of the Port Moller Area, Alaska Peninsula, Cities Service, 1975.
Well-Site Geologist, Tertiary Gas Play, Cook Inlet, Alaska, Cities Service, 1975.
Research Assistant, Pacific Pliocene-Miocene Molluscan Assemblages, Texas A&M University, 1973-74.
Teaching Assistant, General Geology, Texas A&M University, 1972-73.
Teaching Assistant, Vertebrate Zoology, Southern Illinois University, 1971-72.
Head, Biology Program, North Greene High School, White Hall, Illinois, 1970-71.
Biology and Earth Science Teacher, North Greene High School, White Hall, Illinois, 1969-71.
Laboratory Instructor, General Biology, Albright College, 1968-69.

COURSES TAUGHT AT UNIVERSITY OF ALABAMA

Paleoecology
Biogeology
Biostratigraphy (Planktic Foraminifera)
Micropaleontology (Benthic Foraminifera)
Stratigraphy
Petroleum Geology
Sedimentary Basin Analysis

INVITED LECTURES

Surface Coal Mining sponsored by Division of Continuing Education, University of Alabama, 1977.
An Introduction to Practical Energy Systems sponsored by Alabama A&M University, 1978.
Upper Jurassic Petroleum Geology of Southwest Alabama, Mississippi Geological Society, 1980.
Upper Jurassic Regional Stratigraphy in Alabama, Lafayette Geological Society, 1981.
Upper Jurassic Geology of Southwest Alabama, Arco Oil and Gas, 1982.
Paleogene of Alabama, Exxon Corporation, 1982.
Petroleum Geology of South Carlton Field of Alabama, Mississippi Geological Society, 1982.
Petroleum Potential of Southwest Alabama, University of South Alabama, 1982.
Black Warrior Basin Oil and Gas Potential, sponsored by University of Mississippi, 1982.
Petroleum Geology of Alabama, Auburn University, 1982.
Alabama Lignite, sponsored by Alabama Department of Energy, 1982.
Energy in Alabama, sponsored by U.S. Department of Energy, 1982.

Paleogene Biostratigraphy of Alabama, Florida State University, 1982.
Oil and Gas Potential of Southwest Alabama, Houston Geological Society, 1983.
Hatter's Pond Field, Shreveport Geological Society, 1983.
Petroleum Geology of the Black Warrior Basin of Alabama, Mississippi Geological Society, 1983.
Petroleum Potential of Alabama, Alabama Petroleum Council, 1983.
Oil and Gas Potential of the Black Warrior Basin, Alabama Petroleum Institute, 1983.
Oil and Gas Resources of Alabama, Mid-Continent Oil and Gas Association, Mississippi-Alabama Division Annual Meeting, 1983.
Energy and Mineral Resources of the Tennessee-Tombigbee Rivers Area, sponsored by Tennessee-Tombigbee Waterway Development Authority, 1983.
Norphlet Hydrocarbon Potential of Southwest and Offshore Alabama, Mississippi Geological Society, 1984.
Petroleum Geology of the Norphlet Formation of Offshore Alabama, Houston Geological Society, 1985.
Oil and Gas Potential of Southwest and Offshore Alabama, University of South Alabama, 1985.
Hydrocarbon Potential of Offshore Alabama, Auburn University, 1985.
Oil and Gas Production in Alabama, Mid-Continent Oil and Gas Association, Mississippi-Alabama Division Annual Meeting, 1985.
Oil and Gas in Alabama, Alabama Petroleum Council, 1985.
Oil and Gas Development in Alabama, Oil, Gas and Mineral Law Seminar, University of Alabama, 1986.
Petroleum trends in the Eastern Gulf of Mexico region, Houston Geological Society, 1987.

SOCIETY MEMBERSHIPS

Phi Kappa Phi
Sigma Xi
Phi Sigma
Society of Economic Paleontologists and Mineralogists
American Association of Petroleum Geologists
Paleontological Society
Gulf Coast Section of Society of Economic Paleontologists and Mineralogists
Alabama Geological Society
North America Micropaleontology Society
International Micropaleontology Society
Cushman Foundation for Foraminiferal Research

HONORS AND AWARDS

National Council Citation, 1983, Albright College National Council of Alumni, Parents and Friends.
A. I. Levorsen Petroleum Geology Award, 1980, Gulf Coast Association of Geological Societies Meeting.
First Best Poster Award, 1981, Gulf Coast Association of Geological Societies Meeting.
First Best Paper Award, 1980, Gulf Coast Association of Geological Societies Meeting.
Second Best Paper Award, 1985, Gulf Coast Association of Geological Societies Meeting.
Second Best Paper Award, 1982, Gulf Coast Association of Geological Societies.

Listed in Who's Who in the Southeast.
Listed in American Men and Women of Science.
Listed in Who's Who in Technology Today.
Listed in Who's Who in Frontier Science and Technology.
Getty Scholarship, Texas A&M University.
Crowell Scholarship, Albright College.
Eagle Scout Scholarship, Albright College.

THESES SUPERVISED

Foraminiferal biostratigraphy and paleoecology of the Tuscahoma marls (Paleocene) of southwest Alabama. M.S. Thesis by Gary E. Oliver, 1978.

Petrography and environments of deposition of the Carter sandstone (Mississippian) in the Black Warrior Basin of Alabama and Mississippi. M.S. Thesis by Brian K. Shepard, 1979.

Depositional environments of the Lewis "Sand" (Chester Age) in the Black Warrior Basin of Alabama. M.S. Thesis by James W. Holmes, 1980.

Environments of deposition of the Denkman Member of the Norphlet Formation (Jurassic) in southwest Alabama. M.S. Thesis by Richard P. Wilkerson, 1981.

Stratigraphy and petrography of the "Brookwood Coal Group" (Pennsylvanian) in the Black Warrior Basin of Alabama. M.S. Thesis by William M. Katz, 1982.

Biostratigraphic and lithostratigraphic correlation of Upper Eocene and Lower Oligocene strata in Mississippi and Alabama. M.S. Thesis by Laura A. Waters, 1983.

Hydrocarbon trapping mechanisms in the Carter sandstone (Upper Mississippian) in the Black Warrior Basin, Fayette and Lamar Counties, Alabama. M.S. Thesis by Bennett L. Bearden, 1984.

Stratigraphy and environments of deposition of the lower Pride Mountain Formation (Mississippian) in the Colbert County area, northwest Alabama. M.S. Thesis by Marcel Di Giovanni, Jr., 1984.

Paleoenvironmental determination of the Upper Cretaceous, lower Tuscaloosa in the Pollard and South Carlton Field area, southwest Alabama. M.S. Thesis by Joel Wayne Payton, 1984.

Stratigraphy and sedimentology of the Upper Cretaceous, Tombigbee Sand Member of the Eutaw Formation, northeastern Mississippi. M.S. Thesis by David D. Soens, 1984.

Environments of deposition of the Upper Cretaceous, lower Tuscaloosa sands in Pike and Lincoln Counties, Mississippi. M.S. Thesis by Carol W. Bowers, 1986.

Paleoenvironments of the Gravel Creek Sand Member of the Nanafalia Formation (Paleocene) in Alabama. M.S. Thesis by George M. Hidle, 1986.

Paleoecological study of the Gosport Sand (Eocene) in southwest Alabama. M.S. Thesis by Dorothy B. Swindel, 1986.

Petroleum geology of the Floyd and Pride Mountain sandstone reservoirs in the Black Warrior basin of Alabama. M.S. Thesis by Allan D. Keel (in progress).

Trapping mechanisms and hydrocarbon types of the Norphlet Formation of southwest Alabama. M.S. Thesis by Douglas R. Hall (in progress).

Stratigraphy and depositional environments of the Haynesville Formation in southwest Alabama. M.S. Thesis by Randy Oglesby (in progress).

Smackover petroleum trapping mechanisms along the Conecuh Ridge, southwestern Alabama. M.S. Thesis by Thomas J. Powers (in progress).

Stratigraphy, lithofacies relationships, and paleogeography of Oligocene (Rupelian and Chattian) strata in southeastern Mississippi and southern and offshore Alabama. M.S. Thesis by Berry H. Tew, Jr. (in progress).

PUBLICATIONS

Journal Papers

Mancini, Ernest A., Depositional environment of the Grayson Formation (Upper Cretaceous) of Texas, Gulf Coast Assoc. Geol. Socs. Trans. 27:334-351, 1977.

Mancini, Ernest A., and Stephen H. Stow, Preliminary delineation of geologic trends controlling petroleum accumulation in the Smackover Formation of southwestern Alabama, Mineral Resources Institute Technical Report No. 3, 12 pp., 1977.

Mancini, Ernest A., Origin of micromorph faunas in the geologic record, J. Paleontol. 52:311-322, 1978.

Mancini, Ernest A., Origin of the Grayson micromorph fauna (Upper Cretaceous) of north-central Texas, J. Paleontol. 52:1294-1314, 1978.

Mancini, Ernest A., Foraminiferal paleoecology of the Grayson Formation (Upper Cretaceous) of Texas, Gulf Coast Assoc. Geol. Socs. Trans. 28:295-311, 1978.

Mancini, Ernest A., Thomas M. Deeter, and F. Hugh Wingate, Upper Cretaceous forearc sedimentation on the Alaska Peninsula, Geology 6:437-439, 1978.

Mancini, Ernest A., Late Albian and early Cenomanian Grayson ammonite biostratigraphy in north-central Texas, J. Paleontol. 53:1013-1022, 1979.

Mancini, Ernest A., Eocene-Oligocene boundary in southwest Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 29:282-289, 1979.

Mancini, Ernest A., and D. Joe Benson, Regional stratigraphy of Upper Jurassic Smackover carbonates of southwest Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 30:151-165, 1980.

Oliver, Gary E., and Ernest A. Mancini, Late Paleocene planktic foraminiferal biostratigraphy of the Tuscahoma marls in southwest Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 30:467-472, 1980.

Mancini, Ernest A., Lithostratigraphy and biostratigraphy of Paleocene subsurface strata in southwest Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 31:359-367, 1981.

Mancini, Ernest A., and D. Joe Benson, Smackover carbonate petroleum geology in southwest Alabama, Oil and Gas Journal 79:266-275, 1981.

Mancini, Ernest A., and Gary E. Oliver, Late Paleocene planktic foraminifers from the Tuscahoma marls of southwest Alabama, Micropaleontology 27:204-225, 1981.

Mancini, Ernest A., and J. Wayne Payton, Petroleum geology of South Carlton field, lower Tuscaloosa "Pilot Sand," Clarke and Baldwin Counties, Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 31:139-147, 1981.

Mancini, Ernest A., Upper Jurassic petroleum geology of southwest Alabama, Proceedings on the Second Symposium on the Geology of the Southeastern Coastal Plain, Georgia Geologic Survey Information Circular 53:76-87, 1982.

Mancini, Ernest A., Foraminiferal population changes in a shallow, epicontinental marine carbonate-claystone sequence: Main Street-Grayson Interval (Cretaceous), north-central Texas, Proceedings of the Third North American Paleontological Convention, Volume 2, p. 353-358, 1982.

Mancini, Ernest A., Early Cenomanian cephalopods from the Grayson Formation of north-central Texas, Cretaceous Research 3:241-259, 1982.

Mancini, Ernest A., and J. Wayne Payton, A look at lower Tuscaloosa petroleum potential in southwest Alabama, Oil and Gas Journal 80:105-110, 1982.

Benson, D. Joe and Ernest A. Mancini, Petrology and reservoir characteristics of the Smackover Formation, Hatter's Pond Field; implications for Smackover exploration in southwestern Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 32:67-75, 1982.

Gibson, Thomas G., Ernest A. Mancini, and Laurel M. Bybell, Paleocene to Middle Eocene stratigraphy of Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 32:449-458, 1982.

Oliver, Gary E., and Ernest A. Mancini, Late Paleocene planktic foraminiferal biostratigraphy of the Tuscahoma marls in southwest Alabama, in Biostratigraphy and Paleoecology of Gulf Coast Cenozoic Foraminifera, p. 85-90, 1982.

Russell, Ernest E., Don M. Keady, Ernest A. Mancini, and Charles C. Smith, Upper Cretaceous in the Lower Mississippi Embayment of Tennessee and Mississippi: lithostratigraphy and biostratigraphy, Field Trip Guidebook for the 1982 Annual Meeting of the Geological Society of America, 50 p., 1982.

Smith, Charles C., and Ernest A. Mancini, Upper Cretaceous biostratigraphy, in Upper Cretaceous in the Lower Mississippi Embayment of Tennessee and Mississippi: Lithostratigraphy and Biostratigraphy, Field Trip Guidebook for the 1982 Annual Meeting of the Geological Society of America, p. 15-26, 1982.

Waters, Laura A., and Ernest A. Mancini, Correlation of Upper Eocene and Lower Oligocene strata in Mississippi and Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 32:303-307, 1982.

Mancini, Ernest A., Depositional setting and characterization of the deep-basin Oak Hill lignite deposit (middle Paleocene) of southwest Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 33:329-337, 1983.

Mancini, Ernest A., Bennett L. Bearden, James W. Holmes, and Brian K. Shepard, Geology of Alabama's Black Warrior Basin, Oil and Gas Journal 81:147-154, 1983.

Deeter, Thomas M., Frederick H. Wingate, and Ernest A. Mancini, Upper Cretaceous sedimentation on the Alaska Peninsula, Journal of the Alaska Geol. Soc. 3:19-23, 1983.

Russell, Ernest E., Don M. Keady, Ernest A. Mancini, and Charles C. Smith, Upper Cretaceous lithostratigraphy and biostratigraphy in northeast Mississippi, southwest Tennessee, and northwest Alabama shelf chalks and coastal clastics, Field Trip Guidebook for Gulf Coast Section, Society of Economic Paleontologists and Mineralogists, 71 p., 1983.

Smith, Charles C., and Ernest A. Mancini, Calcareous nannofossil and planktonic foraminiferal biostratigraphy, in Upper Cretaceous lithostratigraphy and biostratigraphy in northeast Mississippi, southwest Tennessee, and northwest Alabama shelf chalks and coastal clastics, p. 15-27, 1983.

Mancini, Ernest A., Biostratigraphy of Paleocene strata in southwest Alabama, Micropaleontology 30:268-291, 1984.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Petroleum geology of the Norphlet Formation (Upper Jurassic), southwest and offshore Alabama, Oil and Gas Journal 82:147-150, 1984.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Paleoenvironments and hydrocarbon potential of the Upper Jurassic Norphlet Formation of southwestern and offshore Alabama, Gulf Coast Assoc. Geol. Socs. Trans. 34:151-135, 1984.

Benson, D. Joe, and Ernest A. Mancini, Porosity development and reservoir characteristics of the Smackover Formation in southwest Alabama, in Jurassic of the Gulf Rim, proceedings of the 3rd Ann. Research Conf., p. 1-17, 1984.

Mancini, Ernest A., and Robert M. Mink, Petroleum production and hydrocarbon potential of Alabama's coastal plain and territorial waters, in Habitat of Oil and Gas in the Gulf Coast, Proc. of the 4th Ann. Research Conf., p. 43-60, 1985.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Upper Jurassic Norphlet hydrocarbon potential along the regional peripheral fault trend in Mississippi, Alabama, and the Florida panhandle, Gulf Coast Assoc. Geol. Socs. Trans. 35:225-232, 1985.

Mancini, Ernest A., Robert M. Mink, Bennett L. Bearden, and Richard P. Wilkerson, Norphlet Formation (Upper Jurassic) of southwestern and offshore Alabama: environments of deposition and petroleum geology, Am. Assoc. Petroleum Geologists Bull. 69:881-898, 1985.

Bearden, Bennett L., and Ernest A. Mancini, Petroleum geology of the Carter sandstone (Upper Mississippian) in the Black Warrior Basin of Alabama, Am. Assoc. Petroleum Geol. Bull. 69:361-377, 1985.

Mink, Robert M., Bennett L. Bearden, Ernest A. Mancini, Regional Jurassic geologic framework of Alabama coastal waters area and adjacent federal waters area, State Oil and Gas Board of Alabama Oil and Gas Report 12, 58 p., 1985.

Mancini, Ernest A., Upper Eocene and lower Oligocene strata in southwestern Alabama, U.S.A., in Terminal Eocene Events, Elsevier Science Publishers, p. 181-187, 1986.

Mancini, Ernest A., and Charles W. Copeland, St. Stephens Quarry (Lone Star Cement Company Quarry), St. Stephens, Washington County, Alabama, where a near complete Oligocene section, including the Eocene-Oligocene boundary, is exposed, Geol. Soc. America Centennial Field Guide--Southeastern Section 6:373-378, 1986.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Upper Jurassic Norphlet petroleum potential--on and off Mississippi, Alabama and Florida, Oil and Gas Journal 84:142-148, 1986.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Integrated geological, geophysical and geochemical interpretation of Upper Jurassic petroleum trends in the eastern Gulf of Mexico, Gulf Coast Assoc. Geol. Socs. Trans. 36:219-226, 1986.

Mancini, Ernest A., and Laura A. Waters, Planktonic foraminiferal biostratigraphy of upper Eocene and lower Oligocene strata in southern Mississippi and southwestern and south-central Alabama, Jour. Foraminiferal Research 16:24-33, 1986.

Copeland, Charles W., and Ernest A. Mancini, Cretaceous-Tertiary boundary southeast of Braggs, Lowndes County, Alabama, Geol. Soc. America Centennial Field Guide--Southeastern Section 6:369-372, 1986.

Tew, Berry H., and Ernest A. Mancini, Energy minerals of northwestern Alabama, Field Trip Guidebook for Energy Minerals Division, American Association of Petroleum Gelogists 1986 Annual Meeting, 44 p., 1986.

Mink, Robert M., Richard P. Hamilton, Bennett L. Bearden, and Ernest A. Mancini, Determination of recoverable natural gas reserves for the Alabama coastal waters area, State Oil and Gas Board of Alabama Oil and Gas Report 13, 74 p., 1987.

Mancini, Ernest A., Robert M. Mink, Bennett L. Bearden, and Richard P. Hamilton, Recoverable natural gas reserves from the Jurassic Norphlet

Formation, Alabama coastal waters area, Gulf Coast. Assoc. Geol. Socs. Trans. (in press).
Mancini, Ernest A., Berry H. Tew, and Laura A. Waters, Eocene-Oligocene boundary in southeastern Mississippi and southwestern Alabama: A stratigraphically condensed section of a Type 2 depositional sequence, Cushman Foundation Occasional Papers (in press)

Published Abstracts

Mancini, Ernest A., Grayson micromorph fauna (Late Cretaceous), Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 7, no. 2, p. 12, 1975.
Mancini, Ernest A., Depositional environment of the Grayson Formation (Upper Cretaceous, Texas) based on sediment geochemistry, microfauna, and macrofauna trophic structure, diversity, and age distribution, Am. Assoc. of Petroleum Geologists and Soc. of Econ. Paleont. and Mineralog. (Ann. Mtg.), Abs., v. 2, p. 46-67, 1975.
Mancini, Ernest A., Ammonite and planktonic foraminiferal biostratigraphic zonation for the Grayson interval (Upper Albian to Lower Cenomanian) of north-central Texas, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 8, no. 1, p. 53, 1976.
Mancini, Ernest A., Paedomorphism in Upper Cretaceous oyster populations of Texas, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 9, no. 2, p. 163, 1977.
Mancini, Ernest A., Depositional environment of Grayson Formation (Upper Cretaceous) of Texas, Am. Assoc. Petroleum Geol., v. 61, p. 1541-1542, 1977.
Mancini, Ernest A., and Thomas M. Deeter, Alaska Peninsula Upper Cretaceous forearc deposition, Am. Assoc. Petroleum Geol. Bull., v. 61, p. 811, 1977.
Mancini, Ernest A., Microfaunal paleoecology of the Grayson Formation (Upper Cretaceous) of Texas, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 10, no. 4, p. 174-175, 1978.
Mancini, Ernest A., Foraminiferal paleoecology of the Grayson Formation (Upper Cretaceous) of Texas, Am. Assoc. Petroleum Geol., v. 62, p. 1761, 1978.
Mancini, Ernest A., Geologic trends and processes controlling petroleum accumulation in the Smackover Formation (Upper Jurassic) of southwest Alabama, Second Symposium on the Geology of the Southeastern Coastal Plain, Abs. with Programs, p. 16-17, 1979.
Mancini, Ernest A., Eocene-Oligocene boundary in southwest Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 11, no. 4, p. 188, 1979.
Mancini, Ernest A., Recognition of micromorph faunas occurring in Washita strata, Am. Assoc. Petroleum Geol. Bull., v. 63, p. 490, 1979.
Mancini, Ernest A., Eocene-Oligocene biostratigraphy in southwest Alabama, Am. Assoc. Petroleum Geol. Bull., v. 63, p. 1607, 1979.
Mancini, Ernest A., Paleoenvironments of the lignite-bearing strata in southwest Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 12, no. 4, p. 183, 1980.
Mancini, Ernest A., Early Cenomanian biostratigraphy in the northwestern Gulf of Mexico region of the United States, 26th International Geological Congress, Abstracts, Paris, France, p. 175, 1980.
Mancini, Ernest A., Models for the recognition of micromorph faunas occurring in the geologic record, 26th International Geological Congress, Abstracts, Paris, France, p. 255, 1980.
Mancini, Ernest A., Stratigraphy and characterization of deep-basin Tertiary lignites in southwest Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 12, no. 7, p. 475, 1980.

Mancini, Ernest A., and D. Joe Benson, Regional stratigraphy of Upper Jurassic Smackover carbonates of southwest Alabama, Am. Assoc. Petroleum Geol. Bull., v. 64, p. 1563, 1980.

Mancini, Ernest A., Charles C. Smith, J. Wayne Payton, Geologic age and environ- ment of deposition of the "Pilot Sand" and "Marine Shale," Tuscaloosa Group, South Carlton Field, south Alabama, Gulf Coast Sec. Soc. Econ. Paleont. Mineralog. 1st Ann. Res. Conf., p. 24-25, 1980.

Oliver, Gary E., and Ernest A. Mancini, Late Paleocene planktic foraminiferal biostratigraphy of the Tuscahoma marls in southwest Alabama, Am. Assoc. Petroleum Geol. v. 64, p. 1565-1566, 1980.

Mancini, Ernest A., Characterization and stratigraphy of the Oak Hill lignite (Paleocene) in southwest Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 13, no. 1, p. 29, 1981.

Mancini, Ernest A., Paleogene planktic foraminiferal biostratigraphy in southwest Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 13, no. 7, p. 502, 1981.

Mancini, Ernest A., Lithostratigraphy and biostratigraphy of Paleocene subsurface strata in southwest Alabama, Am. Assoc. Petroleum Geol. Bull., v. 65, p. 1691, 1981.

Mancini, Ernest A., James W. Holmes, and Brian K. Shepard, Petroleum geology of a southern Appalachian Foreland Basin: Black Warrior Basin of Alabama, Am. Assoc. Petroleum Geol. Bull., v. 65, p. 1666, 1981.

Mancini, Ernest A., and J. Wayne Payton, Petroleum geology of South Carlton field, lower Tuscaloosa "Pilot Sand," Clarke and Baldwin Counties, Alabama, Am. Assoc. Petroleum Geol. Bull., v. 65, p. 1678, 1981.

Benson, D. Joe, Ernest A. Mancini, and Richard P. Wilkerson, Hatter's Pond Field: A complex combination trap in the Smackover and Norphlet Formations (Upper Jurassic), southwest Alabama, Am. Assoc. Petroleum Geol. Bull., v. 65, p. 899, 1981.

Smith, Charles C., Ernest A. Mancini, and Charles W. Copeland, Jr., Preliminary Report on Upper Cretaceous geological studies along the Tombigbee River, western Alabama and eastern Mississippi, Geol. Soc. America, Abs. with Programs (Ann. Mtg.) v. 13, no. 1, p. 34, 1981.

Mancini, Ernest A., Foraminiferal population changes in a shallow epicontinental marine clastic-carbonate sequence: Washita Group (Albian-Cenomanian), north-central Texas, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 14, nos. 1 and 2, p. 37, 1982.

Mancini, Ernest A., Deep-basin Tertiary Oak Hill lignite resources of southwest Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 14, no. 7, p. 554-555, 1982.

Mancini, Ernest A., Paleocene biostratigraphy in southwestern Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 14, no. 7, p. 555, 1982.

Mancini, Ernest A., Foraminiferal population changes in a shallow, epicontinental marine claystone-carbonate sequence: Grayson Formation (Cretaceous), north-central Texas, J. Paleontol. Supplement, v. 56, p. 18, 1982.

Mancini, Ernest A., Richard P. Wilkerson, and Janyth S. Tolson, Stratigraphy and hydrocarbon potential of Upper Jurassic formations in northeastern Gulf of Mexico area, Am. Assoc. Petroleum Geol. Bull., v. 66, p. 598-599, 1982.

Benson, D. Joe, and Ernest A. Mancini, Petrology and reservoir characteristics of the Smackover Formation, Hatter's Pond Field: implications for Smackover exploration in southwestern Alabama, Am. Assoc. Petroleum Geol. Bull., v. 66, p. 1424, 1982.

Benson, D. Joe, and Ernest A. Mancini, Porosity development and reservoir characteristics of the Smackover Formation in south Alabama, Gulf Coast Sec., Soc. Econ. Paleont. Mineralog. 3rd Ann. Res. Conf., p. 11-12, 1982.

Gibson, Thomas G., Ernest A. Mancini, and Laurel M. Bybell, Paleocene to Middle Eocene stratigraphy of Alabama, Am. Assoc. Petroleum Geol. Bull., v. 66, p. 1430, 1982.

Waters, Laura A., and Ernest A. Mancini, Lithostratigraphy and biostratigraphy of Upper Eocene and lower Oligocene strata in southwest Alabama and southeast Mississippi, Am. Assoc. Petroleum Geol. Bull., v. 66, p. 1439, 1982.

Mancini, Ernest A., Depositional setting and characterization of deep-basin Oak Hill lignite deposits (middle Paleocene) of southwest Alabama, Am. Assoc. Petroleum Geol. Bull., v. 67, p. 1468, 1983.

Mancini, Ernest A., Bennett L. Bearden, James W. Holmes, and Brian K. Shepard, Mississippian Carter and Lewis sandstone petroleum geology of the Black Warrior Basin of Alabama, Am. Assoc. Petroleum Geol. Bull., v. 67, p. 508-509, 1983.

Mancini, Ernest A., and John H. Masingill, Petroleum production and potential of Alabama's coastal plain and territorial waters, Gulf Coast Sec., Soc. Econ. Paleont. Mineralog. 4th Ann. Research Conf., p. 27-28, 1983.

Mancini, Ernest A., Charles C. Smith, and Ernest E. Russell, Upper Cretaceous biostratigraphy of western Alabama and eastern Mississippi, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 16, no. 3, p. 178, 1983.

Mancini, Ernest A., Charles C. Smith, and Ernest E. Russell, Cretaceous-Tertiary boundary in southwest Alabama and southeast Mississippi, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 15, no. 6, p. 634, 1983.

Mancini, Ernest A., Laura A. Waters, and Dorothy B. Swindel, Paleocene and Eocene biostratigraphy of southwestern Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.) v. 15, p. 59, 1983.

Waters, Laura A., and Ernest A. Mancini, Upper Eocene-Lower Oligocene foraminiferal biostratigraphy and paleoecology in the eastern Gulf Coast region, Am. Assoc. Petroleum Geol. Bull., v. 67, p. 567, 1983.

Waters, Laura A., and Ernest A. Mancini, Upper Eocene and Lower Oligocene foraminiferal population changes in the eastern Gulf Coastal region, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 15, p. 107, 1983.

Mancini, Ernest A., Paleocene lignite deposits of southwest Alabama, Am. Assoc. Petroleum Geol. Bull. v. 68, no. 4, p. 502, 1984.

Mancini, Ernest A., Upper Cretaceous planktonic foraminiferal biostratigraphy of western Alabama and eastern Mississippi, Geol. Soc. of America Abstracts with Programs, v. 16, no. 6, p. 583, 1984.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Upper Jurassic Norphlet Formation--New frontier for hydrocarbon prospecting in the Central and Eastern Gulf of Mexico regions, Am. Assoc. Petroleum Geol. Bull., v. 68, no. 4, p. 502, 1984.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Paleoenvironments and hydrocarbon potential of the Upper Jurassic Norphlet Formation of southwestern and offshore Alabama, Am. Assoc. Petroleum Geol. Bull., v. 68, no. 9, p. 1215, 1984.

Bearden, Bennett L., Ernest A. Mancini, and Phillip R. Reeves, North Blowhorn Creek Oil Field--A stratigraphic trap in the Black Warrior Basin of Alabama, Am. Assoc. Petrol. Geol. Bull., v. 68, no. 4, p. 453, 1984.

Benson, D. Joe, Bennett L. Bearden, and Ernest A. Mancini, Porosity/depth relations in Smackover Formation, southwest Alabama, Am. Assoc. Petroleum Geol. Bull., v. 68, no. 4, p. 454, 1984.

Smith, Charles C., Ernest A. Mancini, and Ernest E. Russell, The Cretaceous-Tertiary boundary in eastern Mississippi and western Alabama--Lithostratigraphy and biostratigraphy, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 16, no. 2, p. 113, 1984.

Mancini, Ernest A., Upper Cretaceous foraminiferal biostratigraphy of the Tombigbee Sand Member of the Eutaw Formation, eastern Mississippi and western Alabama, Geological Soc. America, Abs. with Programs (Ann. Mtg.), v. 17, no. 2, p. 121, 1985.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Upper Jurassic Norphlet eolian dune, wadi and marine petroleum reservoirs, central and eastern Gulf of Mexico regions, Am. Assoc. Petroleum Geol. Bull., v. 69, no. 2, p. 282-283, 1985.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Upper Jurassic hydrocarbon potential along the regional peripheral fault trend in Mississippi, Alabama, and the Florida panhandle, Am. Assoc. Petroleum Geol. Bull., v. 69, no. 9, p. 1427, 1985.

Mancini, Ernest A., Charles C. Smith, and Ernest E. Russell, Lithologic and paleontologic evidence for a regional hiatus at the Cretaceous-Tertiary boundary in the eastern Gulf of Mexico area, Soc. Econ. Paleont. Mineralog. 2nd Ann. Midyear Mtg., p. 58-59, 1985.

Payton, J. Wayne, and Ernest A. Mancini, Paleoenvironments of the lower strata of the Tuscaloosa Group (Upper Cretaceous) of southwestern Alabama, Geological Soc. America, Abs. with Programs (Ann. Mtg.), v. 16, no. 2, p. 686, 1985.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Jurassic petroleum trends in Eastern Gulf Coastal Plain and Central and Eastern Gulf of Mexico, Am. Assoc. Petroleum Geol. Bull., v. 70, no. 5, p. 615, 1986.

Mancini, Ernest A., Robert M. Mink, and Bennett L. Bearden, Integrated geological, geophysical and geochemical interpretation of Upper Jurassic petroleum trends in the eastern Gulf of Mexico, Am. Assoc. Petroleum Geol. Bull., v. 70, no. 9, p. 1185, 1986.

Mancini, Ernest A., and Charles C. Smith, Planktonic foraminiferal biostratigraphy of the Tuscaloosa Group in the subsurface of southwestern Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 18, no. 3, p. 253, 1986.

Mancini, Ernest A., and Berry H. Tew, Lower Oligocene (Rupelian) lithofacies changes in Mississippi, Alabama, and the Florida panhandle, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 18, no. 6, p. 680, 1986.

Mancini, Ernest A., and Laura A. Waters, Eocene-Oligocene boundary in southwestern Alabama: a condensed section, Soc. Econ. Paleont. Mineralog. 3rd Ann. Midyear Mtg., p. 70, 1986.

Claypool, George E., and Ernest A. Mancini, Geochemical characterization of oils, condensates, and potential petroleum source rocks in southwestern Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 18, no. 6, p. 566, 1986.

Smith, Charles C., Ernest A. Mancini, and Julia K. Palmer, Lithostratigraphy, microfossil biostratigraphy, and paleoenvironmental history of the Upper Cretaceous Arcola Limestone Member, Mooreville Chalk, eastern Mississippi and western Alabama, Geol. Soc. America, Abs. with Programs (Ann. Mtg.), v. 18, no. 3, p. 265, 1986.

Mancini, Ernest A., Bennett L. Bearden, and Robert M. Mink, Regional geologic framework and petroleum geology of Miocene sandstones in coastal and offshore Alabama, Am. Assoc. Petroleum Geologists Bull. (in press).

Mancini, Ernest A., and David D. Soens, Foraminiferal paleoecology of the Tombigbee Sand Member of the Eutaw Formation (Campanian) of eastern Mississippi and western Alabama, Geol. Soc. America, Abs. with Programs (in press).

Mancini, Ernest A., Robert M. Mink, Bennett L. Bearden, and Richard P. Hamilton, Recoverable natural gas reserves from the Jurassic Norphlet Formation, Alabama coastal waters area, Am. Assoc. Petroleum Geologists Bull. (in press).

Research Reports

Mancini, Ernest A., Alaska Peninsula Juro-Cretaceous megafossils, Cities Service Report, 4 pp., 1975.

Mancini, Ernest A., Alaska Peninsula Tertiary megafossils, Cities Service Report, 9 pp., 1975.

Mancini, Ernest A., Upper Cretaceous sandstone environment interpretation for enhanced petroleum exploration in Alabama, Alabama Mineral Resources Institute Report, 12 pp., 1978.

Mancini, Ernest A., Determination of an exploration model for prospecting for lignite in the Alabama Coastal Plain, Alabama School of Mines Report, 26 pp., 1979.

Mancini, Ernest A., Assessment of geologic factors controlling the economic recovery of Alabama deep-basin lignite, U. S. Department of Interior Report, 76 pp., 1981.

Mink, Robert M., Bennett L. Bearden, and Ernest A. Mancini, Regional Jurassic geologic framework of Alabama coastal waters area and adjacent federal waters area, U.S. Department of Interior Minerals Management Service Cooperative Agreement Report, 71 p., 1985.

Bearden, Bennett L., Robert M. Mink and Ernest A. Mancini, Regional geologic framework and petroleum geology of Miocene strata of Alabama coastal waters and adjacent federal waters area, U.S. Department of the Interior Minerals Management Service Draft Interim Report, 47 p., 1986.

PROFESSIONAL PAPERS PRESENTED

South-Central Geological Society of America Annual Meeting, 1975, Austin, TX.

American Association of Petroleum Geologists Annual Meeting, 1975, Dallas, TX.

South-Central Geological Society of America Annual Meeting, 1976, Houston, TX.

Southeastern Geological Society of America Annual Meeting, 1977, Winston-Salem, NC.

American Association of Petroleum Geologists Annual Meeting, 1977, Washington, D.C.

Gulf Coast Association of Geological Societies Annual Meeting, 1977, Austin, TX.

Southeastern Geological Society of America Annual Meeting, 1978, Chattanooga, TN.

Gulf Coast Association of Geological Societies Annual Meeting, 1978, New Orleans, LA.

Second Symposium on the Petroleum Geology of the Coastal Plain, 1979, Americus, GA.

American Association of Petroleum Geologists Annual Meeting, 1979, Houston, TX.

Southeastern Geological Society of America Annual Meeting, 1979, Blacksburg, VA.

Gulf Coast Association of Geological Societies Annual Meeting, 1979, San Antonio, TX.
Southeastern Geological Society of America Annual Meeting, 1980, Birmingham, AL.
International Geological Congress, 1980, Paris, France.
Gulf Coast Association of Geological Societies Annual Meeting, 1980, Lafayette, LA.
Geological Society of America Annual Meeting, 1980, Atlanta, GA.
First Annual Research Conference, Woodbine-Tuscaloosa Trend, 1980, Houston, TX.
Southeastern Geological Society of America Annual Meeting, 1981, Hattiesburg, MS.
Eastern Section Meeting, American Association of Petroleum Geologists, 1981, Atlantic City, NJ.
Gulf Coast Association of Geological Societies, Annual Meeting, 1981, Corpus Christi, TX.
Geological Society of America Annual Meeting, 1981, Cincinnati, OH.
Northeastern-Southeastern Geological Society of America Annual Meeting, 1982, Washington, D.C.
American Association of Petroleum Geologists Annual Meeting, 1982, Calgary, Canada.
Third North American Paleontological Convention, 1982, Montreal, Canada.
Geological Society of America Annual Meeting, 1982, New Orleans, LA.
Gulf Coastal Association of Geological Societies Annual Meeting, 1982, Houston, TX.
Third Annual Research Conference, Jurassic of the Gulf Rim, 1982, Baton Rouge, LA (core workshop).
Southeastern Geological Society of America Annual Meeting, 1983, Tallahassee, FL.
American Association of Petroleum Geologists Annual Meeting, 1983, Dallas, TX.
Gulf Coast Association of Geological Societies Annual Meeting, 1983, Jackson, MS.
Geological Society of America Annual Meeting, 1983, Indianapolis, IN.
Gulf Coast Section, Society of Economic Paleontologists and Mineralogists Annual Research Conference, 1983, Houston, TX.
Southeastern-North-Central Geological Society of America Annual Meeting, 1984, Lexington, KY.
American Association of Petroleum Geologists Annual Meeting, 1984, San Antonio, TX.
Gulf Coast Association of Geological Societies Annual Meeting, 1984, Shreveport, MS.
Geological Society of America Annual Meeting, 1984, Reno, NV.
American Association of Petroleum Geologists Annual Meeting, 1985, New Orleans, LA.
Southeastern Geological Society of America Annual Meeting, 1985, Knoxville, TN.
Society of Economic Paleontologists and Mineralogists Annual Midyear Meeting, 1985, Golden, CO.
Gulf Coast Association of Geological Societies Annual Meeting, 1985, Austin, TX.
Geological Society of America Annual Meeting, 1985, Orlando, FL.
Southeastern Geological Society of America Meeting, 1986, Memphis, TN.
American Association of Petroleum Geologists Annual Meeting, 1986, Atlanta, GA.

Society of Economic Paleontologists and Mineralogists Annual Midyear Meeting, 1986, Raleigh, NC.
Gulf Coast Association of Geological Societies Annual Meeting, 1986, Baton Rouge, LA.
Geological Society of America Annual Meeting, 1986, San Antonio, TX.

PROFESSIONAL COMMITTEE MEMBERSHIPS AND SERVICE ACTIVITIES

Society of Economic Paleontologists and Mineralogists Speakers' Bureau, 1979-80.
Gulf Coast Association of Geological Societies Awards Committee, 1978-80.
Gulf Coast Association of Geological Societies Representative, Alabama, 1979-80.
Gulf Coast Association of Geological Societies Session Chairman, Petroleum Geology, 1980.
American Association of Petroleum Geologists Lecture Coordinator for The University of Alabama, 1978-81.
American Association of Petroleum Geologists Membership Committee, 1980-81.
IGCP Mid-Cretaceous Events Participant, 1978-81.
IGCP North America Coordinator for Cenomanian Map Project, 1979-81.
Southeastern Geological Society of America Session Chairman, Coal and Lignite Geology, 1980.
Alabama Geological Society President, 1980-81.
Gulf Coast Association of Geological Societies Executive Committee, 1980-81.
Alabama Geological Society Membership Chairman, 1981-82.
Petroleum Geology of Alabama Conference, Conference Chairman, 1981.
Southeastern-Northeastern Geological Society of America Symposium Co-Chairman, Adaptive Strategies, 1982.
Energy in Alabama Conference, Conference Chairman, 1982.
Geological Society of America Symposium Chairman, Gulf Coast Lignite, 1982.
Gulf Coast Association of Geological Societies Session Chairman, Petroleum Geology, 1982.
Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists Vice-President, 1982-83.
Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists 4th Research Conference Committee Member, 1983.
Alabama Energy Advisory Council, Alabama Department of Energy, 1982-87.
Alabama Minerals Management Resource Committee, 1982-87.
Alabama Resources Development Committee, Alabama Department of Agriculture and Industries, 1982-87.
Alabama Water Resources Council, 1982-86.
Hazardous Waste Technical Advisory Committee, Alabama Department of Environmental Management, 1982-87.
School of Mines and Energy Development External Advisory Committee, University of Alabama, 1982-87.
State Mapping Advisory Committee, in cooperation with U.S. Geological Survey, 1982-87.
Water Well Standards Board, Alabama Department of Environmental Management. 1982-87.
Interstate Oil Compact Commission (IOCC) Executive Committee Member, 1983-87.
Outer Continental Shelf (OCS) Policy Advisory Board Member, 1983-87.
Southeastern Geological Society of America Session Chairman, Microfossils of the Gulf, Caribbean, and Eastern Coastal Plain II, 1983.

Committee to review the U.S. Bureau of Mines Minerals Availability Program, Association of American State Geologists, 1983.
Alabama Coal Export Trading Company Board of Directors, 1983-87.
Alabama Coastal Resources Advisory Committee, 1983-87.
U.S. Geological Survey Office of Water Policy, Alabama Liaison, 1983-84.
South-Central Geological Society of America Symposium Co-chairman, Cretaceous-Tertiary Boundary, 1984.
Southeastern-North-Central Geological Society of America Session Co-Chairman, Paleontology Session, 1984.
North American Commission on Stratigraphic Nomenclature Commissioner, as Representative for the Association of American State Geologists, 1984-87.
Editor, Association of American State Geologists Journal, 1984-86.
Water Resources Cooperative Program Review Committee, Association of American State Geologists, 1984-87.
Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists 5th Research Conference, Co-Chairman, 1984.
Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists, President, 1984-85.
Southeastern Geological Society of America Session Co-chairman, Paleontology Session, 1985.
Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists 6th Research Conference Co-Chairman, 1985.
Southeastern-South-Central Geological Society of America Session Co-Chairman, Cretaceous Session, 1986.
Gulf Coast Association of Geological Societies Session Co-Chairman, Petroleum Geology, 1986.
Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists 7th Research Conference Committee Member, 1986.
U.S. Department of the Interior, Outer Continental Shelf Policy Advisory Board Committee Vice-Chairman, 1986-88.
Association of American State Geologists, Secretary-Treasurer, 1986-88.
Alabama Department of Environmental Management, Environmental Planning Council, 1986-87.

RESEARCH PROPOSALS FUNDED

Origin of micromorph faunas in the geologic record, Sigma Xi, 1973-74 (dissertation research).
The use of micromorph faunas in exploring for fossil fuels and metallic mineral deposits, American Association of Petroleum Geologists, 1973-74 (dissertation research).
Core analysis and computer retrieval of results, State Oil and Gas Board of Alabama and Mineral Resources Institute, 1977-78 (graduate research support).
Determination of the environments of deposition of the Upper Jurassic carbonates in south Alabama, State Oil and Gas Board of Alabama, 1977-78 (Principal Investigator).
Upper Cretaceous sandstone environment interpretation for enhanced petroleum exploration in Alabama, Mineral Resources Institute, 1977-78 (Principal Investigator).
Determination of the environments of deposition of the Carter "sand" (Mississippian) in the Black Warrior Basin of Alabama, Phillips Petroleum Company, Grace Petroleum Company, and Warrior Drilling, 1978-79 (graduate research support).

Petrographic analysis of the Norphlet Formation (Jurassic) in southwest Alabama, Houston Oil and Mineral Corporation, 1978-79 (graduate research support).

Determination of an exploration model for prospecting for lignite in the Alabama Coastal Plain, School of Mines, 1978-79 (Principal Investigator).

Assessment of the geothermal/geopressure potential of the Gulf Coastal Plain of Alabama, U.S. Department of Energy, 1978-79 (Co-Principal Investigator).

Upper Cretaceous geology of the Tennessee-Tombigbee waterway, western Alabama and eastern Mississippi, U.S. Geological Survey, 1978-79 (Research Scientist).

Assessment of geologic factors controlling the economic recovery of Alabama deep-basin lignites, Office of Surface Mining, U.S. Department of Interior, 1979-80 (Principal Investigator).

Elevation data for Upper Cretaceous strata along the Tennessee-Tombigbee Waterway, western Alabama and eastern Mississippi, U.S. Geological Survey, 1979-80 (Principal Investigator).

Depositional systems and lignite resources of the Naheola Formation and Wilcox Group in Mississippi, Alabama and western Tennessee, U.S. Department of Interior, 1980-81 (Co-Principal Investigator).

Assessment of the economic potential of the Tertiary lignites of southeast Alabama, School of Mines, 1980-81 (Principal Investigator).

Stratigraphy and environments of deposition of the lower Pride Mountain Formation (Mississippian) in the Colbert County area, northwest Alabama, Tenneco Oil Company, 1980-81 (graduate research support).

An evaluation of the engineering properties and lignite resources of the Wilcox Group (Lower Eocene) in Mississippi, West Tennessee and Alabama, U.S. Department of Interior, 1981-82 (Co-Principal Investigator).

Assessment of the economic potential of the Tertiary lignites of Alabama, School of Mines, 1981-82 (Principal Investigator).

Regional Jurassic geologic framework study of Alabama coastal waters area and adjacent federal waters area, Minerals Management Service, 1983-85 (Co-Principal Investigator).

Regional geologic framework and petroleum geology of Miocene sediments of Alabama coastal waters area and adjacent federal waters area, Minerals Management Service, 1985-87 (Co-Principal Investigator).

Walter B. Ayers, Jr.

Professional Summary

January 1987

PERSONAL

Born October 16, 1942, Detroit, Michigan.

Business address: The University of Texas at Austin
Bureau of Economic Geology
University Station, Box X
Austin, Texas 78713
512-471-7721

Home address: 13137 New Boston Bend
Austin, Texas 78729
512-331-6273

ACADEMIC BACKGROUND

B.S. Geology, West Virginia University, 1969
M.S. Geology, West Virginia University, 1971
Ph.D. Geology, The University of Texas at Austin, 1984

AREAS OF EXPERTISE

A. Clastic sedimentology
B. Coal geology

PROFESSIONAL WORK EXPERIENCE

A. Present Position: Research Associate, Bureau of Economic Geology, The University of Texas at Austin (September 1984 - present).

Study of Plio-Pleistocene stratigraphy and depositional systems, offshore Texas and Louisiana.

Assessment of the co-production potential of lower Miocene Planulina sands, Esther Gas Field, Louisiana. Evaluation of Late Paleozoic depositional systems and bituminous coal, Harpersville Formation, North-Central Texas.

B. Research Scientist Associate, Bureau of Economic Geology, The University of Texas at Austin (September 1981 - September 1984).

Depositional systems study of the Wilcox Group and Carrizo Sand in east-central Texas with emphasis on the assessment of deep-basin lignite.

C. Research Scientist Assistant, Bureau of Economic Geology, The University of Texas at Austin (June 1979 - June 1981).

Evaluation of Texas lignite resources and uncertainties in coal resource estimations.

D. Associate Professor, Tidewater Community College, Virginia Beach, Virginia (August 1972 - August 1978).

Geology instruction.

E. Instructor, Winthrop College, Rock Hill, South Carolina (September 1971 - July 1972).

Geology instruction.

PROFESSIONAL SOCIETIES

American Association of Petroleum Geologists
Energy Minerals Division, AAPG
International Association of Sedimentologists
Austin Geological Society
American Association for the Advancement of Science
Society of Economic Paleontologists and Mineralogists
Central Texas Mining Section, Society of Mining Engineers, AIME

PUBLICATIONS

Reports, Monographs, Brochures, Pamphlets, Bulletins

Ayers, W. B., 1986, Coal resources of the Tongue River Member, Fort Union Formation (Paleocene), Powder River Basin, Wyoming and Montana: Geological Survey of Wyoming, Report of Investigations No. 35, 22 p.

Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, D. L., Ho, C. L., Holland, C. S., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Macpherson, G. L., Mahan, C. A., Mullin, A. H., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., 1986, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, 182 p.

Ayers, W. B., Jr., Lewis, A. H., and Collins, G. F., 1986, Resistivity, lignite, and lithofacies mapping of the Wilcox Group, east-central Texas, in Kaiser, W. R., and others, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, p. 31-50.

Ayers, W. B., Jr., and Lewis, A. H., 1985, The Wilcox Group and Carrizo Sand (Paleogene) in East-Central Texas: depositional systems and deep-basin lignite: The University of Texas at Austin, Bureau of Economic Geology Special Publication 19 p., 30 pls.

Tewalt, S. J., Bauer, M. A., Mathew, D., Roberts, M. P., Ayers, W. B., Jr., Barnes, J. W., and Kaiser, W. R., 1983, Estimation of coal resources in Texas Gulf Coast, Ohio Northern Appalachian, and Wyoming Powder

River Basins: a comparison of statistical approaches: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 136, 137 p.

Kaiser, W. R., Ayers, W. B., Jr., and LaBrie, L. W., 1980, Lignite resources in Texas: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 104, 52 p.

Chapters, Sections

Ayers, W. B., Jr., 1986, Geology of the San Miguel lignite mine, Jackson Group, South Texas, in Finkelman, R. B., and Casagrande, D. J., eds., Geology of Gulf Coast lignites: Environmental and Coal Associates, guidebook prepared for Geological Society of America, 1986 Annual Meeting, Coal Geology Division field trip, p. 54-67.

Ayers, W. B., Jr., 1986, Sedimentologic controls on lignite quality and mining, Sandow lignite mine, lower Calvert Bluff Formation, East-Central Texas, in Finkelman, R. B., and Casagrande, D. J., eds., Geology of Gulf Coast lignites: Environmental and Coal Associates, guidebook prepared for Geological Society of America, 1986 Annual Meeting, Coal Geology Division field trip, p. 40-53.

Ayers, W. B., Jr., and Kaiser, W. R., 1986, Regional depositional setting, resources, and quality of lignite in the Wilcox Group of East Texas and the Jackson Group of East and South Texas, in Finkelman, R. B., and Casagrande, D. J., eds. Geology of Gulf Coast lignites: Houston, Environmental and Coal Associates, guidebook prepared for Geological Society of America, 1986 Annual Meeting, Coal Geology Division field trip, p. 69-114.

Ayers, W. B., Jr., Renton, J. J., and Morton, R. A., 1972, Shale composition and sandstone properties used to interpret depositional environments of shallow-water deltas, in Pennsylvanian deltas in Ohio and northern West Virginia: American Association of Petroleum Geologists Field Trip Guidebook for May 1972, chapter VI, p. 1-20.

Articles

Ayers, W. B., Jr., 1986, Lacustrine and fluvial-deltaic depositional systems, Fort Union Formation (Paleocene), Powder River Basin, Wyoming and Montana: American Association of Petroleum Geologists Bulletin, v. 70, no. 11, p. 1651-1673.

Jackson, M. L. W., Light, M. P. R., and Ayers, W. B., Jr., 1986, Geology and co-production potential of submarine-fan deposits along the Gulf Coast of East Texas and Louisiana: Proceedings, 1986 Society of Petroleum Engineers/U.S. Department of Energy/Gas Research Institute Joint Symposium on Unconventional Gas Technology, Louisville, Kentucky, SPE Paper No. 15223, p. 181-192.

Ayers, W. B., Jr., and Kaiser, W. R., 1984, Lacustrine-interdeltaic coal in the Fort Union Formation (Palaeocene), Powder River Basin, Wyoming and

Montana, U.S.A., in Rahmani, R., and Flores, R. M., eds., Sedimentology of coal and coal-bearing sequences: International Association of Sedimentologists Special Publication 7, p. 61-84.

Abstracts

Ayers, W. B., Jr., 1985, Depositional systems and coal occurrence in the Fort Union Formation (Paleocene), Powder River Basin, Wyoming and Montana (abs.): Dissertation Abstracts International, v. 46, no. 2, p. 451B-452B.

Ayers, W. B., Jr., and Kaiser, W. R., 1984, Lacustrine-interdeltaic coal in Fort Union Formation (Paleocene), Powder River Basin, Wyoming (abs.): American Association of Petroleum Geologists Bulletin, v. 68, no. 7, p. 931.

Ayers, W. B., Jr., and Lewis, A. H., 1984, Lithofacies control of lignite distribution and ground-water quality, Wilcox Group (Eocene), east-central Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 68, no. 4, p. 450.

Kaiser, W. R., and Ayers, W. B., Jr., 1984, Fluvial depositional architecture and lignite occurrence in the Wilcox Group (Eocene), Texas Gulf Coast Basin (abs.): Geological Society of America, Abstracts with Programs, v. 16, no. 6, p. 553.

Ayers, W. B., Jr., and Kaiser, W. R., 1982, Tongue River (Paleocene) depositional systems and the occurrence of coal in the Powder River Basin of Wyoming and Montana (abs.): International Association of Sedimentologists, 11th International Congress on Sedimentology, abstract volume, p. 56.

Contract Reports

Light, M. P. R., Jackson, M. L. W., and Ayers, W. B., Jr., 1986, Coordination of geological and engineering research in support of Gulf Coast co-production program: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for the Gas Research Institute under contract no. 5084-212-0924, 267 p.

Ayers, W. B., Jr., Lewis, A. H., and Collins, G. F., 1984, Resistivity, lignite, and lithofacies mapping of the Wilcox Group, east-central Texas, in Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, G. L., Ho, C. L., Holland, C. S., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Macpherson, G. L., Mahan, C. A., Mullin, A. H., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., Evaluating the geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for Texas Energy and Natural Resources Advisory Council under contract no. IAC(82-83)-0822, p. 44-70.

Ayers, W. B., Jr., and Lewis, A. H., 1983, Resistivity mapping of the east-central Texas Wilcox Group, in Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, D. L., Ho, C. L., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Mahan, C. A., Macpherson, G. L., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., Evaluating the geology and ground-water hydrology of deep-basin lignite in Texas: The University of Texas at Austin, Bureau of Economic Geology, interim report prepared for Texas Energy and Natural Resources Council under contract no. IAC(82-83)-0822, p. 92-98.

THESIS

Environmental aspects of clay minerals in Conemaugh shales: Morgantown, West Virginia, West Virginia University, M.S. thesis, 75 p., 1971.

DISSERTATION

Depositional systems and coal occurrence in the Fort Union Formation (Paleocene), Powder River Basin, Wyoming and Montana: Austin, Texas, The University of Texas at Austin, Ph.D. dissertation, 208 p., 1984.

RECENT PUBLIC LECTURES AND ADDRESSES

Status and future of lignite mining in Texas: presented to Lower Colorado River Authority, Fuels Workshop, October 1986.

SPECIAL LECTURING

Field Trips

Co-leader (with John Breyer and David Williamson), Geology of Gulf Coast lignites: Geological Society of America, 1986 Annual Meeting, Coal Geology Division field trip.

MILITARY SERVICE

United States Air Force, 1961-1965, Plattsburgh Air Force Base, New York; Honorable Discharge.

DONALD JOE BENSON

Professional Summary
February 1987

PERSONAL

Born - Jan. 13, 1946, Canton, Ohio

Business Address: Department of Geology
The University of Alabama
Box 1945
Tuscaloosa, AL 35487
(205)348-1976

Home Address: 1512 Briarcliff
Northport, AL 35476

EDUCATION

B.A. - 1968 - College of Wooster, Wooster, Ohio
M.S. - 1971 - University of Cincinnati, Cincinnati, Ohio
Ph.D. - 1976 - University of Cincinnati, Cincinnati, Ohio

AREAS OF EXPERTISE

Sedimentary Petrology
Sedimentology

WORK EXPERIENCE

1973 to 1978 - Research Geologist, Lake Erie Section
Ohio Division of Geological Survey
Sandusky, Ohio

1978 to 1984 - Assistant Professor of Geology
University of Alabama
Tuscaloosa, Alabama

1984 to Present - Associate Professor of Geology
University of Alabama
Tuscaloosa, Alabama

PROFESSIONAL SOCIETIES

Alabama Geological Society
American Association of Petrologists
International Association of Sedimentologists
Society of Economic Paleontologists and Mineralogists

PUBLICATIONS

Articles and Reports

1. Benson, D.J., 1975, Maumee Bay erosion and sedimentation: U.S. Army Corps of Engineers Contract Report DACW 35-75-C-0038, 200 p.

2. _____, 1978, Lake Erie shore erosion and flooding, Lucas County, Ohio: Ohio Division of Geological Survey, Report Investigation 107, 99 p.

3. _____, 1980, Smackover petrography: in Wilson, G.V., Wang, G.C., Mancini, E.A., and Benson, D.J., Assessment of the geothermal/geopressure potential of the Gulf Coastal Plain of Alabama: U.S. Department of Energy Contract Report DE-AS05-79ET27015, p. 57-71 and p. 146-169.

4. _____, 1981a, Textural analysis with Texas Instruments 59 programmable calculator: Journal of Sedimentary Petrology, v. 51, p. 641-642.

5. _____, 1981b, Porosity reduction through ductile grain deformation; an experimental assessment: Transactions Gulf Coast Association of Geological Societies, v. 31, p. 235-237.

6. _____, 1982a, Depositional environments of coal-bearing strata in the Warrior Basin: in Rheams, L.J. and Benson, D.J., Depositional setting of the Pottsville Formation in the Black Warrior Basin: Guidebook, 19th Annual Field Trip, Alabama Geological Society, p. 15-26.

7. _____, 1982b, Coal geology of the Warrior Coal Field: an annotated bibliography: in Rheams, L.J., and Benson, D.J., Depositional setting of the Pottsville Formation in the Black Warrior Basin: Guidebook, 19th Annual Field Trip, Alabama Geological Society, p. 47-53.

8. _____, 1984a, Lithology: in LaMoreaux, P.E. et al., (eds.) Guide to the hydrology of carbonate rocks: Studies and Reports in Hydrology No. 41, UNESCO, p. 21-30.

9. _____, 1984b, Book Review - *Sedimentar Petrology* Chemical Geology, v. 45, p. 179-180.

10. _____, 1984c, Development of a predictive model for porosity distribution in the Smackover Formation of southwest Alabama (Progress Report): Research Report 63, School of Mines and Energy Development, University of Alabama, 54 p.

11. _____, 1985, Diagenetic controls on reservoir development and quality, Smackover Formation of southwest Alabama: Transactions Gulf Coast Association Geological Societies, v. 35, p. 317-326.

12. _____, 1986a, Structural and stratigraphic setting of the Middle Ordovician of Alabama: in Benson, D.J., and Stock, C.W., Shelf to basin transition in Middle Ordovician carbonates of the Alabama Appalachians: Field Trip Guidebook, American Association of Petroleum Geologists, 1986 Annual Meeting, p. 2-15.

13. _____, 1986b, Depositional setting and history: in Benson, D.J., and Stock, C.W., Shelf to basin transition in Middle Ordovician carbonates of the Alabama Appalachians: Field Trip Guidebook, American Association of Petroleum Geologists, 1986 Annual Meeting, p. 38-58.

14. _____, 1986c, Development of a predictive model for porosity distribution in the Smackover Formation of southwest Alabama (Final Report): Research Report 76, School of Mines and Energy Development, University of Alabama, 76 p.

15. Benson, D.J. and Mancini, E.A., 1982, Petrology and reservoir characteristics of the Smackover Formation, Hatter's Pond Field: implications for Smackover exploration in southwestern Alabama: Transactions Gulf Coast Association Geological Societies, v. 32, p. 67-76.

16. Benson, D.J., and Mancini, E.A., 1984, Porosity development and reservoir characteristics of the Smackover Formation in southwest Alabama: Jurassic of the Gulf Rim, Proceedings GCS-SEPM 3rd Research Conf., p. 1-17.

17. Benson, D.J. and Mink, R.M., 1983, Depositional history and petroleum potential of Middle and Upper Ordovician strata of the Alabama Appalachians: Transactions Gulf Coast Association Geological Societies, v. 33, p. 67-79.

18. Benson, D.J., and Stock, C.W., 1986, Shelf to basin transition in Middle Ordovician carbonates of the Alabama Appalachians: Field Trip Guidebook, American Association of Petroleum Geologists, 1986 Annual Meeting, 79 p.

19. Carter, C.H., Benson, D.J., and Guy, D.E., 1975, Shoreline and bathymetric changes in and around upper Sandusky Bay since 1905: Proceedings Sandusky River Basin Symposium, International Joint Commission, p. 336-357.

20. _____, 1981, Shore protection structures: effects on recession rates and beaches from the 1870's to the 1970's along the Ohio shore of Lake Erie: Environmental Geology, v. 3, p. 353-362.

21. _____, 1982, Man-made structures and geomorphic changes since 1876 along the Ohio shore of Lake Erie: in Craig, R.G. and Craft, D.E. (eds.) Applied Geomorphology, Allen and Unwin, London, p. 148-164.

22. Clancy, T.A. and Benson, D.J., 1983, Refractory dolomite raw materials: Ceramic Engineering and Sciences Proceedings, v. 4, p. 119-139.

23. Mancini, E.A., and Benson, D.J., 1980, Regional stratigraphy of Upper Jurassic Smackover carbonates of southwest Alabama: Transactions Gulf Coast Association Geological Societies, v. 30, p. 151-165.

24. _____, 1981, Smackover carbonate petroleum geology in southwest Alabama: Oil and Gas Journal, v. 79, no. 52, p. 266-275.

25. Rheams, L.J., and Benson, D.J., 1983, Depositional setting of the Pottsville Formation in the Black Warrior Basin: Guidebook, 19th Annual Field Trip, Alabama Geological Society, 99 p.

26. _____, 1986, Pottsville Formation in Alabama: Geological Society of America Centennial Field Guide-Southeastern Section, p. 185-190.

27. Stock, C.W., and Benson, D.J., 1982, Occurrence and distribution of fossils within and adjacent to Middle Ordovician bioherms in the southern Appalachians of Alabama: Proceedings 3rd North American Paleontological Convention, v. 2, p. 517-524.

Abstracts

1. Benson, D.J., 1974a, The effects of shoreline physiography and composition on shore erosion in northwestern Ohio: (abs.) Geological Society of America, Abstracts with Programs, v. 6, no. 6, p. 490.

2. _____, 1974b, Shore erosion along a low-lying shoreline, western Lake Erie: (abs.) International Association for Great Lakes Research, Abstracts 17th Conference on Great Lakes Research, p. 219.

3. _____, 1975, Shore protection structures along the south shore of western Lake Erie: (abs.) Geological Society of America, Abstracts with Programs, v. 7, no. 6, p. 721-722.

4. _____, 1976, Sediment accumulation in an open embayment - Maumee Bay, Ohio: (abs.) Geological Society of America, Abstracts with Programs, v. 8, no. 4, p. 463.

5. _____, 1978a, Clay mineralogy of Pleistocene and Holocene sediment of a portion of the western basin of Lake Erie: (abs.) Geological Society of America, Abstracts with Programs, v. 10, no. 6, p. 246.

6. _____, 1978b, Lithofacies and depositional environments of Mississippian (Osagean-Meramecian) platform carbonates - southern Indiana, central and eastern Kentucky: (abs.) Geological Society of America, Abstracts with Programs, v. 10, no. 6, p. 246-247.

7. _____, 1978c, Cementation history of Osagean and lower Meramecian carbonates - southern Indiana, central and eastern Kentucky: (abs.) Ohio Journal of Science, v. 78, p. 32.

8. _____, 1979, Diagenetic alteration of grainstones and packstones from the Salem Formation (Mississippian), southern Indiana and central Kentucky: (abs.) Geological Society of America, Abstracts with Programs, v. 11, no. 4, p. 170.

9. _____, 1980a, Diagenetic influence on reservoir development in the upper Smackover Formation of southwestern Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 12, no. 4, p. 171.

10. _____, 1980b, Non-tectonic deformation structures in delta-front sediments in the Pottsville Formation of the Warrior Coal Field: (abs.) Geological Society of America, Abstracts with Programs, v. 12, no. 4, p. 171.

11. _____, 1981a, Experimental simulation of porosity loss through dectile grain deformation in sandstones: (abs.) Geological Society of America, Abstracts with Programs, v. 13, no. 1, p. 2.

12. _____, 1981b, Porosity reduction through ductile grain deformation: an experimental assessment: (abs.) American Association of Petroleum Geologists Bulletin, v. 65, p. 1681.

13. _____, 1982a, Late-stage moldic porosity in the Smackover Formation of Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 14, no. 1, p. 4.

14. _____, 1982b, Depositional history of Middle and Upper Ordovician strata in the Alabama Valley and Ridge: (abs.) Geological Society of America, Abstracts with Programs, v. 14, no. 7, p. 442.

15. _____, 1985a, Smackover reservoirs in southwestern Alabama: (abs.) American Association of Petroleum Geologists Bulletin, v. 69, p. 237.

16. _____, 1985b, Diagenetic controls on reservoir development and quality, Smackover Formation of southwest Alabama: (abs.) American Association of Petroleum Geologists Bulletin, v. 69, p. 1417.

17. _____, 1986a, Burial cementation in the Smackover Formation (Jurassic) of southwest Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 18, no. 3, p. 117.

18. _____, 1986b, Shelf to basin transition in Middle Ordovician carbonates in the Alabama Appalachians: (abs.) American Association of Petroleum Geologists Bulletin, v. 70, p. 563-564.

19. Benson, D.J., Bearden, B.L., and Mancini, E.A., 1984, Porosity/depth relations in Smackover Formation, Southwest Alabama: (abs.) American Association of Petroleum Geologists Bulletin, v. 68, p. 454.

20. Benson, D.J., and Cunningham, A.E., 1985, Paleotopographic control on deposition and diagenesis of Smackover carbonates in southwest Alabama: (abs.) S.E.P.M. Annual Midyear Meeting, Volume II, p. 10.

21. Benson, D.J. and Mancini, E.A., 1982, Petrology and reservoir characteristics of the Smackover Formation, Hatter's Pond Field - implications for Smackover exploration in southwestern Alabama: (abs.) American Association of Petroleum Geologists Bulletin, v. 66, p. 1424-1425.

22. Benson, D.J. and Mancini, E.A., 1982, Porosity development and reservoir characteristics of the Smackover Formation in South Alabama: (abs.) Gulf Coast Section, Society of Economic Paleontologists and Mineralogists, 3rd Annual Research Conference, p. 11-12.

23. Benson, D.J., Mancini, E.A., and Wilkerson, R.P., 1981, Hatter's Pond Field: complex combination trap in the Smackover and Norphlet Formations (Upper Jurassic) of southwest Alabama: (abs.) American Association of Petroleum Geologists Bulletin, v. 65, p. 899.

24. Benson, D.J., and Mink, R.M., 1983, Depositional history and petroleum potential of Middle and Upper Ordovician of Alabama Appalachians: (abs.) American Association of Petroleum Geologists Bulletin, v. 67, p. 1461-1462.

25. Benson, D.J., and Stock, C.W., 1981, Growth history of a Middle Ordovician bryozoan-algal bank complex in central Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 13, no. 7, p. 407.

26. Batchelder, E.C., and Benson, D.J., 1984, Lithofacies and depositional environments of the Copper Ridge and Chepultepec Formations (Cambro-Ordovician) exposed along Alligator Creek, Bibb County, Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 16, no. 3, p. 124.

27. Cunningham, A.E., and Benson, D.J., 1984a, Paleotopographic control on the deposition of Smackover carbonates in the Manila embayment of south Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 16, no. 3, p. 132.

28. Cunningham, A.E., and Benson, D.J., 1984b, Depositional history of Smackover carbonates in Manila Embayment of south Alabama: (abs.) American Association of Petroleum Geologists Bulletin, v. 68, p. 468.

29. Lee, A.M., and Benson, D.J., 1982, Depositional history of the Chickamauga Limestone (Middle Ordovician) in Jefferson County, Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 14, no. 1, p. 34.

30. Mancini, E.A., and Benson, D.J., 1980, Regional stratigraphy of Upper Jurassic Smackover carbonate rocks of southwest Alabama: (abs.) American Association of Petroleum Geologists Bulletin, v. 64, p. 1563.

31. Stock, C.W., and Benson, D.J., 1981, Lithologies and organisms of a Chickamauga Limestone (Middle Ordovician) bioherm and asociated strats in the Birmingham, Alabama area: (abs.) Geological Society of America, Abstracts with Programs, v. 13, no. 1, p. 36.

32. Stock, C.W., and Benson, D.J., 1982, Occurrence and distribution of fossils within and adjacent to Middle Ordovician bioherms in the southern Appalachians of Alabama: (abs.) Journal of Paleontology, v. 56, no. 2, p. 27.

33. Stock, C.W., and Benson, D.J., 1983, Comparison of fossil assemblages in Middle Ordovician bioherms in Alabama with Ordovician carbonate buildups in North American and Scandinavia: (abs.) Geological Society of America, Abstracts with Programs, v. 15, no. 2, p. 113.

34. Ward, W.I., and Benson, D.J., 1981, Tidal flat deposits in the Middle Ordovician Chickamauga Limestone in northeastern Alabama: (abs.) Geological Society of America, Abstracts with Programs, v. 13, no. 1, p. 37.

William R. Kaiser

Professional Summary

January 1987

PERSONAL

Born August 15, 1937, Racine, Wisconsin.

Business address: The University of Texas at Austin
Bureau of Economic Geology
University Station, Box X
Austin, Texas 78713
512-471-7721

Home address: 4921 Strass Drive
Austin, Texas 78731
512-451-2837

ACADEMIC BACKGROUND

B.A. Geology, University of Wisconsin-Madison, 1959
M.S. Geology, University of Wisconsin-Madison, 1962
Ph.D. Geology, The Johns Hopkins University, 1972

AREAS OF EXPERTISE

A. Subsurface geology, basin analysis
B. Coal geology and resource assessment
C. Underground coal gasification
D. Equilibrium thermodynamics and clastic diagenesis
E. Uranium geochemistry and geology
F. Aqueous geochemistry and hydrogeology

PROFESSIONAL WORK EXPERIENCE

A. Present Position: Research Scientist, Bureau of Economic Geology, The University of Texas at Austin (October 1972 - present).

Coal geology and hydrogeology, aqueous geochemistry, radioactive waste isolation.

B. Lecturer, Department of Geological Sciences, The University of Texas at Austin (September 1978 - December 1980).

Graduate-level teaching.

C. Graduate Student, The Johns Hopkins University, Baltimore, Maryland (September 1968 - May 1972).

Teaching and research assistant at undergraduate level.

D. Petroleum Geologist, Exxon Company, U.S.A., Houston, Texas (April 1965 - August 1968).

Production and exploration geology (subsurface), South Texas Tertiary.

E. Acting Senior Petrologist, Ghana Geological Survey, Accra, Ghana, West Africa (May 1963 - February 1965).

U.S. Peace Corps Volunteer, responsible for igneous and metamorphic petrography, X-ray diffraction work.

F. Micropaleontologist, Exxon Company, U.S.A., Houston, Texas (June 1962 - February 1963).

Micropaleontology, South Texas Tertiary.

G. Graduate Student, University of Wisconsin-Madison (September 1959 - June 1962).

Teaching assistant at undergraduate level.

H. Junior Geologist, Exxon Company, U.S.A., Houston, Texas (June - August 1961).

Surface mapping, Tertiary on the Olympic Peninsula of Washington.

AWARDS AND HONORARY SOCIETIES

Phi Beta Kappa

COMMITTEE ACTIVITIES

University

Chairman, Executive Committee, Texas University Coal Research Consortium (1983-1985)

Program Chairman, Gulf Coast Lignite: Geology, Utilization, and Environmental Aspects, conference sponsored by Bureau of Economic Geology and ERDA, Austin, Texas (June 2-4, 1976)

Federal Government

Lignite Subcommittee, Fossil Energy Advisory Committee, U.S. Department of Energy (1978)

Professional

Editorial Board, In Situ (1977-1984)

PUBLICATIONS

Reports, Monographs, Brochures, Pamphlets, Bulletins

Fogg, G. E., and Kaiser, W. R., 1986, Regional hydrogeologic considerations for deep-basin lignite development in Texas, in Kaiser, W. R., and others, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, p. 57-59.

Kaiser, W. R., 1986, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: a summary, in Kaiser, W. R., and others, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, p. 3-10.

Kaiser, W. R., and Ambrose, M. L., 1986, Hydrochemical mapping in the Wilcox-Carrizo aquifer, Sabine Uplift area, in Kaiser, W. R., and others, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, p. 85-99.

Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, D. L., Ho, C. L., Holland, C. S., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Macpherson, G. L., Mahan, C. A., Mullin, A. H., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., 1986, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, 182 p.

Kaiser, W. R., Jackson, M. L. W., and Collins, G. F., 1986, Geology of deep-basin lignite in the Wilcox Group, Sabine Uplift area, in Kaiser, W. R., and others, Geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology Special Publication, p. 11-20.

Kaiser, W. R., 1985, Texas lignite--status and outlook to 2000: The University of Texas at Austin, Bureau of Economic Geology Mineral Resource Circular No. 76, 17 p.

Fogg, G. E., Kaiser, W. R., Ambrose, M. L., and Macpherson, G. L., 1983, Regional aquifer characterization for deep-basin lignite mining, Sabine Uplift area, northeast Texas: The University of Texas at Austin, Bureau of Economic Geology Geological Circular 83-3, 30 p.

Tewalt, S. J., Bauer, M. A., Mathew, D., Roberts, M. P., Ayers, W. B., Jr., Barnes, J. W., and Kaiser, W. R., 1983, Estimation of coal resources in Texas Gulf Coast, Ohio Northern Appalachian, and Wyoming Powder River Basins: a comparison of statistical approaches: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 136, 137 p.

Kaiser, W. R., Ayers, W. B., Jr., and LaBrie, L. W., 1980, Lignite resources in Texas: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 104, 52 p.

Galloway, W. E., and Kaiser, W. R., 1980, Catahoula Formation of the Texas Coastal Plain: origin, geochemical evolution, and characteristics of uranium deposits: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 100, 81 p.

Kaiser, W. R., Cooper, H. B. H., Jr., Gautam, S., Mabray, J., and Saleh, D., 1978, The impact of coal utilization in Texas under the National Energy Plan: 71st Annual Meeting of the Air Pollution Control Association, Houston, Texas, 16 p.

Kaiser, W. R., 1978, Depositional systems in the Wilcox Group (Eocene) of east-central Texas and the occurrence of lignite, in Kaiser, W. R., ed., Proceedings, 1976 Gulf Coast Lignite Conference: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 90, p. 33-53.

Kaiser, W. R., 1978, Electric power generation from Texas lignite, in Gronhovd, G. H., and Kube, W. R., compilers, Technology and use of lignite: Grand Forks, North Dakota, Grand Forks Energy Research Center, U.S. Department of Energy, GFERC/IC-77/1, p. 328-358. Reprinted as The University of Texas at Austin, Bureau of Economic Geology Geological Circular 78-3, 18 p.

Kaiser, W. R., ed., 1978, Proceedings, 1976 Gulf Coast Lignite Conference: geology, utilization, and environmental aspects: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 90, 276 p.

Kaiser, W. R., 1978, The role of the university in lignite research and development, in Kaiser, W. R., ed., Proceedings, 1976 Gulf Coast Lignite Conference: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 90, p. 273-276.

Kaiser, W. R., Johnston, J. E., and Bach, W. N., 1978, Sand-body geometry and the occurrence of lignite in the Eocene of Texas, in Hodgson, H. E., ed., Proceedings, 2nd Rocky Mountain Coal Symposium: Colorado Geological Survey Resource Series 4, p. 67-87. Reprinted as The University of Texas at Austin, Bureau of Economic Geology Geological Circular 78-4, 19 p.

Kaiser, W. R., 1976, Calvert Bluff (Wilcox Group) sedimentation and the occurrence of lignite at Alcoa and Butler, Texas: The University of Texas at Austin, Bureau of Economic Geology Research Note 2, 10 p.

Kaiser, W. R., 1974, Texas lignite: near-surface and deep-basin resources: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 79, 70 p.

Articles

Ayers, W. B., Jr., and Kaiser, W. R., 1986, Regional depositional setting, resources, and quality of lignite in the Wilcox Group of East Texas and the Jackson Group of East and South Texas, in Finkelman, R. B., and Casagrande, D. J., eds., Geology of Gulf Coast lignites: Houston, Environmental and Coal Associates, guidebook prepared for Geological Society of America, 1986 Annual Meeting, Coal Geology Division field trip, p. 69-114.

Kaiser, W. R., 1986, Texas description of seams, in Keystone coal industry manual: New York, McGraw-Hill, p. 551-557.

Kaiser, W. R., 1985, Texas description of seams, in Keystone coal industry manual: New York, McGraw-Hill, p. 568-574.

Ayers, W. B., Jr., and Kaiser, W. R., 1984, Lacustrine-interdeltaic coal in the Fort Union Formation (Palaeocene), Powder River Basin, Wyoming and Montana, U.S.A.: International Association of Sedimentologists Special Publication 7, p. 61-84.

Edgar, T. F., and Kaiser, W. R., 1984, Resources, properties, and utilization of Texas lignite: a review, in Schobert, H. H., ed., The chemistry of low-rank coals: Washington, D.C., American Chemical Society Symposium Series 264, p. 53-76.

Fogg, G. E., Kaiser, W. R., Ambrose, M. L., and Macpherson, G. L., 1984, Regional aquifer characterization for deep-basin lignite mining, Sabine Uplift area, northeast Texas, in Kube, W. R., Sondreal, E. A., and Rao, C. D., eds., 12th Biennial Lignite Symposium: Technology and Utilization of Low-Rank Coals Proceedings: U.S. Department of Energy, Office of Fossil Energy, DOE/METC/84-13(DE84003070), v. 1, p. 364-389.

Kaiser, W. R., 1984, Predicting reservoir quality and diagenetic history in the Frio Formation (Oligocene) of Texas, in McDonald, D. A., and Surdam, R. C., eds., Clastic diagenesis: American Association of Petroleum Geologists Memoir 37, p. 195-215.

Kaiser, W. R., 1984, Texas--description of seams, in Keystone coal industry manual: New York, McGraw-Hill, p. 595-601.

Fogg, G. E., Kaiser, W. R., Ambrose, M. L., and Macpherson, G. L., 1983, Regional aquifer characterization for deep-basin lignite mining, Sabine Uplift area, northeast Texas, in Proceedings, Sixth International Coal Utilization Exhibition & Conference: Houston, Industrial Presentations, Inc., v. 6, Lignite developments and utilization, p. 22-49.

Kaiser, W. R., 1982, Lignite depositional models, Texas Eocene: a regional approach to coal geology, in Schobert, H. H., comp., Proceedings, Basic Coal Science Workshop: U.S. Department of Energy, Grand Forks Energy Technology Center, and Texas A&M University, p. 9-67.

White, D. M., Kaiser, W. R., and Groat, C. G., 1982, Status of Gulf Coast lignite activity, in Kube, W. R., Sondreal, E. A., and White, D. M., compilers, Technology and use of lignite: Grand Forks, North Dakota, Grand Forks Energy Technology Center, U.S. Department of Energy, GFETC/IC-82/1 (DE82015926), p. 107-141.

Kaiser, W. R., and Richmann, D. L., 1981, Predicting diagenetic history and reservoir quality in the Frio Formation of Brazoria County, Texas, and Pleasant Bayou test wells, in Bebout, D. G., and Bachman, A. L., eds., Proceedings, Fifth U.S. Gulf Coast Geopressured-Geothermal Energy Conference: Baton Rouge, Louisiana State University, p. 67-74.

Edgar, T. F., Kaiser, W. R., Humenick, M. J., and Cooper, H. B. H., Jr., 1980, Technical, economic, and environmental factors for in situ gasification of Texas lignite, in Kube, W. R., and Gronhovd, G. H., compilers, Technology and use of lignite: Grand Forks, North Dakota, Grand Forks Energy Technology Center, U.S. Department of Energy, GFETC/IC-79/1 (CONF-79-0579), p. 207-231.

Kaiser, W. R., 1979, Geological factors in the in situ gasification of Texas lignites, in Proceedings, 1978 Gulf Coast Lignites Conference held at The Woodlands, Texas: NUS Corporation, Houston, p. 179-193.

van Rensburg, W. C. J., Cooper, H. B. H., Jr., Kaiser, W. R., and Spurr, S. H., 1979, Coal problems and prospects, in National energy policy issues: The University of Texas at Austin, Council on Energy Resources, June 1979, p. 115-134.

Kaiser, W. R., and Cooper, H. B. H., Jr., 1978, The impact of coal utilization in Texas under the National Energy Plan, in National energy policy: a continuing assessment: The University of Texas at Austin, Council on Energy Resources, January 1978, p. 121-181.

Edgar, T. F., Humenick, M. J., and Kaiser, W. R., 1978, Technical and environmental factors in underground coal gasification, in Energy and mineral resource recovery: American Nuclear Society and U.S. Department of Energy, CONF-770440, p. 20-27.

Edgar, T. F., Kaiser, W. R., and Thompson, T. W., 1977, Research on in situ gasification of Texas lignite at The University of Texas at Austin, in Shuck, L. A., ed., Proceedings, Second Annual Underground Coal Gasification Symposium: Morgantown Energy Research Center, Energy Research and Development Administration, Morgantown, West Virginia, MERC/SP-76-3, p. 90-95.

Edgar, T. F., and Kaiser, W. R., 1977, Resource development/utilization, the potential of in-situ lignite gasification in Texas, in Campbell, M. D., ed., Geology of alternate energy resources in the south-central United States: Houston Geological Society, p. 179-192.

Fisher, W. L., and Kaiser, W. R., 1974, Lignite: the other fuel of Texas: The University of Texas at Austin, Bureau of Business Research, Texas Business Review, v. 48, no. 4, p. 86-91.

Kaiser, W. R., 1974, East Texas iron ore and lignite, in Society of Economic Geologists Guide Book, Arkansas--Texas economic geology field trip: Little Rock, Arkansas Geological Commission, p. 19-47.

Kaiser, W. R., and Groat, C. G., 1973, Lignite geology, mining, and reclamation at Big Brown Steam Plant near Fairfield, Texas: Field Trip Guidebook for November 1973 Annual Meeting, Geological Society of America, Dallas, Texas, 21 p.

Abstracts

Ambrose, M. L., Kaiser, W. R., and Fogg, G. E., 1985, The use of ionic concentrations in mapping ground-water flow: Wilcox-Carrizo aquifer system (Paleogene), East Texas (abs.): Geological Society of America, Abstracts with Programs, v. 17, no. 7, p. 513.

Mukhopadhyay, P. K., Kaiser, W. R., Gormly, J. R., and Tewalt, S. J., 1985, Organic petrography and geochemistry of lower Tertiary coals of Texas and their relation to depositional environment (abs.): Society for Organic Petrology, second annual meeting, Abstracts and Program, p. 16.

Ambrose, M. L., Jackson, M. L. W., Kaiser, W. R., and Fly, D. J., 1984, Lignite occurrence in relation to depositional facies, Eocene Wilcox Group, Sabine Uplift area, East Texas--regional and local comparative studies (abs.): American Association of Petroleum Geologists Bulletin, v. 68, no. 4, p. 448.

Ayers, W. B., Jr., and Kaiser, W. R., 1984, Lacustrine-interdeltaic coal in Fort Union Formation (Paleocene), Powder River Basin, Wyoming (abs.): American Association of Petroleum Geologists Bulletin, v. 68, no. 7, p. 931.

Kaiser, W. R., and Ayers, W. B., Jr., 1984, Fluvial depositional architecture and lignite occurrence in the Wilcox Group (Eocene), Texas Gulf Coast Basin (abs.): Geological Society of America, Abstracts with Programs, v. 16, no. 6, p. 553.

Ambrose, M. L., Kaiser, W. R., and Fogg, G. E., 1983, Hydrochemical mapping of groundwater flow in the Wilcox-Carrizo aquifer, Sabine Uplift area, Texas (abs.): Geological Society of America, Abstracts with Programs, v. 15, no. 6, p. 514.

Fogg, G. E., Kaiser, W. R., Ambrose, M. L., and Macpherson, G. L., 1983, Regional aquifer characterization for deep-basin lignite mining in northeast Texas (abs.): Grand Forks, North Dakota, University of North Dakota, 12th Biennial international meeting on technology and utilization of low-rank coals, Final Schedule and Abstracts, p. 9-10.

Jackson, M. L. W., and Kaiser, W. R., 1983, The use of depositional systems in lignite exploration, Wilcox Group, Sabine Uplift area, Texas (abs.): Geological Society of America, Abstracts with Programs, v. 15, no. 6, p. 602.

Kaiser, W. R., and Morton, R. A., 1983, Brines, clay minerals, and equilibria: predicting diagenetic history and reservoir quality in Oligocene Frio Formation of Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 67, no. 3, p. 492.

Ayers, W. B., Jr., and Kaiser, W. R., 1982, Tongue River (Paleocene) depositional systems and the occurrence of coal in the Powder River Basin of Wyoming and Montana (abs.): International Association of Sedimentologists, 11th International Congress on Sedimentology, Abstracts, p. 56.

Kaiser, W. R., Bassett, R. L., and Morton, R. A., 1982, Brines, clay minerals, and equilibria: predicting diagenetic history and reservoir quality in Oligocene Frio Formation of Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 66, no. 9, p. 1445.

Kaiser, W. R., 1982, Predicting diagenetic history and reservoir quality in the Frio Formation (Oligocene) of Texas (abs.): International Association of Sedimentologists, 11th International Congress on Sedimentology, Abstracts, p. 119-120.

Kaiser, W. R., Magara, Kinji, Milliken, K. L., and Richmann, D. L., 1981, Petrography, water-rock interaction, and cap-rock distribution as potential indicators of secondary porosity in the Frio and Vicksburg Formations of Texas (abs.): Geological Society of America Abstracts with Programs, v. 13, no. 5, p. 240.

Kaiser, W. R., 1979, Gulf Coast lignite--status report (abs.): American Association of Petroleum Geologists Bulletin, v. 63, no. 9, p. 1604.

Kaiser, W. R., and Groat, C. G., 1977, Texas lignite (abs.): American Association of Petroleum Geologists Bulletin, v. 61, no. 5, p. 801-802.

Groat, C. G., and Kaiser, W. R., 1977, Texas lignite: utilization and geology (abs.): Geological Society of America Abstracts with Programs, v. 9, no. 1, p. 24.

Kaiser, W. R., 1976, Depositional systems in the Wilcox Group (Eocene) of East-Central Texas and the occurrence of lignite (abs.): South Texas Geological Society Bulletin, v. 17, no. 2, p. 6.

Kaiser, W. R., 1974, Sedimentology of Texas lignite (abs.): Corpus Christi Geological Society Bulletin, v. 15, no. 1, p. 2-3.

Kaiser, W. R., 1971, Cyclic sedimentation in the Middle Devonian of south-central Pennsylvania (abs.): Geological Society of America Abstracts with Programs, v. 3, no. 7, p. 616.

Contract Reports

Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, G. L., Ho, C. L., Holland, C. S., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Macpherson, G. L., Mahan, C. A.,

Mullin, A. H., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., 1984, Evaluating the geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for Texas Energy and Natural Resources Advisory Council under contract no. IAC(82-83)-0822, 257 p.

Kaiser, W. R., 1983, Predicting reservoir quality and diagenetic history in the Frio Formation (Oligocene) of Texas, in Morton, R. A., and others, Consolidation of geologic studies of geopressured geothermal resources in Texas: The University of Texas at Austin, Bureau of Economic Geology, 1982 annual report prepared for U.S. Department of Energy, Division of Geothermal Energy, under contract no. DE-AC08-79ET27111, p. 137-172.

Morton, R. A., Ewing, T. E., Kaiser, W. R., and Finley, R. J., 1983, Consolidation of geologic studies of geopressured/geothermal resources in Texas: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Department of Energy under contract no. DE-AC08-79ET27111, 195 p.

Tewalt, S. J., and Kaiser, W. R., 1983, Computerized calculation of lignite resources in Texas: a progress report: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Geological Survey under grant nos. 14-08-0001-G-639, 14-08-0001-A-0098, and 9420-0062, 21 p.

Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, D. L., Ho, C. L., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Mahan, C. A., Macpherson, G. L., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., 1983, Evaluating the geology and ground-water hydrology of deep-basin lignite in Texas: The University of Texas at Austin, Bureau of Economic Geology, interim report prepared for Texas Energy and Natural Resources Advisory Council under contract no. IAC(82-83)-0822, 130 p.

Edgar, T. F., Humenick, M. J., Kaiser, W. R., and Charbeneau, R. J., 1981, Environmental effects of in situ gasification of Texas lignite: Springfield, Virginia, National Technical Information Service PB81-171654 (EPA-600/57-81-035), 149 p.

Kaiser, W. R., Magara, Kinji, Milliken, K. L., and Richmann, D. L., 1981, Using presence of calcite cap rock in shales to predict occurrence of reservoirs composed of leached secondary porosity in the geopressured zone: annual report for the period June 1, 1980 - October 31, 1980: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for U.S. Department of Energy under contract no. DE-AC08-79ET27111, 31 p.

Tewalt, S. J., Garner, L. E., and Kaiser, W. R., 1981, Computerized calculation of lignite resources in Texas, report on phases 1 and 2: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Geological Survey under grant no. 14-08-0001-G-639, 2 p.

Edgar, T. F., Kaiser, W. R., Thompson, T. W., Gray, K. E., and Humenick, M. J., 1977, In situ conversion of Texas lignite to synthetic fuels: The University of Texas at Austin, Department of Chemical Engineering, semi-annual report nos. 4 and 5 prepared for National Science Foundation-RANN Division.

Edgar, T. F., Kaiser, W. R., and Thompson, T. W., 1976, In situ conversion of Texas lignite to synthetic fuels: The University of Texas at Austin, Department of Chemical Engineering, semi-annual report no. 3 prepared for National Science Foundation-RANN Division.

Edgar, T. F., and Kaiser, W. R., 1975, In situ conversion of Texas lignite to synthetic fuels: The University of Texas at Austin, Department of Chemical Engineering, semi-annual report prepared for National Science Foundation-RANN Division.

Ledbetter, J. O., Kaiser, W. R., and Ripperger, E. A., 1975, Radioactive waste management by burial in salt domes: The University of Texas at Austin, Engineering Mechanics Research Laboratory, EMRL 1112, 82 p.

THESIS

The Late Mesozoic geology of the Pearse Peak Diorite--southwest Oregon: Madison, Wisconsin, University of Wisconsin, M.S. thesis, 75 p., 1962.

DISSERTATION

Delta cycles in the Middle Devonian of central Pennsylvania: Baltimore, Maryland, The Johns Hopkins University, Ph.D. dissertation, 183 p., 1972.

RESEARCH SUPPORT

Principal Investigator: Computerized calculation and characterization of lignite resources in Texas; U.S. Geological Survey, Branch of Coal Resources (1986, $36,000).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase IV; U.S. Geological Survey, Branch of Coal Resources (1982-1984, $86,143).

Principal Investigator: Hydrologic evaluation of deep-basin lignite; Texas Energy and Natural Resources Advisory Council (1981-1983, $718,431).

Principal Investigator: Cooperative program of coal resource assessment in parts of the State of Texas; U.S. Geological Survey, Branch of Coal Resources (1981-1983, $50,000).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase III; U.S. Geological Survey, Branch of Coal Resources (1981, $70,896).

Principal Investigator: Assessment of lignite exploitability in the deep basin of Texas; Texas Energy and Natural Resources Advisory Council (1980-1981, $80,008).

Co-Principal Investigator: Using presence of calcite cap rock in shales to predict occurrence of reservoirs composed of leached secondary porosity in the geopressured zone; U.S. Department of Energy, Division of Geothermal Research (1980-1981, $194,899).

Co-Principal Investigator: Estimation of uncertainty in coal resources and cost assessments; Texas Energy and Natural Resources Advisory Council (1979-1981, $230,783).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase II; U.S. Geological Survey, Branch of Coal Resources (1979-1980, $95,539).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase I; U.S. Geological Survey, Branch of Coal Resources (1979, $19,021).

Principal Investigator: Quadrangle evaluation of uranium favorability of the Amarillo Quadrangle; Bendix Field Engineering Corporation (1978-1980, $176,672).

Co-Principal Investigator: Environmental effects of in situ gasification of Texas lignite; Environmental Protection Agency (1978-1979, $56,967).

Principal Investigator: Lignite resources in Texas; Texas Energy Advisory Council (1978-1979, $46,111).

Co-Principal Investigator: Uranium potential of the Catahoula Formation, Texas--a stratigraphic, depositional, and geochemical evaluation: Phase II; Bendix Field Engineering Corporation (1977-1979, $67,887).

Co-Principal Investigator: In situ gasification of Texas lignite to synthetic fuel; National Science Foundation (1974-1977, $290,700).

Major contributor to research proposal: Preliminary evaluation of geothermal resources in South Texas; Atomic Energy Commission (1974, $26,000).

Co-Principal Investigator: Use of salt domes for radioactive waste disposal; Atomic Energy Commission (1974, $48,000).

RECENT PUBLIC LECTURES AND ADDRESSES

Geologic and hydrologic factors for lignite development: presented to Texas Mining and Reclamation Association, San Antonio, Texas, October 26, 1984.

Lignite geology, quality, and economics of development: presented to Austin Geological Society, Austin, Texas, December 5, 1983.

Mining in Central Texas: presented to Society of Mining Engineers of the American Institute of Mining, Metallurgical and Petroleum Engineers, South Texas Minerals Section, San Antonio, Texas, October 11, 1983.

Brines, clay minerals, and equilibria: predicting diagenetic history and reservoir quality in Oligocene Frio Formation of Texas: presented at AAPG Research Conference, Role of Clay Minerals in Hydrocarbon Exploration, Santa Fe, New

Mexico, October 13, 1982 (invited) and AAPG Annual Convention, Dallas, Texas, April 19, 1983 (invited).

SPECIAL LECTURING

Corporate Schools, Research Seminars

Environments of coal deposition, U.S. Geological Survey, Branch of Coal Resources, Reston, Virginia, February 25-26, 1982.

Environments of coal deposition, Phillips Coal Company, Tyler, Texas, July 31 - August 1, 1980.

CURRICULUM VITAE

MARK GREGORY STELTENPOHL

Alabama State Geological Survey
420 Hackberry Lane
Tuscaloosa, Alabama 35486
Office:(205) 349-2852, ext. 277

Born: July 20, 1955
Citizenship: USA
Marital status: Married
Home:(205) 752-5179

EDUCATION;

B.S., 1978, University of Alabama, Geology, Chemistry minor. Top Graduating Senior in Geology, 1978.

M.S., 1983, University of Alabama, Structure and Tectonics. Thesis: The structure and stratigraphy of the Ofoten Synform, north Norway.

Ph.D., 1985, University of North Carolina, Structure, Metamorphic Petrology, and Tectonics. Dissertation: The structural and metamorphic history of Skanland, north Norway, and its significance for tectonics in Scandinavia.

PROFESSIONAL EXPERIENCE;

Summer 1978: Fieldwork and geochemical lab studies on the Hillabee Massive Sulfide Complex, Alabama, for the Minerals Resources Institute.

Summer 1978: Field geologist employed by Geochemix.

August 1978-August 1980: Teaching assistant for structural geology, summer field camp, and physical geology classes, University of Alabama.

August 1980-August 1984: Teaching and research assistant, University of North Carolina.

August 1984-August 1985: Instructor/lecturer for mineralogy and structural geology, University of Tromso, Tromso, Norway. Research studies emphasizing Caledonian orogenesis.

August 1985-December 1985: Instructor/lecturer for structural geology, University of North Carolina.

January 1986-March 1986: Consulting geologist for Stonewall Gas and Oil Company, Virginia.

March 1986-May 1986: Exploration geologist for Texasgulf Minerals and Metals, Chapel Hill, North Carolina.

June 1986-Present: Structural geologist and petrologist for the Alabama State Geological Survey.

OTHER EXPERIENCE;

Participant in Penrose Conference, "Timing of orogenic activity in the Appalachian-Caledonian System," J.F. Tull and W.A. Thomas, conveners, Alexander City, Alabama, May 1981.

Participant in the Uppsala Caledonian symposium, IGCP Caledonide Project, Uppsala, Sweden, August 1981.

Participant in Norsk Geologisk Foreningen, a Scandinavian symposium on Caledonian tectonics, Tromso, Norway, January 1985.

RESEARCH FUNDING;

Graduate Research Council Fellow (1979-1980), $3800
Minerals Resources Institute Fellow (1979), $1500
Norwegian Research Council for Science and Humanities (NAVF) (1979), $1000
Graduate Research Council Summer Fellow (1979), $500
Sigma Xi (1979), $300
McCarthy Foundation Fellow (1981), $1000
Sigma Xi (1981-82), $475
Geological Society of America (1982), $750
Norwegian Geological Survey (NGU) (1983), $1000
Reynolds Foundation Fellow (1983), $3000
National Science Foundation (1984), $8906, not funded

PUBLICATIONS;

Steltenpohl, M.G., 1983, The structure and stratigraphy of the Ofoten Synform, north Norway (abs.): Geological Society of America Abstracts with Programs, v. 15, p. 65.

Steltenpohl, M.G., 1983, The tectonic significance of crossfolds and backfolds in the Norwegian Caledonides (abs.): Geological Society of America Abstracts with Programs, v. 15, p. 696.

Steltenpohl, M.G., and Bartley, J.M., 1984, Kyanite-grade metamorphism in the Evenes and Bogen Groups, Ofoten, north Norway: Norsk Geologisk Tiddskrift, v. 64, p. 21-26.

Steltenpohl, M.G., and Bartley, J.M., 1984, Statistical evaluation of P-T trajectories based on elemental partitioning geothermometers and geobarometers (abs.): Geological Society of America Abstracts with Programs, v. 16, p. 667.

Steltenpohl, M.G., Andresen, A., and Tull, J.F., 1985, Evidence for a lithostratigraphic correlation between the Salangen Group (Ofoten) and the Balsfjord Group (Troms) and its regional implications (abs.): Geolognytt, v. 20, p. 47.

Tull, J.F., Bartley, J.M., Hodges, K.V., Andresen, A., Steltenpohl, M.G., and White, J.M., 1985, The Caledonides in the Ofoten region (68-69N), north Norway: key aspects of tectonic evolution: in Gee, D.G., and Sturt, B.A., (eds.), The Caledonide Orogen-Scandinavia and Related Areas, Wiley-Interscience, New York, p. 553-569.

Steltenpohl, M.G., Andresen, A., and Tull, J.F., 1986, Lithologic correlation between the Evenes/Bogen Groups (Ofoten) and the Balsfjord Group (Troms): evidence for the Finnmarkian Unconformity, north Norway (abs.): Geological Society of America Abstracts with Programs, v. 18, p. 762.

Boyd, R., in press, Geology of the 1:50,000 Skjomen sheet, north Norway: Norges Geologisk Undersokelse, co-contributer.

Boyd, R., in press, Geology of the 1:50,000 Evenes sheet, north Norway: Norges Geologisk Undersokelse, co-contributer.

Steltenpohl, M.G., and Bartley, J.M., in press, Thermobarometric profile through the Caledonian nappe stack of western Ofoten, north Norway: Contributions to Mineralogy and Petrology.

Steltenpohl, M.G., in press, Tectonostratigraphy and tectonic evolution of the Skanland area, north Norway: Norges Geologisk Undersokelse.

Steltenpohl, M.G., and Moore, W.B., in press, Metamorphism in Alabama: Alabama State Geological Survey Bulletin.

Dean, L., Beg, M., Guthrie, G., Moore, W.B., Rheams, K.F., Steltenpohl, M.G., and Tew, B.N., in press, Minerals of Alabama: Alabama State Geological Survey

Steltenpohl, M.G., and Bartley, J.M., submitted, The tectonic significance of crossfolds and backfolds in the Norwegian Caledonides: Geological Society of America Bulletin.

Steltenpohl, M.G., submitted, Geology of the Pine Mountain Imbricate Thrust Zone, Opelika, Alabama (abs.): Geological Society of America Abstracts with Programs, Southeastern Section Meeting.

Steltenpohl, M.G., Andresen, A., and Tull, J.F., submitted, A lithologic correlation between the Evenes/Bogen Groups (Ofoten) and the Balsfjord Group (Troms): evidence for the Finnmarkian Unconformity: Norges Geologisk Undersokelse.

Steltenpohl, M.G., and Moore, W.B., submitted, Metamorphism and accretionary history of Alabama: Amer. Jour. Sci.

RESUME

William A. Thomas
Professor of Geology, The University of Alabama

Personal:

born July 23, 1936, at Berea, Kentucky
married Rachel Leach, 1957
children: Carolyn, 1959; Amy, 1962

Education:

B.S.	(Geology)	University of Kentucky	1956
M.S.	(Geology)	University of Kentucky	1957
Ph.D.	(Geology)	Virginia Polytechnic Institute	1960

Honorary Organizations:
Phi Beta Kappa
Sigma Xi
Sigma Gamma Epsilon

Experience:

1979-	University of Alabama, Department of Geology, Professor
1972-1979	Georgia State University, Department of Geology, Professor and Chairman of department
1970-1972	Queens College of City University of New York, Department of Earth and Environmental Sciences,
1970-1972	Associate Professor
1971-1972	Chairman of department
1963-1970	Birmingham-Southern College, Department of Geology,
1963-1968	Associate Professor
1968-1970	Professor
1967-1970	Chairman of department
1969-1970	Geological Survey of Alabama, Visiting Scientist
1959-1963	The California Company (now Chevron), geologist;
1959-1960	well evaluation and field development in Louisiana, Mississippi, and Florida
1960-1961	supervisory assistant, evaluation of field development wells and exploratory wells in Gulf Coast
1961-1963	exploration in subsurface Jurassic of north Louisiana
summer, 1957	The California Company, summer geologist; Devonian-Mississippian stratigraphy of southwest Montana
summer, 1956	The California Company, summer geologist; structural mapping in Cretaceous of northwest Colorado

Grants, fellowships, and contracts:

1956-57, University Fellowship for graduate study (M.S.), University of Kentucky.
1957-58-59, National Science Foundation Fellowship for graduate study (Ph.D.), Virginia Polytechnic Institute.
1959, Geological Society of America Penrose Bequest for dissertation research (Ph.D.), Virginia Polytechnic Institute.
1963-64, National Science Foundation, research director, Undergraduate Research Participation, Mississippian stratigraphy of central Alabama.
1964-66, The California Company, research contract, Mississippian stratigraphy of northern Alabama.
1969, Birmingham-Southern College, Faculty Research Fund, Paleozoic stratigraphy and structure between the Ouachita and Appalachian Mountains.
1969-70, Geological Survey of Alabama, research contract, Stratigraphy and structure of part of the Valley and Ridge province in Alabama.
1973-74, Geological Survey of Alabama, research contract, Geology of the Coosa deformed belt.
1978 (with Greg H. Mack), Georgia State University, Arts and Sciences Research Fund, Stratigraphy and depositional environments of Hartselle Sandstone in Alabama.
1980-82, Geological Survey of Alabama, research contract, Structural geology of the Coosa deformed belt in the Alabama Appalachians.
1980-82, Geological Survey of Alabama, research contract, Coal sampling.
1981-82, The University of Alabama Research Grants Committee, Depositional environments of Parkwood Formation, an ancient delta in central Alabama.
1981-82, Office of Surface Mining, Coal stratigraphy of the deeper Black Warrior basin and the Cahaba and Coosa synclines.
1981-84, National Science Foundation, Variation in time of orogeny along orogenic belts from the perspective of clastic wedges.
1981-83, National Science Foundation - University of Texas at Austin, North American continent-ocean transect program, on-land portion of transect F-2 in Alabama.
1983-86, National Science Foundation, Synsedimentary structures in foreland fold-thrust belts.
1984-85, The University of Alabama School of Mines and Energy Development, Geologic controls on coal-bed methane productivity.
1984-86, Conoco, Synsedimentary structural deformation in the fold-thrust belt of Alabama and west Georgia.
1985-87, Petroleum Research Fund of the American Chemical Society, Foreland basin evolution--sedimentation and tectonics.

Professional organizations:

Geological Society of America, Fellow
General Chairman, Annual Meeting in Atlanta, 1980
Special Publications Study Committee, Vice-Chairman 1980-81
Committee on Membership, Member 1981-83, Chairman 1982-83
Editor, Geological Society of America Bulletin, 1981-
Committee on Publications, Member 1981- , Chairman 1985-
Committee on Committees, Member 1983
Councilor, 1984-1986
American Association of Petroleum Geologists
Committee on Governmental Affairs, Communicator 1975-83
Technical Program Coordinator, Annual Meeting in Atlanta, 1986
Alabama Geological Society, Charter Member
Editor, 1964-66
Secretary, 1966-67
Vice-President, 1967-68
President, 1968-69
Society of Economic Paleontologists and Mineralogists

Professional activities:

1962-63, lecturer, Mississippi Petroleum Committee, Senior Petroleum Scientists High School Visitation Program.
1965, leader, Annual Field Trip of Alabama Geological Society; Structural development of the southernmost Appalachians.
1966, participant, National Science Foundation, summer conference; Stratigraphy and structure of the Appalachians.
1967, stop-discussion leader, Annual Field Trip of Coal Division, Geological Society of America; Carboniferous detrital rocks in northern Alabama.
1967, stop-discussion leader, Annual Field Trip of Alabama Geological Society; Mississippian sediments in northern Alabama and south-central Tennessee.
1968, participant, National Science Foundation, summer conference; Geology of the Canadian Rockies.
1969, participant, National Science Foundation, summer conference; Geology of the Basin and Range.
1969, stop-discussion leader, Annual Field Trip of Alabama Geological Society; The Appalachian structural front in Alabama.
1971, leader (substitute for Byron N. Cooper), field trip, Southeastern Section of Geological Society of America; Appalachian structural and topographic front between Narrows and Beckley, Virginia and West Virginia.
1971, participant, National Science Foundation, summer conference; Geology of the Colorado Plateau.
1972, participant, Geological Society of America, Penrose Conference; Geology and geophysics of the northern Appalachians.
1973, stop-discussion leader, Annual Field Trip of Alabama Geological Society; Talladega metamorphic front.
1974, co-leader (and James A. Drahovzal), Annual Field Trip of Alabama Geological Society; The Coosa deformed belt in the Alabama Appalachians.
1976, participant, Geological Society of America, Penrose Conference; Late orogenic sedimentation and related tectonics in the Cordilleran and Appalachian orogens.
1977, stop-discussion leader, Annual Field Trip of Alabama Geological Society; Cambrian and Devonian stratigraphic problems of eastern Alabama.
1978, participant, Geological Society of America, Penrose Conference; Chronology of thrusting in orogenic terranes.
1979, participant and speaker, field trips and conference, International Geological Correlation Program - Caledonide Orogen Project; Caledonides in the USA.
1979, speaker, New York State Geological Association and New England Intercollegiate Geological Conference, Symposium; Sedimentary strata and tectonic movements.
1980, co-convenor (and Greg H. Mack), Symposium, Southeastern Section of Geological Society of America; Stratigraphy, sedimentology, and paleoecology of Mississippian-Pennsylvanian rocks.
1980, co-leader (and Greg H. Mack and Johnny A. Waters), field trip, Southeastern Section of Geological Society of America; Depositional setting of the Mississippian Hartselle Sandstone and lower Bangor Limestone in northwest Alabama.

Professional activities (continued):

1980, 1981, 1982, stop-discussion leader, American Association of Petroleum Geologists Field Seminar (John M. Dennison, leader); Paleozoic stratigraphy and Appalachian exploration trends.
1980, participant, Society of Economic Paleontologists and Mineralogists, Research Conference; Modern shelf and ancient cratonic sedimentation.
1980, co-leader (and Thornton L. Neathery), field trip, Geological Society of America Annual Meeting; Tectonic framework of the Appalachian orogen in Alabama.
1981, speaker and field trip leader, University of Alabama, Conference on Petroleum Geology of Alabama.
1981, co-convenor (and James F. Tull), Geological Society of America, Penrose Conference; Timing of orogenic activity in the Appalachian-Caledonian system.
1981, participant and speaker, field trips and conference, International Geological Correlation Program - Caledonide Orogen Project; Caledonides in Scandinavia.
1981, speaker, Appalachian Basin Industrial Associates, seminar.
1982, speaker, Conference on Aeromagnetic Mapping.
1982, co-convenor (and James F. Tull), Symposium, Southeastern and Northeastern Sections of Geological Society of America; Timing of orogenic events in the Appalachians.
1982, speaker, Appalachian Basin Industrial Associates, seminar.
1982, participant, North American Continent-Ocean Transects Program.
1982, co-convenor (and George W. Viele), Geological Society of America, Penrose Conference; Tectonic history of the Ouachita orogen.
1982, speaker, Alabama Geological Survey, Conference on Energy.
1982, speaker, field trip, Geological Society of America Annual Meeting; Geology of Ouachita Mountains.
1982, co-convenor (and George W. Viele), Symposium, Geological Society of America Annual Meeting; The Ouachita orogen.
1982, co-leader (and James F. Tull, Thornton L. Neathery, Greg H. Mack, and Benjamin A. Ferrill), field trip, Geological Society of America Annual Meeting; Appalachian thrust belt in Alabama: tectonics and sedimentation.
1983, speaker, Conference on Aeromagnetic Mapping.
1983, speaker, Appalachian Basin Industrial Associates, seminar.
1983, co-leader (and James F. Tull, Thornton L. Neathery, Benjamin A. Ferrill, W. Edward Osborne, and Michael W. Szabo), field trip, Gulf Coast Association of Geological Societies; Appalachian thrust belt in Alabama: tectonics and sedimentation.
1984, participant, Geological Society of America, Penrose Conference; The West African connection.
1984, co-convenor (and Wallace D. Lowry), Symposium, Southeastern and North-Central Sections of Geological Society of America; Tectonics and sedimentation of the southern Appalachians.
1984, co-convenor (and Laurence L. Sloss), Symposium, Southeastern and North-Central Section of Geological Society of America; Tectonics and sedimentation of the eastern North American craton.
1984, participant, North Atlantic Treaty Organization Advanced Studies Institute; Geological synthesis of the Caledonian rocks of the United Kingdom.

Professional activities (continued):

1984, speaker, International Geological Correlation Program - Caledonide Orogen Project; Caledonides in the British Isles.
1984, co-leader (and Thornton L. Neathery, W. Edward Osborne, Michael W. Szabo, Richard H. Groshong, Jr., and Benjamin A. Ferrill), Annual Field Trip of Alabama Geological Society; Appalachian thrust belt in Alabama.
1985, speaker (and R. G. Martin), Symposium, Cornell Program for the Study of the Continents; The structure and evolution of the Gulf of Mexico and surrounding regions.
1985, speaker, University of Alabama School of Mines and Energy Development, External Advisory Council.
1985, speaker, Appalachian Basin Industrial Associates, seminar.

Presented 36 papers at professional meetings:
Geological Society of America
Southeastern Section of Geological Society of America
South-Central Section of Geological Society of America
Northeastern Section of Geological Society of America
Gulf Coast Association of Geological Societies
Alabama Academy of Science
International Geological Correlation Program Conference
International Conference on Basement Tectonics
International Congress of Carboniferous Stratigraphy and Geology

Professional activities (continued):

Invited speaker at:
1968, Mississippi Geological Society
1969, Alabama Geological Society
University of North Carolina
1970, Louisiana State University
Queens College of City University of New York
1973, Auburn University
University of Georgia
1975, Georgia Institute of Technology
1977, West Georgia College
1978, University of Kentucky
1979, University of Georgia
University of Alabama
Florida State University
1980, Monmouth College (Visiting Distinguished Scholar)
1982, United States Geological Survey, Reston
University of Alabama at Birmingham
Texas A&M University
New Orleans Geological Society
1983, University of Texas at Austin
1984, American Institute of Mining Engineers, Alabama Chapter
University of Kentucky (McFarlan Lecturer)
Columbus College
University of New Orleans
1985, University of Oklahoma
University of Kentucky
Appalachian State University
Memphis State University

Reviewer of manuscripts and proposals for:
Geological Society of America Bulletin
American Journal of Science
National Science Foundation
Nuclear Regulatory Commission
Southeastern Geology
American Association of Petroleum Geologists Bulletin
Petroleum Research Fund of American Chemical Society
Georgia Geological Survey
Geological Survey of Alabama
Geology
Tectonics
Journal of Foraminiferal Research
International Conference on Basement Tectonics Proceedings

Bibliography: ARTICLES

1963, and Mann, C. J., Correlation chart of upper Cotton Valley sands: Shreveport Geological Society Reference Volume 5, p. 9-17.

1964, with Mann, C. J., Cotton Valley Group (Jurassic) nomenclature, Louisiana and Arkansas: Gulf Coast Association of Geological Societies Transactions, v. 14, p. 143-152.

1965 (editor), Structural development of the southernmost Appalachians: Alabama Geological Society, Third Annual Field Trip Guidebook, 69 p.

1965, Southernmost Appalachians: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 1-2.

1965, Ouachita influence on Mississippian lithofacies: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 23-28.

1965, and Copeland, C. W., Generalized stratigraphic sections: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 3-4.

1965, and Joiner, T. J., Attalla Conglomerate: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 13-15.

1966, and Mann, C. J., Late Jurassic depositional environments, Louisiana and Arkansas: American Association of Petroleum Geologists Bulletin, v. 50, p. 178-182.

1966, Late Mississippian folding of a syncline in the western Appalachians, West Virginia and Virginia: Geological Society of America Bulletin, v. 77, p. 473-494.

1967, Mississippian facies in Alabama, in Ferm, J. C. and others, A field guide to Carboniferous detrital rocks in northern Alabama: Annual Field Trip Guidebook, Coal Division, Geological Society of America, p. 21-23.

1967, Mississippian stratigraphy of the Tennessee Valley, Alabama: Alabama Geological Society, Fifth Annual Field Trip Guidebook, p. 4-9.

1967, with Moser, P. H., Pre-Hartselle Mississippian sandstone in Colbert County, Alabama: Alabama Geological Society, Fifth Annual Field Trip Guidebook, p. 25-39.

1968, with Mann, C. J., The Ancient Mississippi River: Gulf Coast Association of Geological Societies Transactions, v. 18, p. 187-204.

1968, Contemporaneous normal faults on flanks of Birmingham anticlinorium, central Alabama: American Association of Petroleum Geologists Bulletin, v. 52, p. 2123-2136.

1969, and Bearce, D. N., Sequatchie anticline in north-central Alabama: Alabama Geological Society, Seventh Annual Field Trip Guidebook, p. 26-43.

Bibliography: ARTICLES (continued)

1971, Devonian stratigraphy north of the Uncompahgre Uplift, Colorado: Mountain Geologist, v. 8, p. 85-88.

1972, Regional Paleozoic stratigraphy in Mississippi between Ouachita and Appalachian Mountains: American Association of Petroleum Geologists Bulletin, v. 56, p. 81-106.

1972, Mississippian stratigraphy of Alabama: Alabama Geological Survey Monograph 12, 121 p.

1972, Regional Paleozoic stratigraphy in Mississippi between Ouachita and Appalachian Mountains: Replies to discussions by F. F. Mellen and S. W. Welch: American Association of Petroleum Geologists Bulletin, v. 56, p. 2459-2460 and 2462-2463.

1973, Southwestern Appalachian structural system beneath the Gulf Coastal Plain: American Journal of Science, Cooper Volume, v. 273A, p. 372-390.

1973, and Drahovzal, J. A., Regional Paleozoic stratigraphy of Alabama: Alabama Geological Society, Eleventh Annual Field Trip Guidebook, p. 66-91.

1974 (and Drahovzal, J. A., editors), The Coosa deformed belt in the Alabama Appalachians: Alabama Geological Society, Twelfth Annual Field Trip Guidebook, 98 p.

1974, and Drahovzal, J. A., A field guide to the Coosa deformed belt: Alabama Geological Society, Twelfth Annual Field Trip Guidebook, p. 1-43.

1974, and Drahovzal, J. A., Geology of the Coosa deformed belt: Alabama Geological Society, Twelfth Annual Field Trip Guidebook, p. 45-75.

1974, Converging clastic wedges in the Mississippian of Alabama: Geological Society of America Special Paper 148, p. 187-207.

1975, with Neathery, T. L., Pre-Mesozoic basement rocks of the Alabama coastal plain: Gulf Coast Association of Geological Societies Transactions, v. 25, p. 86-99.

1976, Evolution of Ouachita-Appalachian continental margin: Journal of Geology, v. 84, p. 323-342.

1977, Structural and stratigraphic continuity of the Ouachita and Appalachian Mountains: Arkansas Geological Commission, Symposium on the geology of the Ouachita Mountains, v. 1, p. 9-24.

1977, with Drahovzal, J. A., Pre-Mississippian sandstones in the interior structures of the Appalchian fold and thrust belt of eastern Alabama: Alabama Geological Society, Fifteenth Annual Field Trip Guidebook, p. 29-36.

Bibliography: ARTICLES (continued)

1977, and Drahovzal, J. A., Large-scale recumbent folding in the Valley and Ridge province of Alabama: Discussion: Geological Society of America Bulletin, v. 88, p. 1368-1371.

1977, Evolution of Appalachian-Ouachita salients and recesses from reentrants and promontories in the continental margin: American Journal of Science, v. 277, p. 1233-1278.

1979, Evolution of Appalachian-Ouachita salients and recesses from reentrants and promontories in the continental margin: Reply to discussion by Harold Williams and B. L. Doolan: American Journal of Science, v. 279, p. 95-96.

1979, and Cramer, H. R., The Mississippian and Pennsylvanian (Carboniferous) Systems in the United States - Georgia: U. S. Geological Survey Professional Paper 1110-H, 37 p.

1979, Mississippian stratigraphy of Alabama, in The Mississippian and Pennsylvanian (Carboniferous) Systems in the United States - Alabama and Mississippi: U. S. Geological Survey Professional Paper 1110-I, p. I1-I22. (also Alabama Geological Survey Reprint Series 49)

1980, and Tull, J. F., Bearce, D. N., Russell, G., and Odom, A. L., Geologic synthesis of the southernmost Appalachians, Alabama and Georgia: Virginia Polytechnic Institute Department of Geological Sciences, Memoir 2, p. 91-97.

1980, and Mack, G. H., and Waters, J. A., Depositional setting of the Mississippian Hartselle Sandstone and lower Bangor Limestone in northwest Alabama (Field trip number 2), in Tull, J. F., ed., Field trips for the Southeastern Section of the Geological Society of America, Birmingham, Alabama: Tuscaloosa, Alabama Geological Society, p. 29-44.

1980, and Mack, G. H., Barrier-island and shelf-bar sedimentation, Mississippian Hartselle Sandstone, northern Alabama, in Tull, J. F., ed., Field trips for the Southeastern Section of the Geological Society of America, Birmingham, Alabama: Tuscaloosa, Alabama Geological Society, p. 45-55.

1980, and Neathery, T. L., Tectonic framework of the Appalachian orogen in Alabama, in Frey, R. W., ed., Excursions in southeastern geology, v. 2, Geological Society of America 1980 Annual Meeting, Atlanta, Georgia: American Geological Institute, p. 465-526.

1981, Basement faults along the Appalachian-Ouachita continental margin: Proceedings of Third International Conference on Basement Tectonics, Basement Tectonics Committee Publication No. 3, p. 347-356.

1981, with Mack, G. H., and James, W. C., Orogenic provenance of Mississippian sandstones associated with southern Appalachian-Ouachita orogen: American Association of Petroleum Geologists Bulletin, v. 65, p. 1444-1456.

Bibliography: ARTICLES (continued)

1982, and Mack, G. H., Paleogeographic relationship of a Mississippian barrier-island and shelf-bar system (Hartselle Sandstone) in Alabama to the Appalachian-Ouachita orogenic belt: Geological Society of America Bulletin, v. 93, p. 6-19.

1982, and Tull, J. F., Timing of orogenic events in the Appalachian-Caledonian system: Penrose Conference report: Geology, v. 10, p. 485-486.

1982, Stratigraphy and structure of the Appalachian fold and thrust belt in Alabama, in Thomas, W. A., and Neathery, T. L., eds., Appalachian thrust belt in Alabama: tectonics and sedimentation (Field Trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, p. 55-66.

1982, (and Neathery, T. L., eds.), Appalachian thrust belt in Alabama: tectonics and sedimentation (Field Trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, 78 p.

1982, and Neathery, T. L., Appalachian thrust belt in Alabama, in Thomas, W. A., and Neathery, T. L., eds., Appalachian thrust belt in Alabama: tectonics and sedimentation (Field Trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, p. 1-3.

1982, and Tull, J. F., Neathery, T. L., Mack, G. H., and Ferrill, B. A., A field guide to the Appalachian thrust belt in Alabama: in Thomas, W. A., and Neathery, T. L., eds., Appalachian thrust belt in Alabama: tectonics and sedimentation (Field trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, p. 5-40.

1983, Continental margins, orogenic belts, and intracratonic structures: Geology, v. 11, p. 270-272.

1983, and Viele, G. W., Tectonic history of the Ouachita orogen: Penrose Conference report: Geology, v. 11, p. 482-483.

1983, with Neathery, T. L., Geodynamics transect of the Appalachian orogen in Alabama, in Rast, N., and Delany, F. M., eds., Profiles of orogenic belts: American Geophysical Union, Geodynamics Series, v. 10, p. 301-307. (also Alabama Geological Survey Reprint Series 56)

1983, with Mack, G. H. and Horsey, C. A., Composition of Carboniferous sandstones and tectonic framework of southern Appalachian-Ouachita orogen: Journal of Sedimentary Petrology, v. 53, p. 931-946.

Bibliography: ARTICLES (continued)

1983, and Womack, S. H., Coal stratigraphy of the deeper part of the Black Warrior basin in Alabama: Gulf Coast Association of Geological Societies Transactions, v. 33, p. 439-446.

1983, Basement-cover relations in the Appalachian fold and thrust belt: Geological Journal, v. 18, p. 267-276.

1984, and Neathery, T.L., Osborne, O.E., Szabo, M.W., Groshong, R.H., Jr., and Ferrill, B.A., Appalachian thrust belt in Alabama: Alabama Geological Society, Twenty-first Annual Field Trip Guidebook, 44 p.

1984, Carboniferous tectonic framework of the continental margin of southeastern North America: Compte Rendu, Ninth International Congress on Carboniferous Stratigraphy and Geology, v. 3, p. 291-302.

1985, The Appalachian-Ouachita connection: Paleozoic orogenic belt at the southern margin of North America: Annual Review of Earth and Planetary Sciences, v. 13, p. 175-199.

1985, Northern Alabama sections, in Woodward, N.B., ed., Valley and Ridge thrust belt: Balanced structural sections, Pennsylvania to Alabama (Appalachian Basin Industrial Associates): University of Tennessee Department of Geological Sciences Studies in Geology 12, p. 54-61.

1986, A Paleozoic synsedimentary structure in the Appalachian fold-thrust belt in Alabama, in McDowell, R. C., and Glover, L., III, eds., The Lowry volume: Studies in Appalachian geology: Virginia Tech Department of Geological Sciences Memoir 3, p. 1-12.

1986, and Neathery, T. L., Ferrill, B. A., and Osborne, W. E., Appalachian thrust belt, Alabama: Field Trip Guidebook, American Association of Petroleum Geologists 1986 Annual Meeting, Atlanta, Georgia.

1986, Sequatchie anticline, the northwesternmost structure of the Appalachan fold-thrust belt in Alabama: Geological Society of America Field Guide, v. 6, p. 177-180.

1986, and Bearce, D. N., Birmingham anticlinorium in the Appalachian fold-thrust belt, basement fault system, synsedimentary structure, and thrust ramp: Geological Society of America Centennial Field Guide, v. 6, p. 191-200.

1986, and Drahovzal, J. A., The Coosa deformed belt, thin imbricate thrust slices in the Appalachian fold-thrust belt in Alabama: Geological Society of America Centenniel Field Guide, v. 6, p. 173-174.

1986, and Neathery, T. L., Murphrees Valley anticline, a southeast-verging anticline in the Appalachian fold-thrust belt in Alabama: Geological Society of America Centennial Field Guide, v. 6, p. 175-176.

Bibliography: ABSTRACTS

1965, The Ouachita influence on Mississippian facies in Alabama: Journal of the Alabama Academy of Science, v. 36, p. 179-180.

1966, Slump structures as evidence of Late Mississippian folding, Birmingham anticlinorium, Alabama: program for annual meeting, Southeastern Section, Geological Society of America, p. 43-44.

1967, Stratigraphic and structural continuity of the Appalachian and Ouachita Mountains: program for annual meeting, Southeastern Section, Geological Society of America, p. 56.

1967, Mississippian formations and zones in Alabama: Journal of the Alabama Academy of Science, v. 38, p. 343.

1968, Late Mississippian stratigraphy and tectonic framework in Alabama: program for annual meeting, Southeastern Section, Geological Society of America, p. 71.

1969, Appalachian-Ouachita structural salients and clastic wedges: common genesis?: Geological Society of America Abstracts with Programs for 1969, Part 7, p. 223-224.

1970, Paleozoic stratigraphy of Mississippi: Geological Society of America Abstracts with Programs, v. 2, p. 244.

1970, and Bearce, D. N., and Drahovzal, J. A., Paleozoic folding of the Birmingham anticlinorium, Alabama: Geological Society of America Abstracts with Programs, v. 2, p. 703-704.

1971, Structure of the buried southwestern Appalachian system beneath the Gulf coastal plain: Geological Society of America Abstracts with Programs, v. 3, p. 351-352.

1971, and Drahovzal, J. A., A small-scale imbricate thrust belt in the Alabama Appalachians: Geological Society of America Abstracts with Programs, v. 3, p. 351.

1972, Converging clastic wedges in the Mississippian of Alabama: Geological Society of America Abstracts with Programs, v. 4, p. 109-110.

1973, An interpretation of Ouachita-Appalachian regional structures: Geological Society of America Abstracts with Programs, v. 5, p. 283-284.

1975, Appalachian-Ouachita structure and plate tectonics: Geological Society of America Abstracts with Programs, v. 7, p. 543-544.

1975, and Waag, C. J., Penecontemporaneous structures in Paleozoic rocks of central Mississippi: Geological Society of America Abstracts with Programs, v. 7, p. 544.

Bibliography: ABSTRACTS (continued)

1976, Salients, recesses, and transform faults in the Appalachian-Ouachita continental margin: Geological Society of America Abstracts with Programs, v. 8, p. 285-286.

1976, with Drahovzal, J. A., Cross-strike structural discontinuities in the Appalachians of Alabama: Geological Society of America Abstracts with Programs, v. 8, p. 165.

1978, Tectonics of the Appalachian-Ouachita continental margin: Geological Society of America Abstracts with Programs, v. 10, p. 200.

1978, Basement structures along the Appalachian-Ouachita continental margin: Program, 3rd International Conference on Basement Tectonics, p. 49.

1979, Carboniferous tectonic framework of the continental margin of southeastern North America: Abstracts of Papers, 9th International Congress of Carboniferous Stratigraphy and Geology, p. 213.

1980, and Tull, J. F., Bearce, D. N., Russell, Gail, and Odom, A. L., Geologic synthesis of the southernmost Appalachians, Alabama and Georgia: Virginia Polytechnic Institute Department of Geological Sciences, Memoir 2, p. A6-A7.

1980, Paleogeologic map of Paleozoic Appalachian-Ouachita orogen beneath the Mesozoic-Cenozoic Gulf Coastal Plain: Virginia Polytechnic Institute Department of Geological Sciences, Memoir 2, p. A18-A19.

1980, with Mack, G. H., and James, W. C., Provenance of Hartselle and Parkwood sandstones (Mississippian), northern Alabama: Geological Society of America Abstracts with Programs, v. 12, p. 183.

1980, and Mack, G. H., Mississippian Hartselle barrier island and shelf bar complex, Alabama: Geological Society of America Abstracts with Programs, v. 12, p. 210.

1980, with Tull, J. F., Stratigraphic and structural transition between the external fold and thrust belt and the internal metamorphic belt in the southern Appalachians: Geological Society of America Abstracts with Programs, v. 12, p. 210.

1980, with Tull, J. F., Stratigraphic and structural transition between the external fold and thrust belt and the internal metamorphic belt in the southern Appalachians: Abstracts, 26th International Geological Congress, Paris, v. 1, p. 296.

1980, Evolution of embayments and promontories of the continental margin: Geological Society of America Abstracts with Programs, v. 12, p. 535.

Bibliography: ABSTRACTS (continued)

1981, with Neathery, T. L., The Talladega Slate Belt beneath the Gulf Coastal Plain: Geological Society of America Abstracts with Programs, v. 13, p. 31.

1981, Basement-cover relationships in the Appalachian fold and thrust belt: Terra Cognita, v. 1, p. 78.

1981, Stratigraphy of Mississippian-Pennsylvanian rocks in the southern Appalachians and Black Warrior basin: Geological Society of America Abstracts with Programs, v. 13, p. 566.

1981, with Neathery, T. L., and Tull, J. F., Geodynamics transect of the southernmost exposed Appalachians: Geological Society of America Abstracts with Programs, v. 13, p. 518.

1982, Paleozoic tectonic framework of eastern North America: Geological Society of America Abstracts with Programs, v. 14, p. 90.

1982, Time of orogeny from the perspective of clastic wedges: Geological Society of America Abstracts with Programs, v. 14, p. 90.

1982, Synsedimentary structures in the Appalachian fold and thrust belt: Geological Society of America Abstracts with Programs, v. 14, p. 90.

1982, Paleozoic stratigraphy and structure east of the Ouachita Mountains: Geological Society of America Abstracts with Programs, v. 14, p. 138.

1982, Structure and stratigraphy of the southern Appalachian fold and thrust belt: Geological Society of America Abstracts with Programs, v. 14, p. 630.

1982, Regional geology and aeromagnetic map of the southern United States: Geological Society of America Abstracts with Programs, v. 14, p. 631.

1982, Tectonic evolution of the eastern Ouachita-southern Appalachian orogen: Geological Society of America Abstracts with Programs, v. 14, p. 631.

1982, with Martin, R. G., and Moore, G. T., Hall, D. J., and Hall, S. A., Transect across deep Gulf of Mexico basin from southern Appalachians to Cuba: transect F2: Geological Society of America Abstracts with Programs, v. 14, p. 557.

1983, and Hatcher, R. D., Jr., Effects of older basement structures on mechanics of thrusting: Geological Society of America Abstracts with Programs, v. 15, p. 1.

Bibliography: ABSTRACTS (continued)

1983, Paleozoic and Mesozoic continental margins of southern North America: Geological Society of America Abstracts with Programs, v. 15, p. 183.

1983, with Viele, G. W., Tectonic history of Mississippi embayment and surrounding areas: American Association of Petroleum Geologists Bulletin, v. 67, p. 1460.

1983, and Womack, S. H., Coal stratigraphy of deeper part of Black Warrior basin in Alabama: American Association of Petroleum Geologists Bulletin, v. 67, p. 1473.

1983, The Black Warrior foreland basin: Geological Society of America Abstracts with Programs, v. 15, p. 706.

1984, Tectonic evolution of southern margin of North America: Travaux des Laboratoires des Sciences de la Terre, St. Jerome, Marseille, no. 24, p. 42.

1984, with Dennison, J. M., Sedimentary cover: Travaux des Laboratoires des Sciences de la Terre, St. Jerome, Marseille, no. 24, p. 33.

1984, and Groshong, R. H., Jr., Genetic relation of the Appalachian-Ouachita orogenic belt to structures of the adjacent craton: Geological Society of America Abstracts with Programs, v. 16, p. 202.

1984, and students of University of Alabama seminar in geology, Cross sections of the Appalachian fold and thrust belt in Alabama: Geological Society of America Abstracts with Programs, v. 16, p. 202.

1984, with Drahovzal, J. A., and Hertig, S. P., Basement faults and cover tectonics in southernmost Appalachians: American Association of Petroleum Geologists Bulletin, v. 68, p. 471-472.

1985, with Ferrill, B. A., Devonian stratigraphy of the Appalachians: Geological Society of America Abstracts with Programs, v. 17, p. 581.

1985, with Hines, R. A., Carboniferous stratigraphy of the Appalachians: Geological Society of America Abstracts with Programs, v. 17, p. 611.

1986, Late Precambrian and early Paleozoic rifting history of the southern margin of North America: Geological Society of America Abstracts with Programs, v. 18, p. 268.

1986, Evolution of subsurface Appalachian-Ouachita fold-thrust belt beneath Gulf Coastal Plain: American Association of Petroleum Geologists Bulletin, v. 70, p. 655.

Bibliography: ABSTRACTS (Continued)

1986, with Hines, R A., Upper Mississippian clastic sedimentation in the Black Warrior basin, Alabama and Mississippi: Society of Economic Mineralogists and Paleontologists Annual Mid-year Meeting Abstracts, v. 3, p. 42.

1986, Early Paleozoic southern margin of North America: Geological Society of America Abstracts with Programs, v. 18, p. 772.

1986, with Ferrill, B. A., Acadian wrench tectonics in the southern Appalachians: Geological Society of America Abstracts with Programs, v. 18, p. 600-601.

1986, with Martin, R. G., and Hall, S. A., Transect F-2: Mississippi to Cuba: Geological Society of America Abstracts with Programs, v. 18, p. 684.

1986, with Martin, R. G., and Hall, S. A., Late Paleozoic suture and accreted terrane in southwestern Alabama: Transect F2: Geological Society of America Abstracts with Programs, v. 18, p. 684.

Bibliography: BOOK REVIEWS

1973, Review of Stratigraphic Oil and Gas Fields, R. E. King, editor, American Association of Petroleum Geologists Memoir 16: Economic Geology, v. 68, p. 417.

1984, Review of Geology of the North Atlantic borderlands, J. W. Kerr and A. J. Fergusson, editors, Canadian Society of Petroleum Geologists Memoir 7: Geology, v. 12, p. 448.

UNPUBLISHED MANUSCRIPTS AND REPORTS:

1957, Stratigraphy of the Devonian Chaffee Formation of northeastern Gunnison County, Coloradol [M.S. thesis]: University of Kentucky, 84 p.

1960, Upper Mississippian stratigraphy of southwestern Virginia, southern West Virginia, and eastern Kentucky [Ph.D. thesis]: Virginia Polytechnic Institute, 322 p.

1982, Coal stratigraphy of the deeper Black Warrior basin and the Cahaba and Coosa synclines: Final report, project G5114012, Office of Surface Mining (Alabama Mineral Resources Institute). 322 p.

Willard E. Ward, II

Professional Summary

PERSONAL DATA

Born:	December 15, 1949, Tuscaloosa, Alabama
Business Address:	Geological Survey of Alabama P.O. Box O Tuscaloosa, AL 35486 205/349-2852
Home Address:	1009 Myrtlewood Drive Tuscaloosa, AL 35401

ACADEMIC BACKGROUND

B.S. in Geology, University of Alabama, 1972
M.S. in Geology, University of Alabama, 1977

AREAS OF EXPERTISE

A. Coal Geology
B. Fracture patterns in the Warrior coal basin

PROFESSIONAL WORK EXPERIENCE

A. Present Position: Geologist II, Energy Resources Division, Geological Survey of Alabama (3/80 - Present).

Named head of Coal Section in Energy Resources Division in October 1986.

Assessed coal deposits and relationships in Blount and Walker Counties, Alabama.

Designed format for mapping the coal deposits on 7.5-minute quadrangles in the Warrior coal basin.

Served as coordinator between National Coal Resources Data System (NCRDS) and coal bed data collection projects.

Served as GSA principal investigator for a 4-year cooperative drilling and mapping program in the Warrior coal basin.

B. Geologist I, Energy Resources Division, Geological Survey of Alabama (5/75-3/80).

Served as principal investigator on cooperative project with the Bureau of Mines to investigate fracture patterns in the Warrior coal basin.

Principal investigator in cooperative study with Bureau of Mines and Department of Energy to assess coal resources in Alabama.

C. Scientific Aide III, Energy Resources Division, Geological Survey of Alabama (9/73-5/75).

Co-authored popular report on coal in Alabama.

Conducted limited field mapping of coal deposits in Marion County, Alabama.

PROFESSIONAL SOCIETIES

Alabama Geological Society

PUBLICATIONS

Reports, Monographs, Brochures, Pamphlets, Bulletins

Ward, W. E., II, 1987, Coal occurrence and general geology in the Jasper 7.5-minute quadrangle, Walker County, Alabama: Alabama Geological Survey Special Map (in review).

Ward, W. E., II, 1987, Coal occurrence and general geology in the Nauvoo 7.5-minute quadrangle, Walker and Winston Counties, Alabama: Alabama Geological Survey Special Map 186, 39 p. (in review).

Ward, W. E., II, 1986, Coal occurrence and general geology in the Carbon Hill 7.5-minute quadrangle, Walker and Winston Counties, Alabama: Alabama Geological Survey Special Map 150, 52 p.

Ward, W. E., II, Barnett, R. L., and Rheams, L. J., 1986, Coal resources of Walker County, Alabama: Alabama Geological Survey Special Map 205, 30 p., 13 pls. (in press).

Ward, W. E., II, Drahovzal, J. A., Evans, F. E., Jr., 1984, Fracture analyses in a selected area of the Warrior coal basin, Alabama: Alabama Geological Survey Circular 111, 178 p.

Ward, W. E., II, 1984, Reserve base bituminous coal and lignite in Alabama: Alabama Geological Survey Circular 118, 102 p.

Horsey, C. A., Carnevale, M. J., Hall, R. W., U.S. Geological Survey, and Ward, W. E., II, Alabama Geological Survey, 1984, Lithologic logs of 1981-82 coal drilling in the Warrior coal field, Tuscaloosa, Fayette, and Walker Counties, Alabama: Bureau of Land Management Open-file report, 151 p.

Carnevale, M. J., and Hall, R. W., U.S. Geological Survey, and Ward, W. E., II, Alabama Geological Survey, 1984, Geochemical results of 1981-82 coal drilling in the Warrior coal field, Tuscaloosa, Fayette, and Walker Counties, Alabama: Bureau of Land Management Open-file report, 25 p.

Ward, W. E., II, and Gillette, B., 1983, Compilation of coal quadrangle maps, Warrior basin, Alabama--Coal data listing and coal bed chemical analyses: Alabama Geological Survey Open-file report.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Plateau coal region, Rome Quadrangle, Alabama: Alabama Geological Survey Special Map 181A.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Cahaba coal field, and the Coosa coal field, Birmingham South Quadrangle, Alabama: Alabama Geological Survey Special Map 181B.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Plateau coal region, Haleyville Quadrangle, Alabama: Alabama Geological Survey Special Map 181C.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Cahaba coal field, Tuscaloosa Quadrangle, Alabama: Alabama Geological Survey Special Map 181D.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin, Cahaba coal field, and Plateau coal region, Birmingham North Quadrangle, Alabama: Alabama Geological Survey Special Map 181E.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Plateau coal region, Huntsville and Chickamauga Quadrangles, Alabama: Alabama Geological Survey Special Map 181F.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Plateau coal region, Guntersville Quadrangle, Alabama: Alabama Geological Survey Special Map 181G.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin, Jasper Quadrangle, Alabama: Alabama Geological Survey Special Map 181H.

Hall, R. W., Law, R., Markewich, W., and Horsey, C. A., U.S. Geological Survey, and Ward, W. E., II, and Barnett, R. L., Alabama Geological Survey, 1981, Geophysical and lithological logs of 1980-81 coal drilling in the Warrior coal field, Tuscaloosa, Fayette, and Walker Counties, Alabama: U.S. Geological Survey Open-file Report 81-____.

Ward, W. E., II, and Musgrove, C. G., 1978, Geology and coal resources of coal-bearing rocks in Jefferson County, Alabama, in Stratigraphy and structure of the Birmingham area, Jefferson County, Alabama: Alabama Geological Society Guidebook, 16th Annual Field Trip, p. 68-86.

Ward, W. E., II, and Evans, F. E., Jr., 1975, Coal--its importance to Alabama: Alabama Geological Survey Information Series 53, 26 p.

Thesis

Ward, W. E., II, 1977, Jointing in a selected area of the Warrior coal field: University of Alabama unpublished M.S. thesis, 61 p.

Gary V. Wilson

Professional Summary

February 1987

PERSONAL

Born July 11, 1945, Fairfield, Alabama

Business address: State Oil and Gas Board of Alabama
420 Hackberry Lane
P.O. Box O
Tuscaloosa, Alabama 35486-9780
205/349-2852

Home address: 4802 Peartree Court
Tuscaloosa, Alabama 35405
205/553-1888

ACADEMIC BACKGROUND

B.S. Geology, Birmingham Southern College, 1968

AREAS OF EXPERTISE

A. Petroleum geology
B. Subsurface stratigraphy and structural geology
C. Geophysical techniques of subsurface investigation

PROFESSIONAL WORK EXPERIENCE

A. Present Position: Assistant State Oil and Gas Supervisor and Chief of the Geology Division, State Oil and Gas Board of Alabama (May 1982 to Present).

Administrative responsibilities for the Geology Division and technical advisor to the State Oil and Gas Supervisor.

Technical review and evaluation of the geologic maps, cross-sections and other data on oil and gas fields in Alabama as submitted to the State Oil and Gas Board.

Compile, review and evaluate the geological and geophysical data derived from the drilling and logging of oil and gas test wells.

Studies of the subsurface stratigraphy and structural geology of the oil and gas fields of Alabama.

Subsurface investigations and assessments of the undeveloped natural resources of Alabama.

B. Geologist and Geophysicist, Geological Survey of Alabama (May 1968-May 1982).

Supervised acquisition and processing of gravity, magnetic and resistivity field data.

Interpreted geophysical data and prepared maps and reports.

Microscopic examinations of rock cuttings and cores from oil and gas test wells.

Interpretation and correlation of wire-line geophysical logs from oil and gas test wells. Made determinations of formation tops, lithologies, facies changes, and fault locations and displacements.

Conducted regional subsurface studies of the stratigraphy and structural geology of Gulf Coast basin and Warrior basin of Alabama. Prepared cross-sections and structure, isopach and isolith maps.

PROFESSIONAL SOCIETIES

Alabama Geological Society
Society of Exploration Geophysicists

PUBLICATIONS

Reports

Wilson, Gary V., 1987, Characteristics and resource evaluation of the bitumen and rock-asphalt deposits of northern Alabama: State Oil and Gas Board of Alabama (in press).

Wilson, Gary V., and Tew, Berry H., 1985, Geothermal data for southwest Alabama: Correlations to geology and potential uses: State Oil and Gas Board of Alabama Oil and Gas Report 10, 125 p.

Poe, Rebecca M., Wilson, Gary V., and Tolson, Janyth S., 1979, Oil and gas wells in Alabama: State Oil and Gas Board of Alabama Oil and Gas Report 2, 344 p.

Wilson, Gary V., 1973, Gravity survey of Lamar County, Alabama: Geological Survey of Alabama Circular 87, 29 p.

Kidd, Robert E., and Wilson, Gary V., 1971, Gravity survey of the Mobile Delta, Alabama: Geological Survey of Alabama Circular 74, 78 p.

Wilson, Gary V., Joiner, Thomas J., and Warman, James C., 1970, Evaluation, by test drilling, of geophysical methods used for ground-water development in the Piedmont area, Alabama: Geological Survey of Alabama Circular 65, 15 p.

Articles

Wilson, Gary V., 1984, Bitumen deposits of northwest Alabama: American Association of Petroleum Geologists, Research Conference on Exploration for Heavy Crude Oil and Bitumen, Santa Maria, California, 10 p.

Wilson, Gary V., and Thomas, Donald C., 1983, Geology and geochemistry of bituminous rocks in northern Alabama: Institute of Gas Technology, Synthetic Fuels from Oil Shale and Tar Sands Symposium, Louisville, Kentucky, 17 p.

Wilson, Gary V., 1982, Characteristics of tar sands of Alabama: Kentucky Geological Survey and University of Kentucky, National Tar Sands Symposium, Lexington, Kentucky, 16 p.

Wilson, G. V., Kidd, J. T., and Shannon, S. W., 1976, Relationships of surface and subsurface faults in Choctaw and Clarke Counties, Alabama, in Copeland, C. W., Newton, J. G., and Self, D. M. (eds.), Cretaceous and Tertiary faults in southwestern Alabama: Alabama Geological Society 14th Annual Field Trip Guidebook, p. 58-79.

Wilson, Gary V., 1975, Early differential subsidence and configuration of the northern Gulf Coast basin in southwest Alabama and northwest Florida: Gulf Coast Association of Geological Societies Transactions, v. 25, p. 196-206.

Abstracts

Hinkle, Frank, and Wilson, Gary V., 1982, The influence of geologic structures on the quality of shallow ground water in the lower Tombigbee-Mobile River corridor of southwest Alabama [abs.]: Geological Society of America, Abstracts with Programs, v. 14, no. 1, p. 26.

Wilson, Gary V., 1975, Gravity studies across lineaments mapped from ERTS imagery [abs.]: Geological Society of America, Abstracts with Programs, v. 7, no. 4, p. 550.

Contract Reports

Wilson, Gary V., 1983, Physical and chemical characteristics of Alabama tar sands: Geological Survey of Alabama, prepared for the Tennessee Valley Authority, Contract Report TVA/OP/EDT-83/11, 94 p.

Wilson, Gary V., Wang, George C., Mancini, Ernest A., and Benson, D. Joe, 1980, Assessment of the geothermal/geopressure potential of the Gulf Coastal Plain of Alabama: Geological Survey of Alabama, prepared for the U.S. Department of Energy, Contract Report DE-AS05-79ET27015, 264 p.

Wilson, Gary V., 1978, Geology of the area of U.S. Steel's underground mines and deep disposal well, in Moore, James D., Potential problems with deep-well disposal at U.S. Steel, Fairfield, Alabama: Geological Survey of Alabama, Report prepared for U.S. Steel Corporation, p. 8-19.

Wilson, Gary V., 1974, Gravity studies across lineaments mapped from ERTS imagery, in Henry, Harold R. (Principal investigator), Investigations using data in Alabama from ERTS-A: University of Alabama, Bureau of Engineering Research, Final Report submitted to the National Aeronautics and Space Administration (Goddard Space Flight Center) under Contract No. NAS5-21876, v. 3, p. 452-498.

Wilson, Gary V., and Kidd, Robert E., 1972, Gravimetric study of a granite mass, west-central Randolph County, Alabama: Geological Survey of Alabama, Report prepared for Alabama Power Company, 26 p.

Special Maps

Moffett, T. B., Hinkle, Frank, Epsman, M. L., Wilson, G. V., and Moore, J. D., 1984, Configuration of the top of the Tuscaloosa Group in Alabama: Geological Survey of Alabama Special Map 199C.

Moffett, T. B., Hinkle, Frank, Epsman, M. L., and Wilson, G. V., 1984, Configuration of the top of the Selma Group in Alabama: Geological Survey of Alabama Special Map 199B.

Hinkle, Frank, Moffett, T. B., Epsman, M. L., Wilson, G. V., and Moore, J. D., 1983, Configuration of the top of the Eutaw Formation in Alabama: Geological Survey of Alabama Special Map 199A.

Epsman, M. L., Moffett, T. B., Hinkle, Frank, Wilson, G. V., and Moore, J. D., 1983, Depths to ground waters with approximately 10,000 milligrams per liter of total dissolved solids in parts of Alabama: Geological Survey of Alabama Special Map 198.

Smith, W. Everett, Wilson, Gary V., and Bearden, Bennett L., 1983, Energy resources of Alabama: Geological Survey of Alabama, Special Map 196 (with text).

Wilson, Gary V., 1982, Regional structure map of the Smackover Formation in southwest Alabama and northwest Florida: State Oil and Gas Board of Alabama Oil and Gas Special Map 3.

Wilson, Gary V., 1982, Regional isopach map of the Smackover Formation of southwest Alabama and northwest Florida: State Oil and Gas Board of Alabama Oil and Gas Special Map 4.

George, I. David, Clarke, Otis M., Jr., Kidd, Jack T., Wilson, Gary V., and Masingill, John H., 1978, Mineral resources of Fayette County, Alabama: Geological Survey of Alabama, Special Map 183, with basic data, 46 p.

Wilson, Gary V., 1971, Bouguer gravity map of Fayette County, Alabama: State Oil and Gas Board of Alabama Oil and Gas Special Map 5.

Wilson, Gary V., 1971, Vertical magnetic intensity map of Fayette County, Alabama: State Oil and Gas Board of Alabama Oil and Gas Special Map 6.

Kaiser, W. R., Ayers, W. B., Jr., and LaBrie, L. W., 1980, Lignite resources in Texas: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 104, 52 p.

Galloway, W. E., and Kaiser, W. R., 1980, Catahoula Formation of the Texas Coastal Plain: origin, geochemical evolution, and characteristics of uranium deposits: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 100, 81 p.

Kaiser, W. R., Cooper, H. B. H., Jr., Gautam, S., Mabray, J., and Saleh, D., 1978, The impact of coal utilization in Texas under the National Energy Plan: 71st Annual Meeting of the Air Pollution Control Association, Houston, Texas, 16 p.

Kaiser, W. R., 1978, Depositional systems in the Wilcox Group (Eocene) of east-central Texas and the occurrence of lignite, in Kaiser, W. R., ed., Proceedings, 1976 Gulf Coast Lignite Conference: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 90, p. 33-53.

Kaiser, W. R., 1978, Electric power generation from Texas lignite, in Gronhovd, G. H., and Kube, W. R., compilers, Technology and use of lignite: Grand Forks, North Dakota, Grand Forks Energy Research Center, U.S. Department of Energy, GFERC/IC-77/1, p. 328-358. Reprinted as The University of Texas at Austin, Bureau of Economic Geology Geological Circular 78-3, 18 p.

Kaiser, W. R., ed., 1978, Proceedings, 1976 Gulf Coast Lignite Conference: geology, utilization, and environmental aspects: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 90, 276 p.

Kaiser, W. R., 1978, The role of the university in lignite research and development, in Kaiser, W. R., ed., Proceedings, 1976 Gulf Coast Lignite Conference: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 90, p. 273-276.

Kaiser, W. R., Johnston, J. E., and Bach, W. N., 1978, Sand-body geometry and the occurrence of lignite in the Eocene of Texas, in Hodgson, H. E., ed., Proceedings, 2nd Rocky Mountain Coal Symposium: Colorado Geological Survey Resource Series 4, p. 67-87. Reprinted as The University of Texas at Austin, Bureau of Economic Geology Geological Circular 78-4, 19 p.

Kaiser, W. R., 1976, Calvert Bluff (Wilcox Group) sedimentation and the occurrence of lignite at Alcoa and Butler, Texas: The University of Texas at Austin, Bureau of Economic Geology Research Note 2, 10 p.

Kaiser, W. R., 1974, Texas lignite: near-surface and deep-basin resources: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 79, 70 p.

Articles

Ayers, W. B., Jr., and Kaiser, W. R., 1986, Regional depositional setting, resources, and quality of lignite in the Wilcox Group of East Texas and the Jackson Group of East and South Texas, in Finkelman, R. B., and Casagrande, D. J., eds., Geology of Gulf Coast lignites: Houston, Environmental and Coal Associates, guidebook prepared for Geological Society of America, 1986 Annual Meeting, Coal Geology Division field trip, p. 69-114.

Kaiser, W. R., 1986, Texas description of seams, in Keystone coal industry manual: New York, McGraw-Hill, p. 551-557.

Kaiser, W. R., 1985, Texas description of seams, in Keystone coal industry manual: New York, McGraw-Hill, p. 568-574.

Ayers, W. B., Jr., and Kaiser, W. R., 1984, Lacustrine-interdeltaic coal in the Fort Union Formation (Palaeocene), Powder River Basin, Wyoming and Montana, U.S.A.: International Association of Sedimentologists Special Publication 7, p. 61-84.

Edgar, T. F., and Kaiser, W. R., 1984, Resources, properties, and utilization of Texas lignite: a review, in Schobert, H. H., ed., The chemistry of low-rank coals: Washington, D.C., American Chemical Society Symposium Series 264, p. 53-76.

Fogg, G. E., Kaiser, W. R., Ambrose, M. L., and Macpherson, G. L., 1984, Regional aquifer characterization for deep-basin lignite mining, Sabine Uplift area, northeast Texas, in Kube, W. R., Sondreal, E. A., and Rao, C. D., eds., 12th Biennial Lignite Symposium: Technology and Utilization of Low-Rank Coals Proceedings: U.S. Department of Energy, Office of Fossil Energy, DOE/METC/84-13(DE84003070), v. 1, p. 364-389.

Kaiser, W. R., 1984, Predicting reservoir quality and diagenetic history in the Frio Formation (Oligocene) of Texas, in McDonald, D. A., and Surdam, R. C., eds., Clastic diagenesis: American Association of Petroleum Geologists Memoir 37, p. 195-215.

Kaiser, W. R., 1984, Texas--description of seams, in Keystone coal industry manual: New York, McGraw-Hill, p. 595-601.

Fogg, G. E., Kaiser, W. R., Ambrose, M. L., and Macpherson, G. L., 1983, Regional aquifer characterization for deep-basin lignite mining, Sabine Uplift area, northeast Texas, in Proceedings, Sixth International Coal Utilization Exhibition & Conference: Houston, Industrial Presentations, Inc., v. 6, Lignite developments and utilization, p. 22-49.

Kaiser, W. R., 1982, Lignite depositional models, Texas Eocene: a regional approach to coal geology, in Schobert, H. H., comp., Proceedings, Basic Coal Science Workshop: U.S. Department of Energy, Grand Forks Energy Technology Center, and Texas A&M University, p. 9-67.

White, D. M., Kaiser, W. R., and Groat, C. G., 1982, Status of Gulf Coast lignite activity, in Kube, W. R., Sondreal, E. A., and White, D. M., compilers, Technology and use of lignite: Grand Forks, North Dakota, Grand Forks Energy Technology Center, U.S. Department of Energy, GFETC/IC-82/1 (DE82015926), p. 107-141.

Kaiser, W. R., and Richmann, D. L., 1981, Predicting diagenetic history and reservoir quality in the Frio Formation of Brazoria County, Texas, and Pleasant Bayou test wells, in Bebout, D. G., and Bachman, A. L., eds., Proceedings, Fifth U.S. Gulf Coast Geopressured-Geothermal Energy Conference: Baton Rouge, Louisiana State University, p. 67-74.

Edgar, T. F., Kaiser, W. R., Humenick, M. J., and Cooper, H. B. H., Jr., 1980, Technical, economic, and environmental factors for in situ gasification of Texas lignite, in Kube, W. R., and Gronhovd, G. H., compilers, Technology and use of lignite: Grand Forks, North Dakota, Grand Forks Energy Technology Center, U.S. Department of Energy, GFETC/IC-79/1 (CONF-79-0579), p. 207-231.

Kaiser, W. R., 1979, Geological factors in the in situ gasification of Texas lignites, in Proceedings, 1978 Gulf Coast Lignites Conference held at The Woodlands, Texas: NUS Corporation, Houston, p. 179-193.

van Rensburg, W. C. J., Cooper, H. B. H., Jr., Kaiser, W. R., and Spurr, S. H., 1979, Coal problems and prospects, in National energy policy issues: The University of Texas at Austin, Council on Energy Resources, June 1979, p. 115-134.

Kaiser, W. R., and Cooper, H. B. H., Jr., 1978, The impact of coal utilization in Texas under the National Energy Plan, in National energy policy: a continuing assessment: The University of Texas at Austin, Council on Energy Resources, January 1978, p. 121-181.

Edgar, T. F., Humenick, M. J., and Kaiser, W. R., 1978, Technical and environmental factors in underground coal gasification, in Energy and mineral resource recovery: American Nuclear Society and U.S. Department of Energy, CONF-770440, p. 20-27.

Edgar, T. F., Kaiser, W. R., and Thompson, T. W., 1977, Research on in situ gasification of Texas lignite at The University of Texas at Austin, in Shuck, L. A., ed., Proceedings, Second Annual Underground Coal Gasification Symposium: Morgantown Energy Research Center, Energy Research and Development Administration, Morgantown, West Virginia, MERC/SP-76-3, p. 90-95.

Edgar, T. F., and Kaiser, W. R., 1977, Resource development/utilization, the potential of in-situ lignite gasification in Texas, in Campbell, M. D., ed., Geology of alternate energy resources in the south-central United States: Houston Geological Society, p. 179-192.

Fisher, W. L., and Kaiser, W. R., 1974, Lignite: the other fuel of Texas: The University of Texas at Austin, Bureau of Business Research, Texas Business Review, v. 48, no. 4, p. 86-91.

Kaiser, W. R., 1974, East Texas iron ore and lignite, in Society of Economic Geologists Guide Book, Arkansas--Texas economic geology field trip: Little Rock, Arkansas Geological Commission, p. 19-47.

Kaiser, W. R., and Groat, C. G., 1973, Lignite geology, mining, and reclamation at Big Brown Steam Plant near Fairfield, Texas: Field Trip Guidebook for November 1973 Annual Meeting, Geological Society of America, Dallas, Texas, 21 p.

Abstracts

Ambrose, M. L., Kaiser, W. R., and Fogg, G. E., 1985, The use of ionic concentrations in mapping ground-water flow: Wilcox-Carrizo aquifer system (Paleogene), East Texas (abs.): Geological Society of America, Abstracts with Programs, v. 17, no. 7, p. 513.

Mukhopadhyay, P. K., Kaiser, W. R., Gormly, J. R., and Tewalt, S. J., 1985, Organic petrography and geochemistry of lower Tertiary coals of Texas and their relation to depositional environment (abs.): Society for Organic Petrology, second annual meeting, Abstracts and Program, p. 16.

Ambrose, M. L., Jackson, M. L. W., Kaiser, W. R., and Fly, D. J., 1984, Lignite occurrence in relation to depositional facies, Eocene Wilcox Group, Sabine Uplift area, East Texas--regional and local comparative studies (abs.): American Association of Petroleum Geologists Bulletin, v. 68, no. 4, p. 448.

Ayers, W. B., Jr., and Kaiser, W. R., 1984, Lacustrine-interdeltaic coal in Fort Union Formation (Paleocene), Powder River Basin, Wyoming (abs.): American Association of Petroleum Geologists Bulletin, v. 68, no. 7, p. 931.

Kaiser, W. R., and Ayers, W. B., Jr., 1984, Fluvial depositional architecture and lignite occurrence in the Wilcox Group (Eocene), Texas Gulf Coast Basin (abs.): Geological Society of America, Abstracts with Programs, v. 16, no. 6, p. 553.

Ambrose, M. L., Kaiser, W. R., and Fogg, G. E., 1983, Hydrochemical mapping of groundwater flow in the Wilcox-Carrizo aquifer, Sabine Uplift area, Texas (abs.): Geological Society of America, Abstracts with Programs, v. 15, no. 6, p. 514.

Fogg, G. E., Kaiser, W. R., Ambrose, M. L., and Macpherson, G. L., 1983, Regional aquifer characterization for deep-basin lignite mining in northeast Texas (abs.): Grand Forks, North Dakota, University of North Dakota, 12th Biennial international meeting on technology and utilization of low-rank coals, Final Schedule and Abstracts, p. 9-10.

Jackson, M. L. W., and Kaiser, W. R., 1983, The use of depositional systems in lignite exploration, Wilcox Group, Sabine Uplift area, Texas (abs.): Geological Society of America, Abstracts with Programs, v. 15, no. 6, p. 602.

Kaiser, W. R., and Morton, R. A., 1983, Brines, clay minerals, and equilibria: predicting diagenetic history and reservoir quality in Oligocene Frio Formation of Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 67, no. 3, p. 492.

Ayers, W. B., Jr., and Kaiser, W. R., 1982, Tongue River (Paleocene) depositional systems and the occurrence of coal in the Powder River Basin of Wyoming and Montana (abs.): International Association of Sedimentologists, 11th International Congress on Sedimentology, Abstracts, p. 56.

Kaiser, W. R., Bassett, R. L., and Morton, R. A., 1982, Brines, clay minerals, and equilibria: predicting diagenetic history and reservoir quality in Oligocene Frio Formation of Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 66, no. 9, p. 1445.

Kaiser, W. R., 1982, Predicting diagenetic history and reservoir quality in the Frio Formation (Oligocene) of Texas (abs.): International Association of Sedimentologists, 11th International Congress on Sedimentology, Abstracts, p. 119-120.

Kaiser, W. R., Magara, Kinji, Milliken, K. L., and Richmann, D. L., 1981, Petrography, water-rock interaction, and cap-rock distribution as potential indicators of secondary porosity in the Frio and Vicksburg Formations of Texas (abs.): Geological Society of America Abstracts with Programs, v. 13, no. 5, p. 240.

Kaiser, W. R., 1979, Gulf Coast lignite--status report (abs.): American Association of Petroleum Geologists Bulletin, v. 63, no. 9, p. 1604.

Kaiser, W. R., and Groat, C. G., 1977, Texas lignite (abs.): American Association of Petroleum Geologists Bulletin, v. 61, no. 5, p. 801-802.

Groat, C. G., and Kaiser, W. R., 1977, Texas lignite: utilization and geology (abs.): Geological Society of America Abstracts with Programs, v. 9, no. 1, p. 24.

Kaiser, W. R., 1976, Depositional systems in the Wilcox Group (Eocene) of East-Central Texas and the occurrence of lignite (abs.): South Texas Geological Society Bulletin, v. 17, no. 2, p. 6.

Kaiser, W. R., 1974, Sedimentology of Texas lignite (abs.): Corpus Christi Geological Society Bulletin, v. 15, no. 1, p. 2-3.

Kaiser, W. R., 1971, Cyclic sedimentation in the Middle Devonian of south-central Pennsylvania (abs.): Geological Society of America Abstracts with Programs, v. 3, no. 7, p. 616.

Contract Reports

Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, G. L., Ho, C. L., Holland, C. S., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Macpherson, G. L., Mahan, C. A.,

Mullin, A. H., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., 1984, Evaluating the geology and ground-water hydrology of deep-basin lignite in the Wilcox Group of East Texas: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for Texas Energy and Natural Resources Advisory Council under contract no. IAC(82-83)-0822, 257 p.

Kaiser, W. R., 1983, Predicting reservoir quality and diagenetic history in the Frio Formation (Oligocene) of Texas, in Morton, R. A., and others, Consolidation of geologic studies of geopressured geothermal resources in Texas: The University of Texas at Austin, Bureau of Economic Geology, 1982 annual report prepared for U.S. Department of Energy, Division of Geothermal Energy, under contract no. DE-AC08-79ET27111, p. 137-172.

Morton, R. A., Ewing, T. E., Kaiser, W. R., and Finley, R. J., 1983, Consolidation of geologic studies of geopressured/geothermal resources in Texas: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Department of Energy under contract no. DE-AC08-79ET27111, 195 p.

Tewalt, S. J., and Kaiser, W. R., 1983, Computerized calculation of lignite resources in Texas: a progress report: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Geological Survey under grant nos. 14-08-0001-G-639, 14-08-0001-A-0098, and 9420-0062, 21 p.

Kaiser, W. R., Ambrose, M. L., Ayers, W. B., Jr., Blanchard, P. E., Collins, G. F., Fogg, G. E., Gower, D. L., Ho, C. L., Jackson, M. L. W., Jones, C. M., Lewis, A. H., Mahan, C. A., Macpherson, G. L., Prouty, D. A., Tewalt, S. J., and Tweedy, S. W., 1983, Evaluating the geology and ground-water hydrology of deep-basin lignite in Texas: The University of Texas at Austin, Bureau of Economic Geology, interim report prepared for Texas Energy and Natural Resources Advisory Council under contract no. IAC(82-83)-0822, 130 p.

Edgar, T. F., Humenick, M. J., Kaiser, W. R., and Charbeneau, R. J., 1981, Environmental effects of in situ gasification of Texas lignite: Springfield, Virginia, National Technical Information Service PB81-171654 (EPA-600/57-81-035), 149 p.

Kaiser, W. R., Magara, Kinji, Milliken, K. L., and Richmann, D. L., 1981, Using presence of calcite cap rock in shales to predict occurrence of reservoirs composed of leached secondary porosity in the geopressured zone: annual report for the period June 1, 1980 - October 31, 1980: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for U.S. Department of Energy under contract no. DE-AC08-79ET27111, 31 p.

Tewalt, S. J., Garner, L. E., and Kaiser, W. R., 1981, Computerized calculation of lignite resources in Texas, report on phases 1 and 2: The University of Texas at Austin, Bureau of Economic Geology, report prepared for U.S. Geological Survey under grant no. 14-08-0001-G-639, 2 p.

Edgar, T. F., Kaiser, W. R., Thompson, T. W., Gray, K. E., and Humenick, M. J., 1977, In situ conversion of Texas lignite to synthetic fuels: The University of Texas at Austin, Department of Chemical Engineering, semi-annual report nos. 4 and 5 prepared for National Science Foundation-RANN Division.

Edgar, T. F., Kaiser, W. R., and Thompson, T. W., 1976, In situ conversion of Texas lignite to synthetic fuels: The University of Texas at Austin, Department of Chemical Engineering, semi-annual report no. 3 prepared for National Science Foundation-RANN Division.

Edgar, T. F., and Kaiser, W. R., 1975, In situ conversion of Texas lignite to synthetic fuels: The University of Texas at Austin, Department of Chemical Engineering, semi-annual report prepared for National Science Foundation-RANN Division.

Ledbetter, J. O., Kaiser, W. R., and Ripperger, E. A., 1975, Radioactive waste management by burial in salt domes: The University of Texas at Austin, Engineering Mechanics Research Laboratory, EMRL 1112, 82 p.

THESIS

The Late Mesozoic geology of the Pearse Peak Diorite--southwest Oregon: Madison, Wisconsin, University of Wisconsin, M.S. thesis, 75 p., 1962.

DISSERTATION

Delta cycles in the Middle Devonian of central Pennsylvania: Baltimore, Maryland, The Johns Hopkins University, Ph.D. dissertation, 183 p., 1972.

RESEARCH SUPPORT

Principal Investigator: Computerized calculation and characterization of lignite resources in Texas; U.S. Geological Survey, Branch of Coal Resources (1986, $36,000).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase IV; U.S. Geological Survey, Branch of Coal Resources (1982-1984, $86,143).

Principal Investigator: Hydrologic evaluation of deep-basin lignite; Texas Energy and Natural Resources Advisory Council (1981-1983, $718,431).

Principal Investigator: Cooperative program of coal resource assessment in parts of the State of Texas; U.S. Geological Survey, Branch of Coal Resources (1981-1983, $50,000).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase III; U.S. Geological Survey, Branch of Coal Resources (1981, $70,896).

Principal Investigator: Assessment of lignite exploitability in the deep basin of Texas; Texas Energy and Natural Resources Advisory Council (1980-1981, $80,008).

Co-Principal Investigator: Using presence of calcite cap rock in shales to predict occurrence of reservoirs composed of leached secondary porosity in the geopressured zone; U.S. Department of Energy, Division of Geothermal Research (1980-1981, $194,899).

Co-Principal Investigator: Estimation of uncertainty in coal resources and cost assessments; Texas Energy and Natural Resources Advisory Council (1979-1981, $230,783).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase II; U.S. Geological Survey, Branch of Coal Resources (1979-1980, $95,539).

Principal Investigator: Computerized calculation of lignite resources in Texas, Phase I; U.S. Geological Survey, Branch of Coal Resources (1979, $19,021).

Principal Investigator: Quadrangle evaluation of uranium favorability of the Amarillo Quadrangle; Bendix Field Engineering Corporation (1978-1980, $176,672).

Co-Principal Investigator: Environmental effects of in situ gasification of Texas lignite; Environmental Protection Agency (1978-1979, $56,967).

Principal Investigator: Lignite resources in Texas; Texas Energy Advisory Council (1978-1979, $46,111).

Co-Principal Investigator: Uranium potential of the Catahoula Formation, Texas--a stratigraphic, depositional, and geochemical evaluation: Phase II; Bendix Field Engineering Corporation (1977-1979, $67,887).

Co-Principal Investigator: In situ gasification of Texas lignite to synthetic fuel; National Science Foundation (1974-1977, $290,700).

Major contributor to research proposal: Preliminary evaluation of geothermal resources in South Texas; Atomic Energy Commission (1974, $26,000).

Co-Principal Investigator: Use of salt domes for radioactive waste disposal; Atomic Energy Commission (1974, $48,000).

RECENT PUBLIC LECTURES AND ADDRESSES

Geologic and hydrologic factors for lignite development: presented to Texas Mining and Reclamation Association, San Antonio, Texas, October 26, 1984.

Lignite geology, quality, and economics of development: presented to Austin Geological Society, Austin, Texas, December 5, 1983.

Mining in Central Texas: presented to Society of Mining Engineers of the American Institute of Mining, Metallurgical and Petroleum Engineers, South Texas Minerals Section, San Antonio, Texas, October 11, 1983.

Brines, clay minerals, and equilibria: predicting diagenetic history and reservoir quality in Oligocene Frio Formation of Texas: presented at AAPG Research Conference, Role of Clay Minerals in Hydrocarbon Exploration, Santa Fe, New

Mexico, October 13, 1982 (invited) and AAPG Annual Convention, Dallas, Texas, April 19, 1983 (invited).

SPECIAL LECTURING

Corporate Schools, Research Seminars

Environments of coal deposition, U.S. Geological Survey, Branch of Coal Resources, Reston, Virginia, February 25-26, 1982.

Environments of coal deposition, Phillips Coal Company, Tyler, Texas, July 31 - August 1, 1980.

CURRICULUM VITAE

MARK GREGORY STELTENPOHL

Alabama State Geological Survey
420 Hackberry Lane
Tuscaloosa, Alabama 35486
Office:(205) 349-2852, ext. 277

Born: July 20, 1955
Citizenship: USA
Marital status: Married
Home:(205) 752-5179

EDUCATION;

B.S., 1978, University of Alabama, Geology, Chemistry minor. Top Graduating Senior in Geology, 1978.

M.S., 1983, University of Alabama, Structure and Tectonics. Thesis: The structure and stratigraphy of the Ofoten Synform, north Norway.

Ph.D., 1985, University of North Carolina, Structure, Metamorphic Petrology, and Tectonics. Dissertation: The structural and metamorphic history of Skanland, north Norway, and its significance for tectonics in Scandinavia.

PROFESSIONAL EXPERIENCE;

Summer 1978: Fieldwork and geochemical lab studies on the Hillabee Massive Sulfide Complex, Alabama, for the Minerals Resources Institute.

Summer 1978: Field geologist employed by Geochemix.

August 1978-August 1980: Teaching assistant for structural geology, summer field camp, and physical geology classes, University of Alabama.

August 1980-August 1984: Teaching and research assistant, University of North Carolina.

August 1984-August 1985: Instructor/lecturer for mineralogy and structural geology, University of Tromso, Tromso, Norway. Research studies emphasizing Caledonian orogenesis.

August 1985-December 1985: Instructor/lecturer for structural geology, University of North Carolina.

January 1986-March 1986: Consulting geologist for Stonewall Gas and Oil Company, Virginia.

March 1986-May 1986: Exploration geologist for Texasgulf Minerals and Metals, Chapel Hill, North Carolina.

June 1986-Present: Structural geologist and petrologist for the Alabama State Geological Survey.

OTHER EXPERIENCE;

Participant in Penrose Conference, "Timing of orogenic activity in the Appalachian-Caledonian System," J.F. Tull and W.A. Thomas, conveners, Alexander City, Alabama, May 1981.

Participant in the Uppsala Caledonian symposium, IGCP Caledonide Project, Uppsala, Sweden, August 1981.

Participant in Norsk Geologisk Foreningen, a Scandinavian symposium on Caledonian tectonics, Tromso, Norway, January 1985.

RESEARCH FUNDING;

Graduate Research Council Fellow (1979-1980), $3800
Minerals Resources Institute Fellow (1979), $1500
Norwegian Research Council for Science and Humanities (NAVF) (1979), $1000
Graduate Research Council Summer Fellow (1979), $500
Sigma Xi (1979), $300
McCarthy Foundation Fellow (1981), $1000
Sigma Xi (1981-82), $475
Geological Society of America (1982), $750
Norwegian Geological Survey (NGU) (1983), $1000
Reynolds Foundation Fellow (1983), $3000
National Science Foundation (1984), $8906, not funded

PUBLICATIONS;

Steltenpohl, M.G., 1983, The structure and stratigraphy of the Ofoten Synform, north Norway (abs.): Geological Society of America Abstracts with Programs, v. 15, p. 65.

Steltenpohl, M.G., 1983, The tectonic significance of crossfolds and backfolds in the Norwegian Caledonides (abs.): Geological Society of America Abstracts with Programs, v. 15, p. 696.

Steltenpohl, M.G., and Bartley, J.M., 1984, Kyanite-grade metamorphism in the Evenes and Bogen Groups, Ofoten, north Norway: Norsk Geologisk Tiddskrift, v. 64, p. 21-26.

Steltenpohl, M.G., and Bartley, J.M., 1984, Statistical evaluation of P-T trajectories based on elemental partitioning geothermometers and geobarometers (abs.): Geological Society of America Abstracts with Programs, v. 16, p. 667.

Steltenpohl, M.G., Andresen, A., and Tull, J.F., 1985, Evidence for a lithostratigraphic correlation between the Salangen Group (Ofoten) and the Balsfjord Group (Troms) and its regional implications (abs.): Geolognytt, v. 20, p. 47.

Tull, J.F., Bartley, J.M., Hodges, K.V., Andresen, A., Steltenpohl, M.G., and White, J.M., 1985, The Caledonides in the Ofoten region (68-69N), north Norway: key aspects of tectonic evolution: in Gee, D.G., and Sturt, B.A., (eds.), The Caledonide Orogen-Scandinavia and Related Areas, Wiley-Interscience, New York, p. 553-569.

Steltenpohl, M.G., Andresen, A., and Tull, J.F., 1986, Lithologic correlation between the Evenes/Bogen Groups (Ofoten) and the Balsfjord Group (Troms): evidence for the Finnmarkian Unconformity, north Norway (abs.): Geological Society of America Abstracts with Programs, v. 18, p. 762.

Boyd, R., in press, Geology of the 1:50,000 Skjomen sheet, north Norway: Norges Geologisk Undersokelse, co-contributer.

Boyd, R., in press, Geology of the 1:50,000 Evenes sheet, north Norway: Norges Geologisk Undersokelse, co-contributer.

Steltenpohl, M.G., and Bartley, J.M., in press, Thermobarometric profile through the Caledonian nappe stack of western Ofoten, north Norway: Contributions to Mineralogy and Petrology.

Steltenpohl, M.G., in press, Tectonostratigraphy and tectonic evolution of the Skanland area, north Norway: Norges Geologisk Undersokelse.

Steltenpohl, M.G., and Moore, W.B., in press, Metamorphism in Alabama: Alabama State Geological Survey Bulletin.

Dean, L., Beg, M., Guthrie, G., Moore, W.B., Rheams, K.F., Steltenpohl, M.G., and Tew, B.N., in press, Minerals of Alabama: Alabama State Geological Survey

Steltenpohl, M.G., and Bartley, J.M., submitted, The tectonic significance of crossfolds and backfolds in the Norwegian Caledonides: Geological Society of America Bulletin.

Steltenpohl, M.G., submitted, Geology of the Pine Mountain Imbricate Thrust Zone, Opelika, Alabama (abs.): Geological Society of America Abstracts with Programs, Southeastern Section Meeting.

Steltenpohl, M.G., Andresen, A., and Tull, J.F., submitted, A lithologic correlation between the Evenes/Bogen Groups (Ofoten) and the Balsfjord Group (Troms): evidence for the Finnmarkian Unconformity: Norges Geologisk Undersokelse.

Steltenpohl, M.G., and Moore, W.B., submitted, Metamorphism and accretionary history of Alabama: Amer. Jour. Sci.

RESUME

William A. Thomas
Professor of Geology, The University of Alabama

Personal:

born July 23, 1936, at Berea, Kentucky
married Rachel Leach, 1957
children: Carolyn, 1959; Amy, 1962

Education:

B.S.	(Geology)	University of Kentucky	1956
M.S.	(Geology)	University of Kentucky	1957
Ph.D.	(Geology)	Virginia Polytechnic Institute	1960

Honorary Organizations:
Phi Beta Kappa
Sigma Xi
Sigma Gamma Epsilon

Experience:

1979-	University of Alabama, Department of Geology, Professor
1972-1979	Georgia State University, Department of Geology, Professor and Chairman of department
1970-1972	Queens College of City University of New York, Department of Earth and Environmental Sciences,
1970-1972	Associate Professor
1971-1972	Chairman of department
1963-1970	Birmingham-Southern College, Department of Geology,
1963-1968	Associate Professor
1968-1970	Professor
1967-1970	Chairman of department
1969-1970	Geological Survey of Alabama, Visiting Scientist
1959-1963	The California Company (now Chevron), geologist;
1959-1960	well evaluation and field development in Louisiana, Mississippi, and Florida
1960-1961	supervisory assistant, evaluation of field development wells and exploratory wells in Gulf Coast
1961-1963	exploration in subsurface Jurassic of north Louisiana
summer, 1957	The California Company, summer geologist; Devonian-Mississippian stratigraphy of southwest Montana
summer, 1956	The California Company, summer geologist; structural mapping in Cretaceous of northwest Colorado

Grants, fellowships, and contracts:

1956-57, University Fellowship for graduate study (M.S.), University of Kentucky.
1957-58-59, National Science Foundation Fellowship for graduate study (Ph.D.), Virginia Polytechnic Institute.
1959, Geological Society of America Penrose Bequest for dissertation research (Ph.D.), Virginia Polytechnic Institute.
1963-64, National Science Foundation, research director, Undergraduate Research Participation, Mississippian stratigraphy of central Alabama.
1964-66, The California Company, research contract, Mississippian stratigraphy of northern Alabama.
1969, Birmingham-Southern College, Faculty Research Fund, Paleozoic stratigraphy and structure between the Ouachita and Appalachian Mountains.
1969-70, Geological Survey of Alabama, research contract, Stratigraphy and structure of part of the Valley and Ridge province in Alabama.
1973-74, Geological Survey of Alabama, research contract, Geology of the Coosa deformed belt.
1978 (with Greg H. Mack), Georgia State University, Arts and Sciences Research Fund, Stratigraphy and depositional environments of Hartselle Sandstone in Alabama.
1980-82, Geological Survey of Alabama, research contract, Structural geology of the Coosa deformed belt in the Alabama Appalachians.
1980-82, Geological Survey of Alabama, research contract, Coal sampling.
1981-82, The University of Alabama Research Grants Committee, Depositional environments of Parkwood Formation, an ancient delta in central Alabama.
1981-82, Office of Surface Mining, Coal stratigraphy of the deeper Black Warrior basin and the Cahaba and Coosa synclines.
1981-84, National Science Foundation, Variation in time of orogeny along orogenic belts from the perspective of clastic wedges.
1981-83, National Science Foundation - University of Texas at Austin, North American continent-ocean transect program, on-land portion of transect F-2 in Alabama.
1983-86, National Science Foundation, Synsedimentary structures in foreland fold-thrust belts.
1984-85, The University of Alabama School of Mines and Energy Development, Geologic controls on coal-bed methane productivity.
1984-86, Conoco, Synsedimentary structural deformation in the fold-thrust belt of Alabama and west Georgia.
1985-87, Petroleum Research Fund of the American Chemical Society, Foreland basin evolution--sedimentation and tectonics.

Professional organizations:

Geological Society of America, Fellow
General Chairman, Annual Meeting in Atlanta, 1980
Special Publications Study Committee, Vice-Chairman 1980-81
Committee on Membership, Member 1981-83, Chairman 1982-83
Editor, Geological Society of America Bulletin, 1981-
Committee on Publications, Member 1981- , Chairman 1985-
Committee on Committees, Member 1983
Councilor, 1984-1986
American Association of Petroleum Geologists
Committee on Governmental Affairs, Communicator 1975-83
Technical Program Coordinator, Annual Meeting in Atlanta, 1986
Alabama Geological Society, Charter Member
Editor, 1964-66
Secretary, 1966-67
Vice-President, 1967-68
President, 1968-69
Society of Economic Paleontologists and Mineralogists

Professional activities:

1962-63, lecturer, Mississippi Petroleum Committee, Senior Petroleum Scientists High School Visitation Program.
1965, leader, Annual Field Trip of Alabama Geological Society; Structural development of the southernmost Appalachians.
1966, participant, National Science Foundation, summer conference; Stratigraphy and structure of the Appalachians.
1967, stop-discussion leader, Annual Field Trip of Coal Division, Geological Society of America; Carboniferous detrital rocks in northern Alabama.
1967, stop-discussion leader, Annual Field Trip of Alabama Geological Society; Mississippian sediments in northern Alabama and south-central Tennessee.
1968, participant, National Science Foundation, summer conference; Geology of the Canadian Rockies.
1969, participant, National Science Foundation, summer conference; Geology of the Basin and Range.
1969, stop-discussion leader, Annual Field Trip of Alabama Geological Society; The Appalachian structural front in Alabama.
1971, leader (substitute for Byron N. Cooper), field trip, Southeastern Section of Geological Society of America; Appalachian structural and topographic front between Narrows and Beckley, Virginia and West Virginia.
1971, participant, National Science Foundation, summer conference; Geology of the Colorado Plateau.
1972, participant, Geological Society of America, Penrose Conference; Geology and geophysics of the northern Appalachians.
1973, stop-discussion leader, Annual Field Trip of Alabama Geological Society; Talladega metamorphic front.
1974, co-leader (and James A. Drahovzal), Annual Field Trip of Alabama Geological Society; The Coosa deformed belt in the Alabama Appalachians.
1976, participant, Geological Society of America, Penrose Conference; Late orogenic sedimentation and related tectonics in the Cordilleran and Appalachian orogens.
1977, stop-discussion leader, Annual Field Trip of Alabama Geological Society; Cambrian and Devonian stratigraphic problems of eastern Alabama.
1978, participant, Geological Society of America, Penrose Conference; Chronology of thrusting in orogenic terranes.
1979, participant and speaker, field trips and conference, International Geological Correlation Program - Caledonide Orogen Project; Caledonides in the USA.
1979, speaker, New York State Geological Association and New England Intercollegiate Geological Conference, Symposium; Sedimentary strata and tectonic movements.
1980, co-convenor (and Greg H. Mack), Symposium, Southeastern Section of Geological Society of America; Stratigraphy, sedimentology, and paleoecology of Mississippian-Pennsylvanian rocks.
1980, co-leader (and Greg H. Mack and Johnny A. Waters), field trip, Southeastern Section of Geological Society of America; Depositional setting of the Mississippian Hartselle Sandstone and lower Bangor Limestone in northwest Alabama.

Professional activities (continued):

1980, 1981, 1982, stop-discussion leader, American Association of Petroleum Geologists Field Seminar (John M. Dennison, leader); Paleozoic stratigraphy and Appalachian exploration trends.
1980, participant, Society of Economic Paleontologists and Mineralogists, Research Conference; Modern shelf and ancient cratonic sedimentation.
1980, co-leader (and Thornton L. Neathery), field trip, Geological Society of America Annual Meeting; Tectonic framework of the Appalachian orogen in Alabama.
1981, speaker and field trip leader, University of Alabama, Conference on Petroleum Geology of Alabama.
1981, co-convenor (and James F. Tull), Geological Society of America, Penrose Conference; Timing of orogenic activity in the Appalachian-Caledonian system.
1981, participant and speaker, field trips and conference, International Geological Correlation Program - Caledonide Orogen Project; Caledonides in Scandinavia.
1981, speaker, Appalachian Basin Industrial Associates, seminar.
1982, speaker, Conference on Aeromagnetic Mapping.
1982, co-convenor (and James F. Tull), Symposium, Southeastern and Northeastern Sections of Geological Society of America; Timing of orogenic events in the Appalachians.
1982, speaker, Appalachian Basin Industrial Associates, seminar.
1982, participant, North American Continent-Ocean Transects Program.
1982, co-convenor (and George W. Viele), Geological Society of America, Penrose Conference; Tectonic history of the Ouachita orogen.
1982, speaker, Alabama Geological Survey, Conference on Energy.
1982, speaker, field trip, Geological Society of America Annual Meeting; Geology of Ouachita Mountains.
1982, co-convenor (and George W. Viele), Symposium, Geological Society of America Annual Meeting; The Ouachita orogen.
1982, co-leader (and James F. Tull, Thornton L. Neathery, Greg H. Mack, and Benjamin A. Ferrill), field trip, Geological Society of America Annual Meeting; Appalachian thrust belt in Alabama: tectonics and sedimentation.
1983, speaker, Conference on Aeromagnetic Mapping.
1983, speaker, Appalachian Basin Industrial Associates, seminar.
1983, co-leader (and James F. Tull, Thornton L. Neathery, Benjamin A. Ferrill, W. Edward Osborne, and Michael W. Szabo), field trip, Gulf Coast Association of Geological Societies; Appalachian thrust belt in Alabama: tectonics and sedimentation.
1984, participant, Geological Society of America, Penrose Conference; The West African connection.
1984, co-convenor (and Wallace D. Lowry), Symposium, Southeastern and North-Central Sections of Geological Society of America; Tectonics and sedimentation of the southern Appalachians.
1984, co-convenor (and Laurence L. Sloss), Symposium, Southeastern and North-Central Section of Geological Society of America; Tectonics and sedimentation of the eastern North American craton.
1984, participant, North Atlantic Treaty Organization Advanced Studies Institute; Geological synthesis of the Caledonian rocks of the United Kingdom.

Professional activities (continued):

1984, speaker, International Geological Correlation Program - Caledonide Orogen Project; Caledonides in the British Isles.
1984, co-leader (and Thornton L. Neathery, W. Edward Osborne, Michael W. Szabo, Richard H. Groshong, Jr., and Benjamin A. Ferrill), Annual Field Trip of Alabama Geological Society; Appalachian thrust belt in Alabama.
1985, speaker (and R. G. Martin), Symposium, Cornell Program for the Study of the Continents; The structure and evolution of the Gulf of Mexico and surrounding regions.
1985, speaker, University of Alabama School of Mines and Energy Development, External Advisory Council.
1985, speaker, Appalachian Basin Industrial Associates, seminar.

Presented 36 papers at professional meetings:
Geological Society of America
Southeastern Section of Geological Society of America
South-Central Section of Geological Society of America
Northeastern Section of Geological Society of America
Gulf Coast Association of Geological Societies
Alabama Academy of Science
International Geological Correlation Program Conference
International Conference on Basement Tectonics
International Congress of Carboniferous Stratigraphy and Geology

Professional activities (continued):

Invited speaker at:
1968, Mississippi Geological Society
1969, Alabama Geological Society
University of North Carolina
1970, Louisiana State University
Queens College of City University of New York
1973, Auburn University
University of Georgia
1975, Georgia Institute of Technology
1977, West Georgia College
1978, University of Kentucky
1979, University of Georgia
University of Alabama
Florida State University
1980, Monmouth College (Visiting Distinguished Scholar)
1982, United States Geological Survey, Reston
University of Alabama at Birmingham
Texas A&M University
New Orleans Geological Society
1983, University of Texas at Austin
1984, American Institute of Mining Engineers, Alabama Chapter
University of Kentucky (McFarlan Lecturer)
Columbus College
University of New Orleans
1985, University of Oklahoma
University of Kentucky
Appalachian State University
Memphis State University

Reviewer of manuscripts and proposals for:
Geological Society of America Bulletin
American Journal of Science
National Science Foundation
Nuclear Regulatory Commission
Southeastern Geology
American Association of Petroleum Geologists Bulletin
Petroleum Research Fund of American Chemical Society
Georgia Geological Survey
Geological Survey of Alabama
Geology
Tectonics
Journal of Foraminiferal Research
International Conference on Basement Tectonics Proceedings

Bibliography: ARTICLES

1963, and Mann, C. J., Correlation chart of upper Cotton Valley sands: Shreveport Geological Society Reference Volume 5, p. 9-17.

1964, with Mann, C. J., Cotton Valley Group (Jurassic) nomenclature, Louisiana and Arkansas: Gulf Coast Association of Geological Societies Transactions, v. 14, p. 143-152.

1965 (editor), Structural development of the southernmost Appalachians: Alabama Geological Society, Third Annual Field Trip Guidebook, 69 p.

1965, Southernmost Appalachians: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 1-2.

1965, Ouachita influence on Mississippian lithofacies: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 23-28.

1965, and Copeland, C. W., Generalized stratigraphic sections: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 3-4.

1965, and Joiner, T. J., Attalla Conglomerate: Alabama Geological Society, Third Annual Field Trip Guidebook, p. 13-15.

1966, and Mann, C. J., Late Jurassic depositional environments, Louisiana and Arkansas: American Association of Petroleum Geologists Bulletin, v. 50, p. 178-182.

1966, Late Mississippian folding of a syncline in the western Appalachians, West Virginia and Virginia: Geological Society of America Bulletin, v. 77, p. 473-494.

1967, Mississippian facies in Alabama, in Ferm, J. C. and others, A field guide to Carboniferous detrital rocks in northern Alabama: Annual Field Trip Guidebook, Coal Division, Geological Society of America, p. 21-23.

1967, Mississippian stratigraphy of the Tennessee Valley, Alabama: Alabama Geological Society, Fifth Annual Field Trip Guidebook, p. 4-9.

1967, with Moser, P. H., Pre-Hartselle Mississippian sandstone in Colbert County, Alabama: Alabama Geological Society, Fifth Annual Field Trip Guidebook, p. 25-39.

1968, with Mann, C. J., The Ancient Mississippi River: Gulf Coast Association of Geological Societies Transactions, v. 18, p. 187-204.

1968, Contemporaneous normal faults on flanks of Birmingham anticlinorium, central Alabama: American Association of Petroleum Geologists Bulletin, v. 52, p. 2123-2136.

1969, and Bearce, D. N., Sequatchie anticline in north-central Alabama: Alabama Geological Society, Seventh Annual Field Trip Guidebook, p. 26-43.

Bibliography: ARTICLES (continued)

1971, Devonian stratigraphy north of the Uncompahgre Uplift, Colorado: Mountain Geologist, v. 8, p. 85-88.

1972, Regional Paleozoic stratigraphy in Mississippi between Ouachita and Appalachian Mountains: American Association of Petroleum Geologists Bulletin, v. 56, p. 81-106.

1972, Mississippian stratigraphy of Alabama: Alabama Geological Survey Monograph 12, 121 p.

1972, Regional Paleozoic stratigraphy in Mississippi between Ouachita and Appalachian Mountains: Replies to discussions by F. F. Mellen and S. W. Welch: American Association of Petroleum Geologists Bulletin, v. 56, p. 2459-2460 and 2462-2463.

1973, Southwestern Appalachian structural system beneath the Gulf Coastal Plain: American Journal of Science, Cooper Volume, v. 273A, p. 372-390.

1973, and Drahovzal, J. A., Regional Paleozoic stratigraphy of Alabama: Alabama Geological Society, Eleventh Annual Field Trip Guidebook, p. 66-91.

1974 (and Drahovzal, J. A., editors), The Coosa deformed belt in the Alabama Appalachians: Alabama Geological Society, Twelfth Annual Field Trip Guidebook, 98 p.

1974, and Drahovzal, J. A., A field guide to the Coosa deformed belt: Alabama Geological Society, Twelfth Annual Field Trip Guidebook, p. 1-43.

1974, and Drahovzal, J. A., Geology of the Coosa deformed belt: Alabama Geological Society, Twelfth Annual Field Trip Guidebook, p. 45-75.

1974, Converging clastic wedges in the Mississippian of Alabama: Geological Society of America Special Paper 148, p. 187-207.

1975, with Neathery, T. L., Pre-Mesozoic basement rocks of the Alabama coastal plain: Gulf Coast Association of Geological Societies Transactions, v. 25, p. 86-99.

1976, Evolution of Ouachita-Appalachian continental margin: Journal of Geology, v. 84, p. 323-342.

1977, Structural and stratigraphic continuity of the Ouachita and Appalachian Mountains: Arkansas Geological Commission, Symposium on the geology of the Ouachita Mountains, v. 1, p. 9-24.

1977, with Drahovzal, J. A., Pre-Mississippian sandstones in the interior structures of the Appalchian fold and thrust belt of eastern Alabama: Alabama Geological Society, Fifteenth Annual Field Trip Guidebook, p. 29-36.

Bibliography: ARTICLES (continued)

1977, and Drahovzal, J. A., Large-scale recumbent folding in the Valley and Ridge province of Alabama: Discussion: Geological Society of America Bulletin, v. 88, p. 1368-1371.

1977, Evolution of Appalachian-Ouachita salients and recesses from reentrants and promontories in the continental margin: American Journal of Science, v. 277, p. 1233-1278.

1979, Evolution of Appalachian-Ouachita salients and recesses from reentrants and promontories in the continental margin: Reply to discussion by Harold Williams and B. L. Doolan: American Journal of Science, v. 279, p. 95-96.

1979, and Cramer, H. R., The Mississippian and Pennsylvanian (Carboniferous) Systems in the United States - Georgia: U. S. Geological Survey Professional Paper 1110-H, 37 p.

1979, Mississippian stratigraphy of Alabama, in The Mississippian and Pennsylvanian (Carboniferous) Systems in the United States - Alabama and Mississippi: U. S. Geological Survey Professional Paper 1110-I, p. I1-I22. (also Alabama Geological Survey Reprint Series 49)

1980, and Tull, J. F., Bearce, D. N., Russell, G., and Odom, A. L., Geologic synthesis of the southernmost Appalachians, Alabama and Georgia: Virginia Polytechnic Institute Department of Geological Sciences, Memoir 2, p. 91-97.

1980, and Mack, G. H., and Waters, J. A., Depositional setting of the Mississippian Hartselle Sandstone and lower Bangor Limestone in northwest Alabama (Field trip number 2), in Tull, J. F., ed., Field trips for the Southeastern Section of the Geological Society of America, Birmingham, Alabama: Tuscaloosa, Alabama Geological Society, p. 29-44.

1980, and Mack, G. H., Barrier-island and shelf-bar sedimentation, Mississippian Hartselle Sandstone, northern Alabama, in Tull, J. F., ed., Field trips for the Southeastern Section of the Geological Society of America, Birmingham, Alabama: Tuscaloosa, Alabama Geological Society, p. 45-55.

1980, and Neathery, T. L., Tectonic framework of the Appalachian orogen in Alabama, in Frey, R. W., ed., Excursions in southeastern geology, v. 2, Geological Society of America 1980 Annual Meeting, Atlanta, Georgia: American Geological Institute, p. 465-526.

1981, Basement faults along the Appalachian-Ouachita continental margin: Proceedings of Third International Conference on Basement Tectonics, Basement Tectonics Committee Publication No. 3, p. 347-356.

1981, with Mack, G. H., and James, W. C., Orogenic provenance of Mississippian sandstones associated with southern Appalachian-Ouachita orogen: American Association of Petroleum Geologists Bulletin, v. 65, p. 1444-1456.

Bibliography: ARTICLES (continued)

1982, and Mack, G. H., Paleogeographic relationship of a Mississippian barrier-island and shelf-bar system (Hartselle Sandstone) in Alabama to the Appalachian-Ouachita orogenic belt: Geological Society of America Bulletin, v. 93, p. 6-19.

1982, and Tull, J. F., Timing of orogenic events in the Appalachian-Caledonian system: Penrose Conference report: Geology, v. 10, p. 485-486.

1982, Stratigraphy and structure of the Appalachian fold and thrust belt in Alabama, in Thomas, W. A., and Neathery, T. L., eds., Appalachian thrust belt in Alabama: tectonics and sedimentation (Field Trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, p. 55-66.

1982, (and Neathery, T. L., eds.), Appalachian thrust belt in Alabama: tectonics and sedimentation (Field Trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, 78 p.

1982, and Neathery, T. L., Appalachian thrust belt in Alabama, in Thomas, W. A., and Neathery, T. L., eds., Appalachian thrust belt in Alabama: tectonics and sedimentation (Field Trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, p. 1-3.

1982, and Tull, J. F., Neathery, T. L., Mack, G. H., and Ferrill, B. A., A field guide to the Appalachian thrust belt in Alabama: in Thomas, W. A., and Neathery, T. L., eds., Appalachian thrust belt in Alabama: tectonics and sedimentation (Field trip Guidebook, Geological Society of America 1982 Annual Meeting, New Orleans, Louisiana): Tuscaloosa, Alabama Geological Society, p. 5-40.

1983, Continental margins, orogenic belts, and intracratonic structures: Geology, v. 11, p. 270-272.

1983, and Viele, G. W., Tectonic history of the Ouachita orogen: Penrose Conference report: Geology, v. 11, p. 482-483.

1983, with Neathery, T. L., Geodynamics transect of the Appalachian orogen in Alabama, in Rast, N., and Delany, F. M., eds., Profiles of orogenic belts: American Geophysical Union, Geodynamics Series, v. 10, p. 301-307. (also Alabama Geological Survey Reprint Series 56)

1983, with Mack, G. H. and Horsey, C. A., Composition of Carboniferous sandstones and tectonic framework of southern Appalachian-Ouachita orogen: Journal of Sedimentary Petrology, v. 53, p. 931-946.

Bibliography: ARTICLES (continued)

1983, and Womack, S. H., Coal stratigraphy of the deeper part of the Black Warrior basin in Alabama: Gulf Coast Association of Geological Societies Transactions, v. 33, p. 439-446.

1983, Basement-cover relations in the Appalachian fold and thrust belt: Geological Journal, v. 18, p. 267-276.

1984, and Neathery, T.L., Osborne, O.E., Szabo, M.W., Groshong, R.H., Jr., and Ferrill, B.A., Appalachian thrust belt in Alabama: Alabama Geological Society, Twenty-first Annual Field Trip Guidebook, 44 p.

1984, Carboniferous tectonic framework of the continental margin of southeastern North America: Compte Rendu, Ninth International Congress on Carboniferous Stratigraphy and Geology, v. 3, p. 291-302.

1985, The Appalachian-Ouachita connection: Paleozoic orogenic belt at the southern margin of North America: Annual Review of Earth and Planetary Sciences, v. 13, p. 175-199.

1985, Northern Alabama sections, in Woodward, N.B., ed., Valley and Ridge thrust belt: Balanced structural sections, Pennsylvania to Alabama (Appalachian Basin Industrial Associates): University of Tennessee Department of Geological Sciences Studies in Geology 12, p. 54-61.

1986, A Paleozoic synsedimentary structure in the Appalachian fold-thrust belt in Alabama, in McDowell, R. C., and Glover, L., III, eds., The Lowry volume: Studies in Appalachian geology: Virginia Tech Department of Geological Sciences Memoir 3, p. 1-12.

1986, and Neathery, T. L., Ferrill, B. A., and Osborne, W. E., Appalachian thrust belt, Alabama: Field Trip Guidebook, American Association of Petroleum Geologists 1986 Annual Meeting, Atlanta, Georgia.

1986, Sequatchie anticline, the northwesternmost structure of the Appalachan fold-thrust belt in Alabama: Geological Society of America Field Guide, v. 6, p. 177-180.

1986, and Bearce, D. N., Birmingham anticlinorium in the Appalachian fold-thrust belt, basement fault system, synsedimentary structure, and thrust ramp: Geological Society of America Centennial Field Guide, v. 6, p. 191-200.

1986, and Drahovzal, J. A., The Coosa deformed belt, thin imbricate thrust slices in the Appalachian fold-thrust belt in Alabama: Geological Society of America Centenniel Field Guide, v. 6, p. 173-174.

1986, and Neathery, T. L., Murphrees Valley anticline, a southeast-verging anticline in the Appalachian fold-thrust belt in Alabama: Geological Society of America Centennial Field Guide, v. 6, p. 175-176.

Bibliography: ABSTRACTS

1965, The Ouachita influence on Mississippian facies in Alabama: Journal of the Alabama Academy of Science, v. 36, p. 179-180.

1966, Slump structures as evidence of Late Mississippian folding, Birmingham anticlinorium, Alabama: program for annual meeting, Southeastern Section, Geological Society of America, p. 43-44.

1967, Stratigraphic and structural continuity of the Appalachian and Ouachita Mountains: program for annual meeting, Southeastern Section, Geological Society of America, p. 56.

1967, Mississippian formations and zones in Alabama: Journal of the Alabama Academy of Science, v. 38, p. 343.

1968, Late Mississippian stratigraphy and tectonic framework in Alabama: program for annual meeting, Southeastern Section, Geological Society of America, p. 71.

1969, Appalachian-Ouachita structural salients and clastic wedges: common genesis?: Geological Society of America Abstracts with Programs for 1969, Part 7, p. 223-224.

1970, Paleozoic stratigraphy of Mississippi: Geological Society of America Abstracts with Programs, v. 2, p. 244.

1970, and Bearce, D. N., and Drahovzal, J. A., Paleozoic folding of the Birmingham anticlinorium, Alabama: Geological Society of America Abstracts with Programs, v. 2, p. 703-704.

1971, Structure of the buried southwestern Appalachian system beneath the Gulf coastal plain: Geological Society of America Abstracts with Programs, v. 3, p. 351-352.

1971, and Drahovzal, J. A., A small-scale imbricate thrust belt in the Alabama Appalachians: Geological Society of America Abstracts with Programs, v. 3, p. 351.

1972, Converging clastic wedges in the Mississippian of Alabama: Geological Society of America Abstracts with Programs, v. 4, p. 109-110.

1973, An interpretation of Ouachita-Appalachian regional structures: Geological Society of America Abstracts with Programs, v. 5, p. 283-284.

1975, Appalachian-Ouachita structure and plate tectonics: Geological Society of America Abstracts with Programs, v. 7, p. 543-544.

1975, and Waag, C. J., Penecontemporaneous structures in Paleozoic rocks of central Mississippi: Geological Society of America Abstracts with Programs, v. 7, p. 544.

Bibliography: ABSTRACTS (continued)

1976, Salients, recesses, and transform faults in the Appalachian-Ouachita continental margin: Geological Society of America Abstracts with Programs, v. 8, p. 285-286.

1976, with Drahovzal, J. A., Cross-strike structural discontinuities in the Appalachians of Alabama: Geological Society of America Abstracts with Programs, v. 8, p. 165.

1978, Tectonics of the Appalachian-Ouachita continental margin: Geological Society of America Abstracts with Programs, v. 10, p. 200.

1978, Basement structures along the Appalachian-Ouachita continental margin: Program, 3rd International Conference on Basement Tectonics, p. 49.

1979, Carboniferous tectonic framework of the continental margin of southeastern North America: Abstracts of Papers, 9th International Congress of Carboniferous Stratigraphy and Geology, p. 213.

1980, and Tull, J. F., Bearce, D. N., Russell, Gail, and Odom, A. L., Geologic synthesis of the southernmost Appalachians, Alabama and Georgia: Virginia Polytechnic Institute Department of Geological Sciences, Memoir 2, p. A6-A7.

1980, Paleogeologic map of Paleozoic Appalachian-Ouachita orogen beneath the Mesozoic-Cenozoic Gulf Coastal Plain: Virginia Polytechnic Institute Department of Geological Sciences, Memoir 2, p. A18-A19.

1980, with Mack, G. H., and James, W. C., Provenance of Hartselle and Parkwood sandstones (Mississippian), northern Alabama: Geological Society of America Abstracts with Programs, v. 12, p. 183.

1980, and Mack, G. H., Mississippian Hartselle barrier island and shelf bar complex, Alabama: Geological Society of America Abstracts with Programs, v. 12, p. 210.

1980, with Tull, J. F., Stratigraphic and structural transition between the external fold and thrust belt and the internal metamorphic belt in the southern Appalachians: Geological Society of America Abstracts with Programs, v. 12, p. 210.

1980, with Tull, J. F., Stratigraphic and structural transition between the external fold and thrust belt and the internal metamorphic belt in the southern Appalachians: Abstracts, 26th International Geological Congress, Paris, v. 1, p. 296.

1980, Evolution of embayments and promontories of the continental margin: Geological Society of America Abstracts with Programs, v. 12, p. 535.

Bibliography: ABSTRACTS (continued)

1981, with Neathery, T. L., The Talladega Slate Belt beneath the Gulf Coastal Plain: Geological Society of America Abstracts with Programs, v. 13, p. 31.

1981, Basement-cover relationships in the Appalachian fold and thrust belt: Terra Cognita, v. 1, p. 78.

1981, Stratigraphy of Mississippian-Pennsylvanian rocks in the southern Appalachians and Black Warrior basin: Geological Society of America Abstracts with Programs, v. 13, p. 566.

1981, with Neathery, T. L., and Tull, J. F., Geodynamics transect of the southernmost exposed Appalachians: Geological Society of America Abstracts with Programs, v. 13, p. 518.

1982, Paleozoic tectonic framework of eastern North America: Geological Society of America Abstracts with Programs, v. 14, p. 90.

1982, Time of orogeny from the perspective of clastic wedges: Geological Society of America Abstracts with Programs, v. 14, p. 90.

1982, Synsedimentary structures in the Appalachian fold and thrust belt: Geological Society of America Abstracts with Programs, v. 14, p. 90.

1982, Paleozoic stratigraphy and structure east of the Ouachita Mountains: Geological Society of America Abstracts with Programs, v. 14, p. 138.

1982, Structure and stratigraphy of the southern Appalachian fold and thrust belt: Geological Society of America Abstracts with Programs, v. 14, p. 630.

1982, Regional geology and aeromagnetic map of the southern United States: Geological Society of America Abstracts with Programs, v. 14, p. 631.

1982, Tectonic evolution of the eastern Ouachita-southern Appalachian orogen: Geological Society of America Abstracts with Programs, v. 14, p. 631.

1982, with Martin, R. G., and Moore, G. T., Hall, D. J., and Hall, S. A., Transect across deep Gulf of Mexico basin from southern Appalachians to Cuba: transect F2: Geological Society of America Abstracts with Programs, v. 14, p. 557.

1983, and Hatcher, R. D., Jr., Effects of older basement structures on mechanics of thrusting: Geological Society of America Abstracts with Programs, v. 15, p. 1.

Bibliography: ABSTRACTS (continued)

1983, Paleozoic and Mesozoic continental margins of southern North America: Geological Society of America Abstracts with Programs, v. 15, p. 183.

1983, with Viele, G. W., Tectonic history of Mississippi embayment and surrounding areas: American Association of Petroleum Geologists Bulletin, v. 67, p. 1460.

1983, and Womack, S. H., Coal stratigraphy of deeper part of Black Warrior basin in Alabama: American Association of Petroleum Geologists Bulletin, v. 67, p. 1473.

1983, The Black Warrior foreland basin: Geological Society of America Abstracts with Programs, v. 15, p. 706.

1984, Tectonic evolution of southern margin of North America: Travaux des Laboratoires des Sciences de la Terre, St. Jerome, Marseille, no. 24, p. 42.

1984, with Dennison, J. M., Sedimentary cover: Travaux des Laboratoires des Sciences de la Terre, St. Jerome, Marseille, no. 24, p. 33.

1984, and Groshong, R. H., Jr., Genetic relation of the Appalachian-Ouachita orogenic belt to structures of the adjacent craton: Geological Society of America Abstracts with Programs, v. 16, p. 202.

1984, and students of University of Alabama seminar in geology, Cross sections of the Appalachian fold and thrust belt in Alabama: Geological Society of America Abstracts with Programs, v. 16, p. 202.

1984, with Drahovzal, J. A., and Hertig, S. P., Basement faults and cover tectonics in southernmost Appalachians: American Association of Petroleum Geologists Bulletin, v. 68, p. 471-472.

1985, with Ferrill, B. A., Devonian stratigraphy of the Appalachians: Geological Society of America Abstracts with Programs, v. 17, p. 581.

1985, with Hines, R. A., Carboniferous stratigraphy of the Appalachians: Geological Society of America Abstracts with Programs, v. 17, p. 611.

1986, Late Precambrian and early Paleozoic rifting history of the southern margin of North America: Geological Society of America Abstracts with Programs, v. 18, p. 268.

1986, Evolution of subsurface Appalachian-Ouachita fold-thrust belt beneath Gulf Coastal Plain: American Association of Petroleum Geologists Bulletin, v. 70, p. 655.

Bibliography: ABSTRACTS (Continued)

1986, with Hines, R A., Upper Mississippian clastic sedimentation in the Black Warrior basin, Alabama and Mississippi: Society of Economic Mineralogists and Paleontologists Annual Mid-year Meeting Abstracts, v. 3, p. 42.

1986, Early Paleozoic southern margin of North America: Geological Society of America Abstracts with Programs, v. 18, p. 772.

1986, with Ferrill, B. A., Acadian wrench tectonics in the southern Appalachians: Geological Society of America Abstracts with Programs, v. 18, p. 600-601.

1986, with Martin, R. G., and Hall, S. A., Transect F-2: Mississippi to Cuba: Geological Society of America Abstracts with Programs, v. 18, p. 684.

1986, with Martin, R. G., and Hall, S. A., Late Paleozoic suture and accreted terrane in southwestern Alabama: Transect F2: Geological Society of America Abstracts with Programs, v. 18, p. 684.

Bibliography: BOOK REVIEWS

1973, Review of Stratigraphic Oil and Gas Fields, R. E. King, editor, American Association of Petroleum Geologists Memoir 16: Economic Geology, v. 68, p. 417.

1984, Review of Geology of the North Atlantic borderlands, J. W. Kerr and A. J. Fergusson, editors, Canadian Society of Petroleum Geologists Memoir 7: Geology, v. 12, p. 448.

UNPUBLISHED MANUSCRIPTS AND REPORTS:

1957, Stratigraphy of the Devonian Chaffee Formation of northeastern Gunnison County, Coloradol [M.S. thesis]: University of Kentucky, 84 p.

1960, Upper Mississippian stratigraphy of southwestern Virginia, southern West Virginia, and eastern Kentucky [Ph.D. thesis]: Virginia Polytechnic Institute, 322 p.

1982, Coal stratigraphy of the deeper Black Warrior basin and the Cahaba and Coosa synclines: Final report, project G5114012, Office of Surface Mining (Alabama Mineral Resources Institute). 322 p.

Willard E. Ward, II

Professional Summary

PERSONAL DATA

Born:	December 15, 1949, Tuscaloosa, Alabama
Business Address:	Geological Survey of Alabama P.O. Box O Tuscaloosa, AL 35486 205/349-2852
Home Address:	1009 Myrtlewood Drive Tuscaloosa, AL 35401

ACADEMIC BACKGROUND

B.S. in Geology, University of Alabama, 1972
M.S. in Geology, University of Alabama, 1977

AREAS OF EXPERTISE

A. Coal Geology
B. Fracture patterns in the Warrior coal basin

PROFESSIONAL WORK EXPERIENCE

A. Present Position: Geologist II, Energy Resources Division, Geological Survey of Alabama (3/80 - Present).

Named head of Coal Section in Energy Resources Division in October 1986.

Assessed coal deposits and relationships in Blount and Walker Counties, Alabama.

Designed format for mapping the coal deposits on 7.5-minute quadrangles in the Warrior coal basin.

Served as coordinator between National Coal Resources Data System (NCRDS) and coal bed data collection projects.

Served as GSA principal investigator for a 4-year cooperative drilling and mapping program in the Warrior coal basin.

B. Geologist I, Energy Resources Division, Geological Survey of Alabama (5/75-3/80).

Served as principal investigator on cooperative project with the Bureau of Mines to investigate fracture patterns in the Warrior coal basin.

Principal investigator in cooperative study with Bureau of Mines and Department of Energy to assess coal resources in Alabama.

C. Scientific Aide III, Energy Resources Division, Geological Survey of Alabama (9/73-5/75).

Co-authored popular report on coal in Alabama.

Conducted limited field mapping of coal deposits in Marion County, Alabama.

PROFESSIONAL SOCIETIES

Alabama Geological Society

PUBLICATIONS

Reports, Monographs, Brochures, Pamphlets, Bulletins

Ward, W. E., II, 1987, Coal occurrence and general geology in the Jasper 7.5-minute quadrangle, Walker County, Alabama: Alabama Geological Survey Special Map (in review).

Ward, W. E., II, 1987, Coal occurrence and general geology in the Nauvoo 7.5-minute quadrangle, Walker and Winston Counties, Alabama: Alabama Geological Survey Special Map 186, 39 p. (in review).

Ward, W. E., II, 1986, Coal occurrence and general geology in the Carbon Hill 7.5-minute quadrangle, Walker and Winston Counties, Alabama: Alabama Geological Survey Special Map 150, 52 p.

Ward, W. E., II, Barnett, R. L., and Rheams, L. J., 1986, Coal resources of Walker County, Alabama: Alabama Geological Survey Special Map 205, 30 p., 13 pls. (in press).

Ward, W. E., II, Drahovzal, J. A., Evans, F. E., Jr., 1984, Fracture analyses in a selected area of the Warrior coal basin, Alabama: Alabama Geological Survey Circular 111, 178 p.

Ward, W. E., II, 1984, Reserve base bituminous coal and lignite in Alabama: Alabama Geological Survey Circular 118, 102 p.

Horsey, C. A., Carnevale, M. J., Hall, R. W., U.S. Geological Survey, and Ward, W. E., II, Alabama Geological Survey, 1984, Lithologic logs of 1981-82 coal drilling in the Warrior coal field, Tuscaloosa, Fayette, and Walker Counties, Alabama: Bureau of Land Management Open-file report, 151 p.

Carnevale, M. J., and Hall, R. W., U.S. Geological Survey, and Ward, W. E., II, Alabama Geological Survey, 1984, Geochemical results of 1981-82 coal drilling in the Warrior coal field, Tuscaloosa, Fayette, and Walker Counties, Alabama: Bureau of Land Management Open-file report, 25 p.

Ward, W. E., II, and Gillette, B., 1983, Compilation of coal quadrangle maps, Warrior basin, Alabama--Coal data listing and coal bed chemical analyses: Alabama Geological Survey Open-file report.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Plateau coal region, Rome Quadrangle, Alabama: Alabama Geological Survey Special Map 181A.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Cahaba coal field, and the Coosa coal field, Birmingham South Quadrangle, Alabama: Alabama Geological Survey Special Map 181B.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Plateau coal region, Haleyville Quadrangle, Alabama: Alabama Geological Survey Special Map 181C.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Cahaba coal field, Tuscaloosa Quadrangle, Alabama: Alabama Geological Survey Special Map 181D.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin, Cahaba coal field, and Plateau coal region, Birmingham North Quadrangle, Alabama: Alabama Geological Survey Special Map 181E.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Plateau coal region, Huntsville and Chickamauga Quadrangles, Alabama: Alabama Geological Survey Special Map 181F.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin and Plateau coal region, Guntersville Quadrangle, Alabama: Alabama Geological Survey Special Map 181G.

Ward, W. E., II, and Chase, D. D., 1981, Map of selected coal beds in parts of the Warrior coal basin, Jasper Quadrangle, Alabama: Alabama Geological Survey Special Map 181H.

Hall, R. W., Law, R., Markewich, W., and Horsey, C. A., U.S. Geological Survey, and Ward, W. E., II, and Barnett, R. L., Alabama Geological Survey, 1981, Geophysical and lithological logs of 1980-81 coal drilling in the Warrior coal field, Tuscaloosa, Fayette, and Walker Counties, Alabama: U.S. Geological Survey Open-file Report 81-____.

Ward, W. E., II, and Musgrove, C. G., 1978, Geology and coal resources of coal-bearing rocks in Jefferson County, Alabama, in Stratigraphy and structure of the Birmingham area, Jefferson County, Alabama: Alabama Geological Society Guidebook, 16th Annual Field Trip, p. 68-86.

Ward, W. E., II, and Evans, F. E., Jr., 1975, Coal--its importance to Alabama: Alabama Geological Survey Information Series 53, 26 p.

Thesis

Ward, W. E., II, 1977, Jointing in a selected area of the Warrior coal field: University of Alabama unpublished M.S. thesis, 61 p.

Gary V. Wilson

Professional Summary

February 1987

PERSONAL

Born July 11, 1945, Fairfield, Alabama

Business address: State Oil and Gas Board of Alabama
420 Hackberry Lane
P.O. Box O
Tuscaloosa, Alabama 35486-9780
205/349-2852

Home address: 4802 Peartree Court
Tuscaloosa, Alabama 35405
205/553-1888

ACADEMIC BACKGROUND

B.S. Geology, Birmingham Southern College, 1968

AREAS OF EXPERTISE

A. Petroleum geology
B. Subsurface stratigraphy and structural geology
C. Geophysical techniques of subsurface investigation

PROFESSIONAL WORK EXPERIENCE

A. Present Position: Assistant State Oil and Gas Supervisor and Chief of the Geology Division, State Oil and Gas Board of Alabama (May 1982 to Present).

Administrative responsibilities for the Geology Division and technical advisor to the State Oil and Gas Supervisor.

Technical review and evaluation of the geologic maps, cross-sections and other data on oil and gas fields in Alabama as submitted to the State Oil and Gas Board.

Compile, review and evaluate the geological and geophysical data derived from the drilling and logging of oil and gas test wells.

Studies of the subsurface stratigraphy and structural geology of the oil and gas fields of Alabama.

Subsurface investigations and assessments of the undeveloped natural resources of Alabama.

B. Geologist and Geophysicist, Geological Survey of Alabama (May 1968-May 1982).

Supervised acquisition and processing of gravity, magnetic and resistivity field data.

Interpreted geophysical data and prepared maps and reports.

Microscopic examinations of rock cuttings and cores from oil and gas test wells.

Interpretation and correlation of wire-line geophysical logs from oil and gas test wells. Made determinations of formation tops, lithologies, facies changes, and fault locations and displacements.

Conducted regional subsurface studies of the stratigraphy and structural geology of Gulf Coast basin and Warrior basin of Alabama. Prepared cross-sections and structure, isopach and isolith maps.

PROFESSIONAL SOCIETIES

Alabama Geological Society
Society of Exploration Geophysicists

PUBLICATIONS

Reports

Wilson, Gary V., 1987, Characteristics and resource evaluation of the bitumen and rock-asphalt deposits of northern Alabama: State Oil and Gas Board of Alabama (in press).

Wilson, Gary V., and Tew, Berry H., 1985, Geothermal data for southwest Alabama: Correlations to geology and potential uses: State Oil and Gas Board of Alabama Oil and Gas Report 10, 125 p.

Poe, Rebecca M., Wilson, Gary V., and Tolson, Janyth S., 1979, Oil and gas wells in Alabama: State Oil and Gas Board of Alabama Oil and Gas Report 2, 344 p.

Wilson, Gary V., 1973, Gravity survey of Lamar County, Alabama: Geological Survey of Alabama Circular 87, 29 p.

Kidd, Robert E., and Wilson, Gary V., 1971, Gravity survey of the Mobile Delta, Alabama: Geological Survey of Alabama Circular 74, 78 p.

Wilson, Gary V., Joiner, Thomas J., and Warman, James C., 1970, Evaluation, by test drilling, of geophysical methods used for ground-water development in the Piedmont area, Alabama: Geological Survey of Alabama Circular 65, 15 p.

Articles

Wilson, Gary V., 1984, Bitumen deposits of northwest Alabama: American Association of Petroleum Geologists, Research Conference on Exploration for Heavy Crude Oil and Bitumen, Santa Maria, California, 10 p.

Wilson, Gary V., and Thomas, Donald C., 1983, Geology and geochemistry of bituminous rocks in northern Alabama: Institute of Gas Technology, Synthetic Fuels from Oil Shale and Tar Sands Symposium, Louisville, Kentucky, 17 p.

Wilson, Gary V., 1982, Characteristics of tar sands of Alabama: Kentucky Geological Survey and University of Kentucky, National Tar Sands Symposium, Lexington, Kentucky, 16 p.

Wilson, G. V., Kidd, J. T., and Shannon, S. W., 1976, Relationships of surface and subsurface faults in Choctaw and Clarke Counties, Alabama, in Copeland, C. W., Newton, J. G., and Self, D. M. (eds.), Cretaceous and Tertiary faults in southwestern Alabama: Alabama Geological Society 14th Annual Field Trip Guidebook, p. 58-79.

Wilson, Gary V., 1975, Early differential subsidence and configuration of the northern Gulf Coast basin in southwest Alabama and northwest Florida: Gulf Coast Association of Geological Societies Transactions, v. 25, p. 196-206.

Abstracts

Hinkle, Frank, and Wilson, Gary V., 1982, The influence of geologic structures on the quality of shallow ground water in the lower Tombigbee-Mobile River corridor of southwest Alabama [abs.]: Geological Society of America, Abstracts with Programs, v. 14, no. 1, p. 26.

Wilson, Gary V., 1975, Gravity studies across lineaments mapped from ERTS imagery [abs.]: Geological Society of America, Abstracts with Programs, v. 7, no. 4, p. 550.

Contract Reports

Wilson, Gary V., 1983, Physical and chemical characteristics of Alabama tar sands: Geological Survey of Alabama, prepared for the Tennessee Valley Authority, Contract Report TVA/OP/EDT-83/11, 94 p.

Wilson, Gary V., Wang, George C., Mancini, Ernest A., and Benson, D. Joe, 1980, Assessment of the geothermal/geopressure potential of the Gulf Coastal Plain of Alabama: Geological Survey of Alabama, prepared for the U.S. Department of Energy, Contract Report DE-AS05-79ET27015, 264 p.

Wilson, Gary V., 1978, Geology of the area of U.S. Steel's underground mines and deep disposal well, in Moore, James D., Potential problems with deep-well disposal at U.S. Steel, Fairfield, Alabama: Geological Survey of Alabama, Report prepared for U.S. Steel Corporation, p. 8-19.

Wilson, Gary V., 1974, Gravity studies across lineaments mapped from ERTS imagery, in Henry, Harold R. (Principal investigator), Investigations using data in Alabama from ERTS-A: University of Alabama, Bureau of Engineering Research, Final Report submitted to the National Aeronautics and Space Administration (Goddard Space Flight Center) under Contract No. NAS5-21876, v. 3, p. 452-498.

Wilson, Gary V., and Kidd, Robert E., 1972, Gravimetric study of a granite mass, west-central Randolph County, Alabama: Geological Survey of Alabama, Report prepared for Alabama Power Company, 26 p.

Special Maps

Moffett, T. B., Hinkle, Frank, Epsman, M. L., Wilson, G. V., and Moore, J. D., 1984, Configuration of the top of the Tuscaloosa Group in Alabama: Geological Survey of Alabama Special Map 199C.

Moffett, T. B., Hinkle, Frank, Epsman, M. L., and Wilson, G. V., 1984, Configuration of the top of the Selma Group in Alabama: Geological Survey of Alabama Special Map 199B.

Hinkle, Frank, Moffett, T. B., Epsman, M. L., Wilson, G. V., and Moore, J. D., 1983, Configuration of the top of the Eutaw Formation in Alabama: Geological Survey of Alabama Special Map 199A.

Epsman, M. L., Moffett, T. B., Hinkle, Frank, Wilson, G. V., and Moore, J. D., 1983, Depths to ground waters with approximately 10,000 milligrams per liter of total dissolved solids in parts of Alabama: Geological Survey of Alabama Special Map 198.

Smith, W. Everett, Wilson, Gary V., and Bearden, Bennett L., 1983, Energy resources of Alabama: Geological Survey of Alabama, Special Map 196 (with text).

Wilson, Gary V., 1982, Regional structure map of the Smackover Formation in southwest Alabama and northwest Florida: State Oil and Gas Board of Alabama Oil and Gas Special Map 3.

Wilson, Gary V., 1982, Regional isopach map of the Smackover Formation of southwest Alabama and northwest Florida: State Oil and Gas Board of Alabama Oil and Gas Special Map 4.

George, I. David, Clarke, Otis M., Jr., Kidd, Jack T., Wilson, Gary V., and Masingill, John H., 1978, Mineral resources of Fayette County, Alabama: Geological Survey of Alabama, Special Map 183, with basic data, 46 p.

Wilson, Gary V., 1971, Bouguer gravity map of Fayette County, Alabama: State Oil and Gas Board of Alabama Oil and Gas Special Map 5.

Wilson, Gary V., 1971, Vertical magnetic intensity map of Fayette County, Alabama: State Oil and Gas Board of Alabama Oil and Gas Special Map 6.

January 1987

FACILITIES AND CAPABILITIES OF THE BUREAU OF ECONOMIC GEOLOGY

The University of Texas at Austin

General Statement

The Bureau of Economic Geology was established in 1909 by the Board of Regents of the University of Texas, who recognized "the necessity of keeping the University in close touch with the affairs of the State, the importance in multiplying the bonds of mutual interest that connect the University with the citizens of the State, and the significance of furthering the utilization of the State's natural and mineral resources." The Bureau functions as a major organized research unit of the University and as a quasi-state agency, the geological survey of Texas. Prime areas of research are the geologic, mineral, energy, and land resources of Texas.

In 1982, The University Board of Regents authorized the construction of a new research complex for the Bureau to be located at the Balcones Research Center (7 miles north of main campus). The complex was completed in 1985 and includes a building for Research and Administration, a building for the Mineral Studies Laboratory and the offices of the Core Research Center, and a third building to archive the Bureau's well core and sample collections.

The Research and Administration building contains about 150,000 gross square feet in a three-story structure. Research and support staff offices, the Reading Room/Data Center, and the Publication Sales Office are housed in this building.

The laboratories and the offices of the Core Research Center occupy a two-story structure totaling approximately 35,500 gross square feet. The Mineral Studies Laboratory, located on the second floor, is specially designed for sample preparation, wet chemistry, inorganic and organic chemistry, and instrumental analyses. The core research facility is on the ground floor and includes administrative offices and large rooms with rollertop tables for examining core and drill cuttings. Core impregnation, freezing, and X-ray analysis are carried out in a special processes room.

The third building contains approximately 101,500 gross square feet of warehouse space for storage of the sample and core collections. Included in this building is a temperature-controlled area for archiving core and samples, such as salt, that require a controlled environment.

The Bureau is currently involved in over 35 separate research projects. Active projects include geologic mapping; studies of energy resources; land, environmental, and geohydrologic resources; coastal and marine resources; nonfuel mineral resources; energy and mineral statistics; energy policy analysis; and basic research and future applications. Other investigations concern alternate energy resources (coal, uranium, and geothermal) and comprehensive land and environmental resource analysis, as well as nuclear waste isolation studies.

Results of Bureau work are disseminated mainly through reports and maps published by the Bureau. To date, nearly 1,200 bulletins, reports, and maps covering the major aspects of Texas resources have been published by the Bureau. In addition, hundreds of scientific papers resulting from Bureau research have been published in national and international journals.

Directoral and Research Staff

Directoral Staff

W. L. Fisher, Director: Ph.D., University of Kansas: Energy and mineral resources, environmental geology, coastal zone management, genetic stratigraphy and sedimentation of the Gulf Coast Basin, energy and minerals policy.

E. C. Bingler, Deputy Director: Ph.D., The University of Texas at Austin: Structural geology, stratigraphy and sedimentation, neotectonics, ash-flow stratigraphy, economic geology.

E. G. Wermund, Jr., Associate Director: Ph.D., Louisiana State University: Environmental geology, remote sensing, stratigraphy and sedimentology; research administration.

D. C. Ratcliff, Associate Director for Administration: M.B.A., St. Edward's University: Contract management, coordination and supervision of Bureau support personnel, fiscal reporting, general administration, quality assurance.

Research Staff

Senior Research Engineer

Claude R. Hocott: Ph.D., The University of Texas at Austin: Hydrocarbon phase behavior, formation evaluation, fluid mechanics, oil and gas recovery, reservoir engineering and geochemistry.

Senior Research Scientists

Virgil E. Barnes (Professor Emeritus): Ph.D., University of Wisconsin: Paleozoic stratigraphy, economic geology, Precambrian stratigraphy, gravity and magnetics, earth temperatures, tektites and meteorites, geologic mapping, petrology.

Don G. Bebout: Ph.D., University of Kansas: Gulf Coast geology, carbonate facies, depositional environments, diagenesis, subsurface geology, carbonate reservoir geology, Permian Basin geology.

L. F. Brown, Jr.: Ph.D., University of Wisconsin: Basin analysis, genetic and seismic stratigraphy, Upper Paleozoic rocks of Texas, Pleistocene/Holocene facies of the coastal zone, clastic facies.

William E. Galloway: Ph.D., The University of Texas at Austin: Sedimentation, physical stratigraphy, mineral fuels, seismic stratigraphy, sedimentary petrography.

Research Scientists

Jules R. DuBar: Ph.D., University of Kansas: Stratigraphy, sedimentary facies, Atlantic and Gulf coastal plain geology, paleontology and paleoecology of mollusks, foraminifers, and echinoids; technical editing.

Robert J. Finley: Ph.D., University of South Carolina: Oil and gas reservoir studies and resource distribution, clastic sedimentology and depositional systems, remote sensing, coastal and surficial processes, geomorphology of semiarid environments.

Thomas C. Gustavson: Ph.D., University of Massachusetts: Sedimentary and geomorphic processes, environmental geology, Pleistocene stratigraphy, glacial geology.

Christopher D. Henry: Ph.D., The University of Texas at Austin: Igneous petrology and geochemistry, isotope and aqueous geochemistry, environmental geology.

Martin P. A. Jackson: Ph.D., The University of Cape Town: Structural geology, tectonics, salt dome geology and mechanics, centrifuge modeling, metamorphic petrology, remote-sensing mapping, geology of mineral deposits and mineral exploration.

William R. Kaiser: Ph.D., Johns Hopkins University: Subsurface geology, basin analysis, lignite geology and resource assessment, underground coal gasification, equilibrium thermodynamics and clastic diagenesis, uranium geochemistry and geology, aqueous geochemistry and hydrogeology.

David W. Koppenaal: Ph.D., University of Missouri: Analytical laboratory management, fossil fuel characterization and analysis, geological/geochemical exploration, environmental assessment investigations, trace element analysis and speciation.

Charles W. Kreitler: Ph.D., The University of Texas at Austin: Hydrogeology, low-temperature aqueous geochemistry, stable isotope geochemistry, engineering geology.

Malcolm P. R. Light: D. Phil., University of Rhodesia: Plate tectonics, geologic, structural, metamorphic, and seismic interpretation, geological field mapping.

Robert A. Morton: Ph.D., West Virginia University: Gulf Coast structure and stratigraphy, coastal and marine geology, sedimentary processes, Upper Paleozoic stratigraphy in Central Appalachians.

Jonathan G. Price: Ph.D., University of California at Berkeley: Geology and geochemistry of ore deposits, igneous and metamorphic petrology, computer applications in geology, uranium mining and exploration.

Jay A. Raney: Ph.D., The University of Texas at Austin: Structural geology, regional tectonics and stratigraphy, economic geology.

Stephen C. Ruppel: Ph.D., University of Tennessee: Carbonate sedimentology, paleoenvironmental analysis, Paleozoic stratigraphy and basin analysis, conodont micropaleontology, petroleum geology, invertebrate paleontology.

Zvi Sofer: Ph.D., The Feinberg Graduate School of the Weizmann Institute of Science: Isotope geochemistry and organic geochemistry.

Noel Tyler: Ph.D., Colorado State University: Reservoir development geology, basin analysis, energy and ore deposits in sediments, resource assessment.

Research Fellows

Amos Bein: Ph.D., Hebrew University of Jerusalem, Israel: Organic and inorganic geochemistry applied to oil prospecting, hydrogeology and carbonate sedimentology.

Jerry Lucia: M.S., University of Minnesota: Origin of carbonate rocks, reservoir geology of petroleum accumulations, exploration for petroleum accumulations, origin of sandstones.

Harry Posey: Ph.D., University of North Carolina at Chapel Hill: Isotope geochemistry, carbonate/evaporite sedimentology, economic geology, salt dome geochemistry.

Research Associates

Walter B. Ayers, Jr.: Ph.D., The University of Texas at Austin: Clastic sedimentology, basin analysis, coal geology.

Edward W. Collins: M.S., Stephen F. Austin State University: Environmental geology, field geology, surface geology, structural geology.

Alan R. Dutton: Ph.D., The University of Texas at Austin: Hydrogeology, geochemistry, sandstone petrography and petrology of shales, statistical analysis of geologic data, geologic mapping.

Shirley P. Dutton: Ph.D., The University of Texas at Austin: Subsurface genetic stratigraphy and basin analysis, sandstone petrography and diagenesis, hydrocarbon resources.

R. Stephen Fisher: Ph.D., The University of Texas at Austin: Sedimentary and aqueous geochemistry, stable isotope geochemistry, sedimentary petrology.

Graham E. Fogg: M.S., University of Arizona: Ground-water hydraulics (well hydraulics and regional aquifer hydraulics), numerical and mathematical modeling of ground-water flow systems, stochastic characterization of aquifer heterogeneity, hydrologic drilling program design and coordination.

Mike A. Fracasso: Ph.D., Yale University: Vertebrate paleontology, Permo-carboniferous continental sedimentology and biostratigraphy, sedimentary basin evolution, paleontology and stratigraphy.

Edgar Guevara: Ph.D., The University of Texas at Austin: Depositional systems, stratigraphy, basin analysis, petroleum exploration, reservoir characterization.

Charles Kerans: Ph.D., Carleton University, Ottawa, Canada: Carbonate petrology, carbonate facies and depositional environments, basin analysis-stratigraphy, analysis of paleokarst systems.

Elisabeth Kosters: Ph.D., Louisiana State University: (Holocene) Geomorphology, sedimentology, stratigraphy, coal-forming environments, peat.

Stephen E. Laubach: Ph.D., University of Illinois-Urbana: Structural geology, fracture analysis and tectonics.

Richard Major: Ph.D., Brown University: Sedimentology, stratigraphy, carbonate petrology.

Prasanta Mukhopadhyay: Ph.D., Jadavpur University, Calcutta, India: Coal petrology, coal geochemistry, and organic geochemistry.

Ronit Nativ: Ph.D., Ben Gurion University of Negev, Israel: Hydrogeology and hydrogeochemistry.

Steven J. Seni: M.A., The University of Texas at Austin: Basin analysis, salt tectonics, terrigenous depositional systems, depositional history of East Texas and Gulf Coastal Basin, mechanisms and patterns of salt dome growth in East Texas Basin, sandstone petrography.

William A. White: M.Ed., The University of Texas at Austin: Environmental geology, coastal land and water resource delineation including wetlands, sediment geochemistry, coastal processes.

Research Scientist Associates

Saleem Akhter: M.S., The University of Texas at Austin: Multi-phase flow correlations, production simulation, pressure-transient testing.

William Ambrose: M.A., The University of Texas at Austin: Sedimentology and production trend analysis through development of facies models based on genetic stratigraphy.

Mark Andreason: B.S., The University of Texas at Austin: Quality assurance inspection of core processing operations, well log analysis.

Robert W. Baumgardner, Jr.: M.A., The University of Texas at Austin: Quantitative geomorphology, geomorphic mapping, pedology, remote sensing, interpretation of SAR and Landsat imagery and aerial photographs, digital image processing, and stratigraphy.

Thomas R. Calnan: M.S., Texas A&M University: Marine biology.

S. Christopher Caran: M.A., The University of Texas at Austin: Geomorphology and environmental geology, remote sensing, Quaternary stratigraphy, field geology and mapping.

Carolyn E. Condon: B.S., Texas Tech University: Nuclear quality assurance, groundwater pollution monitoring, coordination of contract requirements, water quality laboratory supervision, applicability of environmental rules and regulations.

Robert D. Conti: M.A., The University of Texas at Austin: East Texas stratigraphy, clastic depositional systems, geophysical log analysis, Palo Duro Basin Permian carbonate facies analysis.

Reinold Cornelius: M.A., The University of Texas at Austin: Structural analysis of gravity driven structures, Fortran programming, aerial photo interpretation.

Chester M. Garrett, Jr.: B.S., The University of Tulsa: Petroleum geology, basin analysis, integration and coordination of subsurface and seismic information, geothermal energy research, reservoir studies.

H. Scott Hamlin: B.A., The University of Texas at Austin: Stratigraphy, sedimentology, geohydrology.

Rodney Heathcott: B.A., McMurry College, Abilene, Texas: Physics, math, computer programming.

Tucker F. Hentz: M.S., University of Kansas: Continental depositional systems, field mapping and stratigraphy, sandstone petrology, sulfur geology, Quaternary geology of North Texas.

Susan D. Hovorka: M.A., The University of Texas at Austin: Sedimentology, petrography, basin analysis.

Mary L. W. Jackson: M.S., Colorado State University: Geomorphology and environmental geology, coal sedimentology and subsurface geology.

Lee A. Jirik: B.A., The University of Texas at Austin: Gulf Coast structure and stratigraphy.

David A. Johns: M.A., The University of Texas at Austin: Sedimentary clastic geology, basin analysis, economic geology.

Christopher Lewis, B.S., Montana State University: Verification, implementation, and development of quality assurance procedures, coordination of contract reporting requirements.

Cynthia A. Mahan: B.S., Texas Women's University: Analytical geochemistry using state-of-the-art instrumentation.

Mary W. McBride: M.S., University of Oklahoma: General subsurface geology, resource information, earthquake analysis, warm-water geothermal resources.

William F. Mullican III: M.S., Texas Tech University: Basin analysis, carbonate depositional systems, stratigraphy, carbonate petrography.

H. S. Nance: B.S., The University of Texas at Austin: Sedimentology, basin analysis, stratigraphy.

Elizabeth D. Orr: M.A., The University of Texas at Austin: Systems analysis and system management, computer and statistical application to geology, sedimentology, sedimentary petrography, hydrology.

Jeffrey G. Paine: M.S., The University of Washington: Quaternary and coastal geology, crustal structure, rock properties, computer geology.

Bernd C. Richter: M.A., The University of Texas at Austin: Deep-basin hydrogeology, geochemistry.

Michael P. Roberts: M.S., University of Cape Town: Computing services management, systems analysis and design, operations research, computer applications and systems relating to mining and minerals, especially coal.

Rainer K. Senger: M.A., The University of Texas at Austin: Numerical ground-water flow models, deep-basin hydrology and hydrochemistry, hydrology and hydrochemistry of karst, permeability and porosity analyses.

Steven W. Tweedy: B.S., Southwest Texas State University: Inorganic analytical chemistry.

Gary W. Vander Stoep: B.S., The University of Texas at Austin: Petroleum engineering.

Liaison with State Agencies of Texas

In keeping with its original charge, the Bureau maintains statewide programs in basic, applied, and functional research; systematic mapping; and direct public service in the areas of Texas geology, natural mineral resources, earth processes, and resource use and statistics.

The Bureau maintains strong ties with all State governmental agencies in Texas concerned with natural resources. It conducts limited as well as continuing cooperative programs and projects with many State, Federal, and local governmental agencies. The Bureau serves as the public geologic consultant for such agencies as the Railroad Commission of Texas, General Land Office, Texas Department of Water Resources, Texas Water Commission, Texas Department of Highways and Public Transportation, and Governor's Budget and Planning Office, as well as the Texas Parks and Wildlife Department, Texas Department of Health Resources, Governor's Office of Nuclear Waste Programs, and others. The Bureau serves with many of these and other agencies to direct policy of the Texas Natural Resources Information System. Aerial photographs, subsurface data files, and other basic information are accessible to the Bureau through its cooperative arrangements with State agencies.

Published and Open-File Data on Texas

The Bureau maintains its own publication series and distributes about 65,000 items per year; annual reports are mailed to approximately 8,000 people to acquaint them with Bureau services. The Bureau currently publishes approximately 40 items (monographs, reports, and maps) each year. Since 1909, the Bureau has published more than 1,200 reports and has distributed more than 1 million publications worldwide.

The Bureau also maintains open-file copies of work data, reports, maps, and other materials derived from research projects. The Bureau serves as a designated open-file repository for Federal and State agencies involved in geologic and hydrologic studies. The Bureau is also a repository for several U.S. Geological Survey and U.S. Bureau of Mines reports,

including topographic and geologic maps. Due to space limitations, only those materials concerning Texas, bordering states, and special interest topics are housed in the Reading Room/Data Center. Other materials are housed at the Geology Library at The University of Texas at Austin.

Available Geologic Mapping in Texas

A geologic map of the state of Texas showing the extent of outcropping rock units is being published as 38 separate 1° x 2° map sheets. Each sheet is printed in multicolor, using the Army Map Service topographic base at a scale of 1:250,000. Thirty-seven of the sheets have been issued. The remaining sheet (Wichita Falls) is expected to be published in 1987.

Geologic quadrangle maps at a scale of 1:24,000 are also available for parts of central Texas and many areas of Trans-Pecos Texas. Geologic maps accompany many of the reports published by the Bureau. An extensive environmental coastal atlas, composed of 63 maps and charts, describes the Pleistocene and Holocene geology of the Texas Coastal Zone, and an atlas series of Texas submerged lands is in preparation. Other regional land resource maps cover areas of special concern such as Councils of Governments. A statewide land resources map of Texas at a scale of 1:500,000 depicts numerous units including mineral lands.

Available Geologic Data and Research Materials on Texas

The Bureau houses extensive files of aerial photographs of Texas. The file includes photomosaics, photo indexes, black-and-white stereographic prints, color-infrared stereographic positive transparencies, RB-57 high-altitude photographs, and Landsat and limited ERTS imagery.

In addition to surface coverage of the state, the Bureau has extensive subsurface information, including subsurface maps, driller's logs, sample logs, scout tickets, completion cards, and geophysical logs. Many of the logs were acquired for research projects evaluating geothermal energy, uranium, lignite, oil and gas, and proposed sites for isolation of nuclear

waste materials. As a result of State legislation and an agreement with the Railroad Commission of Texas, the Bureau is the repository of geophysical well logs for all oil, gas, and geothermal wells drilled in Texas since September 1, 1985. In addition, the Bureau has access to the log libraries and files of the Railroad Commission of Texas (which regulates oil and gas production), the Texas Department of Water Resources, and the Geological Information Library in Dallas, Texas. Through continuing cooperative programs, the Bureau has limited access to proprietary data held by oil companies and mineral companies.

Bureau Research Staff

The full-time research staff consists of 65 members, of whom 37 hold Ph.D. degrees, 22 hold master's degrees, and 6 hold bachelor's degrees. The staff includes geologists, engineers, resource economists, chemists, and biologists. The research staff is supplemented by half-time employment of 26 graduate students (who have bachelor's or master's degrees and are working toward master's or doctoral degrees) and by temporary appointment of academic faculty from The University of Texas at Austin and other colleges and universities.

The staff displays expertise in a variety of research areas applied to Texas energy resources, such as uranium, oil, gas, geothermal, and lignite; non-energy mineral commodities; surface- and ground-water hydrology; and geochemical, structural, geomorphological, and environmental studies, among others. Bureau research staff members actively participate in geological societies and professional associations and maintain close contacts with industrial-sector peers.

Reading Room/Data Center

Located in the Research and Administration building, the Bureau's Reading Room/Data Center contains about 8,000 books and 45 periodical titles. The collection includes not only Bureau, but also Federal agency, State agency, and national and local geological society publications; the Bureau has an active publications exchange program with more than 150

institutions worldwide. The Bureau's Reading Room/Data Center also houses several special collections of aerial photographs, well logs, driller's logs, completion cards, seismic data, and maps. In addition, the Bureau has access to the 65,000 volumes, 1,200 journals, and 30,000 maps contained in the Geology Library at The University of Texas at Austin, which in turn is part of the 4.2-million-volume General Libraries System at UT.

Bureau staff members provide reference and bibliographic services in response to thousands of inquiries each year. Since 1932 the Bureau has published several bibliographic indexes of Texas geology; current bibliographies are published every 5 years.

Texas Mining and Mineral Resources Research Institute

A Mining and Mineral Resources Research Institute was established as an administrative unit of the Bureau of Economic Geology on September 15, 1978, by President Lorene Rogers of The University of Texas at Austin. This Institute and similar institutes in other states were provided for in Title III of the Federal Surface Mining Control and Reclamation Act of 1977.

The Institute conducts both research and training. Funding is provided by the U.S. Department of the Interior, Bureau of Mines. Although the Institute does not award degrees, Federal funds for research grants and for fellowships and scholarships are provided; funds for operation of the Institute are matched at a rate of 3 to 2 by funds supplied by The University of Texas at Austin. Creation and funding of the Institute permit new research directions and provide for integration, enlargement, and refinement of existing mining research and training programs. In 1984, Congress reauthorized the program for another five years.

Participating members of the Mining and Mineral Resources Research Institute at The University of Texas at Austin include the Bureau of Economic Geology, the College of Engineering, and the Department of Geological Sciences. Fellowships and scholarships are also provided to students of mining and mineral resources at Texas A&M University. The Director of the Institute, also a Research Scientist of the Bureau of Economic Geology, supervises research activities and student financial support. The Institute Director reports to the Director

of the Bureau of Economic Geology, who in turn reports to the Vice-President for Research of The University of Texas at Austin.

Mineral Studies Laboratory

The Bureau maintains a strong analytical capability in the form of its Mineral Studies Laboratory, an organization entity that includes professional staff chemists, a modern array of analytical instruments, and a newly-constructed laboratory facility. The primary function of the Laboratory is to provide analytical research and services to the Bureau staff in support of research programs relevant to the State of Texas.

The capabilities of the Laboratory include complete sample preparation and comminution facilities and analytical geochemistry expertise in mineral, fossil fuel, soil/sediment, and fresh and saline water research applications. New analytical methods are continually under development or being applied to characterize such geological materials.

Specific analytical facilities include the following:

- A simultaneous multi-element inductively-coupled plasma emission spectrometer for the determination of major and trace inorganic elements in solid and liquid samples.
- An electron microprobe system capable of high-resolution compositional analysis on individual mineral crystals.
- A scanning electron microscope for high-resolution imaging analysis.
- A stable isotope mass spectrometer for isotope geochemistry studies.
- An inductively-coupled plasma mass spectrometer for trace and ultra-trace determination of elemental composition of solid and liquid samples.
- Complete wet-chemical capabilities for the general analysis of geologic materials.
- A X-ray diffraction spectrometer for mineral phase identification.
- Laboratory facilities and instrumentation for evaluation of coal and other fossil fuel resources.

- A rapid sediment analyzer and particle counter for volumetric size analysis of sand, silt, and clay.
- Complete sample comminution facilities.

The Mineral Studies Laboratory therefore possesses expertise and facilities for the characterization and chemical analysis of a wide variety of geological materials.

A new 19,000-ft^2 laboratory building provides an excellent environment for new and expanded geochemical characterization and research. New areas for research include analysis of precious metal, rare earth elements, and semiconductor elements associated with resource and industrial developments. The new facility and the addition of state-of-the-art instrumentation enables the Mineral Studies Laboratory to expand in new directions of research for the Bureau and the State of Texas.

Core Research Center

The Bureau of Economic Geology maintains a Core Research Center, which serves as the major public repository for core samples, cuttings, and well records in the state. The research center was established in 1937 by authorization of the State Legislature. Originally named the Well Sample Core Library, the name was changed to the Core Research Center when moved to the new facility. The Core Research Center is the only public repository of subsurface data in Texas, housing drill cuttings from more than 60,000 wells and cores from approximately 6,012 wells, and driller's logs representing approximately 500,000 wells totaling more than 22,000 miles of geological section. Indexes to core samples and cuttings, as well as a computerized data system, provide access to a vast amount of subsurface information. Equipment includes two automatic core saws, each capable of slabbing 48 feet per hour, two target saws utilized to slab small sections of core, an automatic porosity/permeability plug extractor, a gamma-ray scanner, a vacuum pressure chamber, and an X-ray unit capable of reproducing images of 4" diameter core. The Core Research Center contains two core examination rooms capable of accommodating 14 patrons, and a drill cuttings examination room with 16 individual cubicles.

There is a fully equipped thin section lab which will produce requested thin sections for a small fee. The current CRC staff consists of 25 full-time and 6 half-time employees.

Thin Section Services

In August 1982 the Bureau acquired two new thin section and lapping machines made by Logitech of Scotland. These highly engineered machines herald a technological advance in geologic thin section production. Higher production rates and consistently excellent sections are the benefits. Control of surface relief and maintenance of uniform thickness to within a micron with no edge-fading are routine. Mounted polished sections for microprobe analysis and reflection studies are available. Impregnation of unconsolidated or porous materials, sectioning of water-soluble materials, and other special processing are available upon request. Over 2,000 sections are prepared annually.

Cartographic Services

The cartographic staff, which includes design and photographic personnel and consists of 14 people with an average of five and one-half years of Bureau service, is responsible for cartographic preparation of all full-color and black-and-white maps, and charts. This group also prepares all text figures, slide copies, and poster materials for Bureau publications and meetings.

The professional cartographers are qualified in all photogrammetric techniques and procedures in map-making. They utilize a full array of instruments and materials to produce maps that meet international map standards.

The design section, consisting of 2 staff members with an average of three years of Bureau experience, is responsible for the design and layout of all Bureau publications and covers, and for the final paste-up for printing.

The photographic staff consists of one person who has eight years of Bureau experience. The photography lab is expansive and uses state-of-the-art equipment, including a copy camera,

rapid access film processor, color slide processor, vacuum frame, a full black and white darkroom and a color darkroom. This section produces everything necessary for Bureau publications and color-separated maps, including composite negatives.

Editing and Publication Preparation

Publications are the focal point of Bureau research. The publications staff, composed of 14 staff members, includes technical editors, proofreaders, and word processing and typesetting operators. Camera-ready copy is produced within the Bureau and then submitted for printing. The editorial staff prepares all Bureau publications.

Administrative/Secretarial Support Staff

This staff is an integral part of the efficient operation of the Bureau. Purchasing, accounting, personnel, payroll, and communicating are accomplished by the administrative and secretarial staff in response to needs of both research and public service. These professionals supervise and continually audit research funds as well as state and grant funds. The staff works in close cooperation with the University accounting and purchasing offices to maintain continual control of purchases, salaries, and other accounts. It also administers sales of all Bureau publications.

Computing Staff

The Computing Staff provides computing capabilities and develops, acquires, or modifies computer programs and systems. Over 100 terminals are connected via a MICOM port selector system to the Bureau's own VAX 11/780 and to the University's Dual CDC Cyber 170/750, IBM 3081, Cray supercomputer, and other computers. Processing tools on the VAX include the MASS-11 word processing program, a spreadsheet (DECALC), business graphics display (DEC-GRAPH), full relational data base facilities (RDB and DATATRIEVE), screen management programs (SMARTSTAR), statistical analysis (DATAPLOT) and contour mapping (CPS-1), as

well as FORTRAN, PASCAL, and COBOL compilers, and the DECNET network communications software.

In addition to terminals and printers, the Bureau has six DEC Rainbow microcomputers, a Tektronix 4054 Graphics System desktop computer, a Summagraphics ID-2 digitizing system, a QMS 1200 Laser printer, a 22-inch Versatec monochrome plotter, a Gould-deAnza FD5000 graphics image processor, and a Houston Instruments 36-inch drum plotter. Computing Staff duties include direct support for scientific research by providing computer consultancy, by developing computerized data bases, and by providing programs for such purposes as data analysis and display. These process surface and subsurface data, and geochemical, hydrologic, and other geological research data. The Computing Staff also provides assistance for administrative, support, or service functions such as contract and personnel accounting, publication preparation and sales, cartography, the Core Research Center, and the Mineral Studies Laboratory.

Field Equipment

Major equipment operated by the Bureau includes a fleet of 20 automotive vehicles, and a Mobil Drill B34 drilling rig. The Bureau has extensive field instruments available for state-of-the-art field investigations in geology, geohydrology, limited geophysics, and geochemistry. Typical examples are theodolites, pH meters, scintillometers, water sampling systems, and seismographic equipment.

Summary

The Bureau's facilities include three large buildings housing research and administration offices, a geochemical laboratory and a core research center, and a repository. Using a wide variety of state-of-the-art equipment, the Bureau's research and support staffs conduct extensive geological research and mapping as well as provide ongoing public service through an active program of publication and public information.

Further information about the Bureau of Economic Geology can be found in the Bureau's Annual Report and List of Publications.

GEOLOGICAL SURVEY OF ALABAMA

SUMMARY OF RESOURCES AND CAPABILITIES

As the leading agency performing geologic research in Alabama, the Geological Survey of Alabama/State Oil and Gas Board is uniquely qualified to carry out all phases of a research program relating coalbed methane occurrence and productivity to coal geology, stratigraphy, environments of deposition and hydrology. The professional scientific/engineering staff numbers 51 individuals, representing about half the total staff. Approximately 20% of the professionals have earned Ph.D's or are doctoral candidates; the majority of the remainder have degrees at the Master's level. Research is presently being carried on in the areas of energy resources, mineral resources, environmental geology, biology, water resources, and surface and subsurface geology.

Support services include fully equipped geochemical and geocartographic laboratories and an in-house printing and publishing facility (geochemical laboratory equipment, capabilities and a sample quality assurance are attached). Files are maintained on all oil and gas (including coalbed methane) test wells drilled in the State, and include all logs run, permitting, completion, re-completion, production statistics, and abandonment information. Similar information is filed for all public water supply wells, and many private water wells. In addition, well cuttings and/or cores are maintained on over 5700 wells. Included in this collection is over 52,000 feet of core from the Warrior and Cahaba Basins.

The files of the Energy Resources Division contain several thousand unpublished coal maps and reports and other data gathered over the past 25 years from private companies, consultants, government agencies, and in-house field investigations. These files are continuously supplemented as new information is accumulated. These data include coal outcrop maps, drill hole logs, prospect pit data, underground and surface mine maps, structural data, and measured sections. Analytical information for much of the data is also available.

A systematic survey of the coal data in the files began in November 1978. Information from each map and report is compiled onto stratigraphic sequence forms for entry into a computerized data bank. Specific information entered on the stratigraphic form include the following: thicknesses and lithologic descriptions of the overburden and interburden; coal thickness, elevation, and bed name; coal cleat data if available; type of data (i.e., drill hole, outcrop, test pit, etc.); and location of data point. Data point locations for each stratigraphic form are compiled onto 7½-minute topographic quadrangles with coal outcrop lines, mined areas, and faults being delineated on separate topos. Approximately 7,300 stratigraphic points, covering a sixty-quadrangle area in the Warrior basin, have been incorporated into the data bank. This work includes all or parts of Marion, Winston, Cullman, Lamar, Fayette, Walker, Tuscaloosa and Jefferson Counties.

It is estimated that there are an additional 10,000 data points in GSA's files that contain point-source coal information within the Warrior basin. Those data may be utilized to supplement any gaps in the areal coverage of the computer data base.

GSA also has a large body of published and unpublished coal quality information in its files. Approximately one-half of these data are concentrated in the Warrior coal basin, but much of it has not been organized into a systematically integrated data base. These file data consist of an estimated 1,500 to 2,000 coal analyses, the majority of which contain only proximate analyses and Btu determinations.

In addition, GSA has collected over 1,100 coal samples in the Warrior coal basin as part of cooperative agreements with various agencies.

These samples were forwarded to the U.S. Geological Survey (USGS) for proximate and ultimate analyses and trace element determinations were made for most of them. All of these analyses are integrated into the computer data base. An additional 340 coal analyses from the Warrior basin, most of them with only proximate analyses and Btu determinations, have also been incorporated into the data base.

As part of its coal sampling program, GSA retains a library of approximately 300 coal samples collected from the Warrior basin. With very few exceptions, these samples are representative of every coal bed that occurs, from several different locales, in the Warrior coal basin. These samples were collected from outcrops, surface mines, and core holes and can provide a foundation for a complete petrographic study of all the coals in the Warior basin. If needed, additional samples can be obtained from active underground mines and current core drilling programs being conducted by private industry.

Facilities

The Geological Survey of Alabama is housed in a modern office and laboratory building, comprising 67,800 square feet of space, located on the University of Alabama campus in Tuscaloosa, Alabama. Rock laboratories are located near the main facility in a 13,000-square-foot building.

The Geological Survey of Alabama has the laboratories and physical facilities to support major initiatives in all areas of geoscience research including fully equipped facilities to produce high-quality maps, charts and reports of all sizes, and a research library to support research in the fields of energy, minerals, water, geophysics, biology, environmental geology, chemistry, regional and areal geology, and remote sensing.

Geocartography

The Geocartography Division of the Geological Survey is divided into four elements: drafting, photo lab, typography, and printing. Each department is integrated into one comprehensive work unit dedicated to producing the highest quality printed product obtainable. Most of the staff of the Geocartography Division have been with the agency for more than 10 years and are capable of multiple work efforts in the production of maps, charts, and reports. From time to time, the Division employs specialized people for editing responsibilities. All products are subjected to a rigid quality control mechanism to insure error-free publications.

Drafting

The drafting section of the Geocartography Division is staffed by five (5) cartographic draftsmen with a combined total of 35 years experience. They are skilled in the art of map making using the latest techniques and materials.

Each draftsman is proficient in the use of modern methods for lettering and for scribing precision line widths. They have prepared hundreds of geologic, mineral, and water-availability maps complete with multiple overlays. Many of

these maps are in color ranging from 4 to 25 different colors and screen patterns. The Survey maintains a supply of large screens in various tints used in map making.

The drafting tables are capable of handling map sizes to 42 and 60 inches. All drafting materials are base stable and all overlays are drafted in perfect register using photosenzitized peel-coat film and other state of the art cartography supplies.

Photo Lab

The drafting section has at its disposal a complete photo lab that includes a Consolidated graphic-arts camera with film size up to 24 inches by 36 inches, which will enlarge up to 800 percent and reduce down to 12 percent; a Cronalith Processor capable of processing contact prints, direct positives, laser scanner and photo-typesetting films, and resin-coated papers up to 25 inches wide by any length; a large vacuum frame that will handle negatives up to 50 inches x 70 inches in size; and a Nu-Arc 400 printing lamp used in contact printing of overlays for register work and proofing of both black and white and color proofing of publications and maps.

Typography

The typography section of the Geocartography Division consists of two typographers with a combined total of 30 years experience.

The facilities of this section include the latest types of equipment used in the production of high-quality camera-ready copy prior to printing. This includes two (2) Xerox-6085 Information Processor Centers. These processors and other Xerox equipment are linked to a laser printer by a LAN System.

The Xerox 6085 performs difficult composing tasks electronically, stores and revises using magnetic disks and electronic file storage, uses a wide range of interchangeable type styles and sizes, and has complete pagination capabilities.

Printing

The printing section is a complete in-house printing facility with the capabilities of printing a wide variety of publications on different media. The large presses are capable of printing color process and/or dot-for-dot registration. Large color maps, four-color process, and book printing are examples of their capabilities. Publications can be reproduced in-house starting with concept and ending with bound-finished product. We have the capability to quickly reproduce documents, pamphlets, borchures, forms, and various maps and text. Our printing department has the presses and binding equipment necessary to reproduce most any type of publication. Some of the equipment is listed below:

Heidelburg (SOR) press (24" x 32¼" paper size)

1870 Multilith press (two heads) (15" x 19" paper size)

1850 Multilith press (15" x 19" paper size)

360 A.B. Dick press (11" x 19" paper size)

Xerox 9500 automated copy system with collator

Paper cutter (32¼" x 35" paper size)

Offset plate maker (40" x 30" plate size)

Baumfolder folding machine with right-angle capabilities (17½" x 22½" paper size)

Sulby Auto-minibinda book binder (hot glue) with book size ranging from 1/8" to over 2" spine (16" x 12" finished book size)

Laminator (25" x continuous length)

Collator (one 52 bin)

Paper drill (3 hole)

Book stitcher (3/4" thick books)

Spiral binding equipment

Library

The Geological Survey of Alabama maintains an earth science library of more than 150,000 books, periodicals, manuscripts, open-file reports, maps, and field notes.

Through purchase and exchange, the Geological Survey of Alabama has collected, since 1870, nearly complete sets of the publications of other state geological surveys. The Geological Survey of Alabama's collection spans the whole of North American geology, with emphasis on published and unpublished manuscripts on the geology, hydrology, and the environment of the southeastern Coastal Plain, Appalachian, and Piedmont area. Current holdings on the geology of surrounding states are particularly complete including not only the reports of the geological surveys of the adjacent states, but publications by various geological societies, universities, regional journals, and geologic publications of public and private sectors of the geological community.

In addition to the publications of various state agencies, including those of Alabama, the library holds a complete st of the serial publications of the United States Geological Survey and the United Bureau of Mines. The library also has exchange agreements with over 150 national, educational, and research organizations of other countries, provinding worldwide coverage of geological and related earth science literature.

The Survey library has been the recipient of several very fine collections of books, including thousands of technical publications, maps, and related materials from the United States National Aeronautics and Space Administration.

Subscriptions to most of the scientific and technical periodicals in the fields of geology, minerals, water, and energy provide current geological data and results of research. An effort is also made to obtain copies of theses

and dissertations on the geology of the southeastern United States.

The Survey's map collection contains most of the out-of-print topographic maps of Alabama published by the U.S. Geological Survey and various geologic maps of the Southeast. New maps are added to the collection gegularly as they are published and made available.

Although it is primarily a research library concerned with providing assistance to the more than 100 members of our staff, our facilities are readily available to faculty, staff, and students of the various educational institutions in the area and to the general public.

Remote Sensing Capabilities

Remotely sensed data of various kinds including aerial photographs, color-infrared photographs, and space, thermal and radar imagery are used by staff geologists and technicians for earth science investigations. Remotely sensed data products are used routinely to map surface geologic units and structures, assist in the development of water supplies, differentiate habitats, inventory surface mines, map shoreline changes, and map floods.

Imagery Available

In-house imagery includes complete Landsat coverage of the State, dated 1976-82, at 1:250,000 scale; Landsat and Skylab imagery at about 1:1,000,000 scale, as 9 x 9 prints and transparencies; U-2 color-infrared photography of the central part of the State at 1:130,000 scale; low-altitude color and color-infrared photography of selected areas in the State; U.S. Geological Survey side-looking airborne radar (SLAR)-images (scale 1:250,000) of the Gadsden, Rome, Birmingham, and Atlanta 2^{o} quadrangles; black-and-white infrared photography of oil fields in south Alabama; thermal and radar imagery of selected small areas; and standard ASCS photo-mosaics of all counties in Alabama. Imagery is updated on a continuous basis as it becomes available.

Geochemical Laboratory

The Geochemical-Water Laboratory is housed on the upper floors of the main agency building in approximately 3,000 square feet of sectionally organized space. Staff consists of two full time chemists, and two technical assistances. The chemists are skilled in standard and specialized laboratory procedures. The laboratory is EPA and USGS certified and normally uses USGS Standard Procedures and EPA authorized techniques for all laboratory analyses.