HYDRODYNAMICS OF THE HUNTON GROUP IN THE ANADARKO BASIN, OKLAHOMA AND TEXAS PANHANDLE

By

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HYDRODYNAMICS OF THE HUNTON GROUP

IN THE ANADARKO BASIN, OKLAHOMA

AND TEXAS PANHANDLE

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TABLE OF CONTENTS

Chapter Page

LIST OF FIGURES

Figure Page

Figure | Page

LIST OF PLATES

In memory of my Father, 1935-1974

I must have been about 5 years old when I asked my Dad,
"Is there such as thing as black gold?"

His reply was a simple, "Yes."

CHAPTER I

INTRODUCTION

Purpose

The goal of this report is to characterize lateral fluid movement within the Hunton Group in the Anadarko basin, thereby helping to better predict oil and gas accumulations. The study of fluid movement caused by force imbalances is termed hydrodynamics. An implicit assumption within this investigation is that flow of formation water affects the distribution of hydrocarbons. Traditionally, exploration for petroleum begins with the assumption that petroleum is pervasive within a basin. Yet, locating a reservoir rock is no guarantee of finding oil and gas. Characterization of hydrodynamics of the Hunton may reduce this risk and help to identify subtle and hard-to-find hydrocarbon traps.

Study Area

In the Anadarko basin, the Hunton Group is composed of carbonate strata of Ordovician-Silurian-Devonian age (primarily Silurian). A regional map of the Hunton subcrop in the Anadarko basin, stratigraphic cross sections, and locations of Hunton well penetrations are shown in Figure 1, Plate 1, Plate 2 and Plate 3. The Anadarko basin is

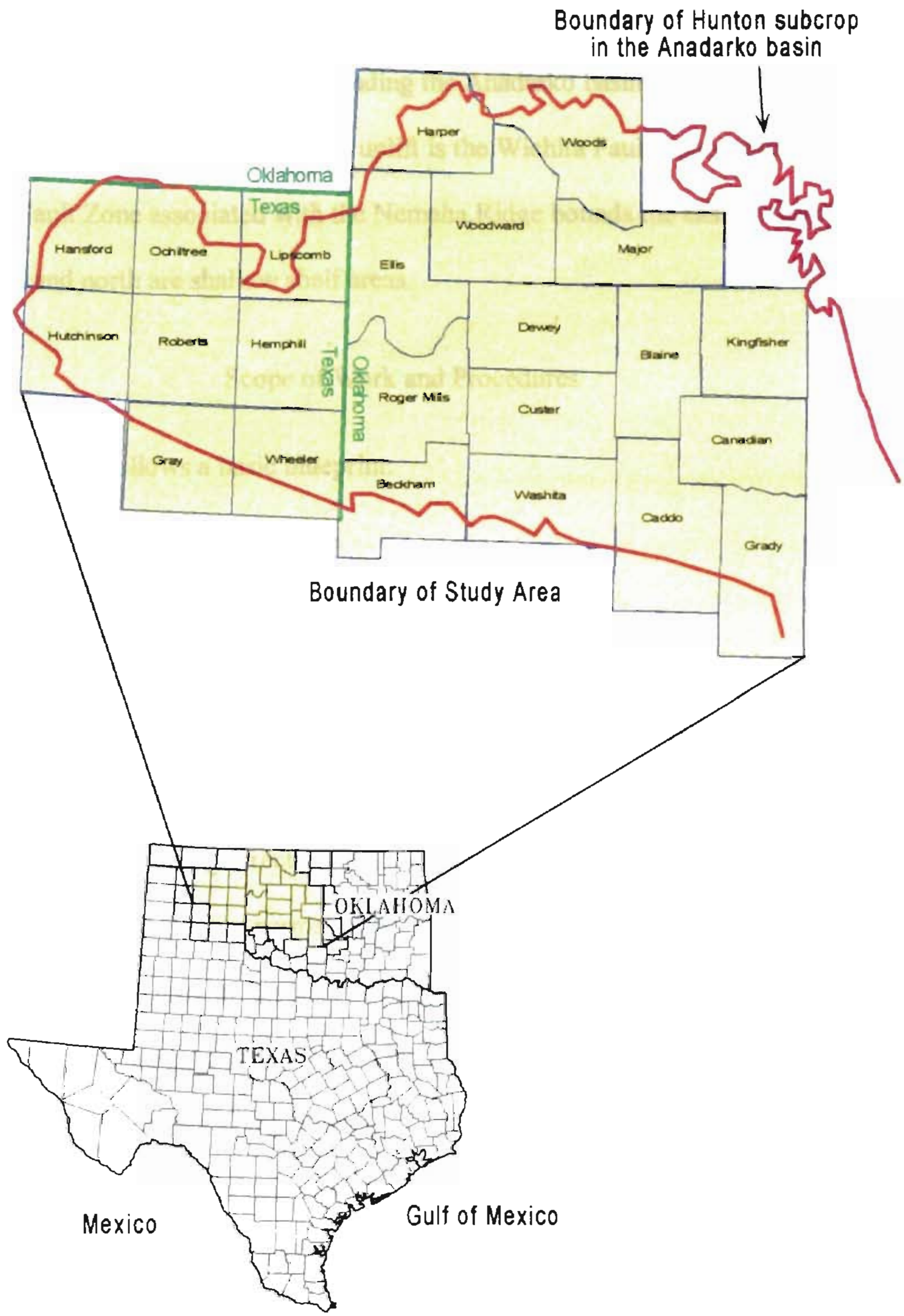


Figure 1. Study area with counties and Hunton subcrop boundary.

the deepest basin in the U.S., with a sediment thickness of 40,000 feet (Johnson, 1989, p. 3). The basin is S-dipping and asymmetric (Amsden, 1989 p.143, and shown in the conceptual cross section, Figure 2). Sediments thicken toward the ancient eroded Amarillo-Wichita Mountain Front. Bounding the Anadarko basin on the south and separating it from the Wichita Mountain uplift is the Wichita Fault Zone. The Central Oklahoma Fault Zone associated with the Nemaha Ridge bounds the basin on the east. To the west and north are shallow shelf areas.

Scope of Work and Procedures

This study follows a basic blueprint:

1) describe Hunton stratigraphy,
2) characterize typical Hunton reservoir pressures and porosity,
3) develop a computer database of Hunton reservoir pressures using drill stem tests,
4) construct basic geologic maps and cross sections of the Hunton and adjacent formations of the Woodford Shale and Sylvan Shale,
5) construct a map showing direction of fluid movement in the Hunton,
6) construct a general Hunton permeability map,
7) integrate observed rock properties such as porosity and permeability with lateral fluid migration throughout the Hunton within the Anadarko basin,
8) identify basin-wide producing trends,
9) demonstrate how drill stem tests can be combined with reservoir facies maps produced from electric logs and core analyses, and
10) explain on the reservoir and basin-scale how these techniques help find oil and gas.

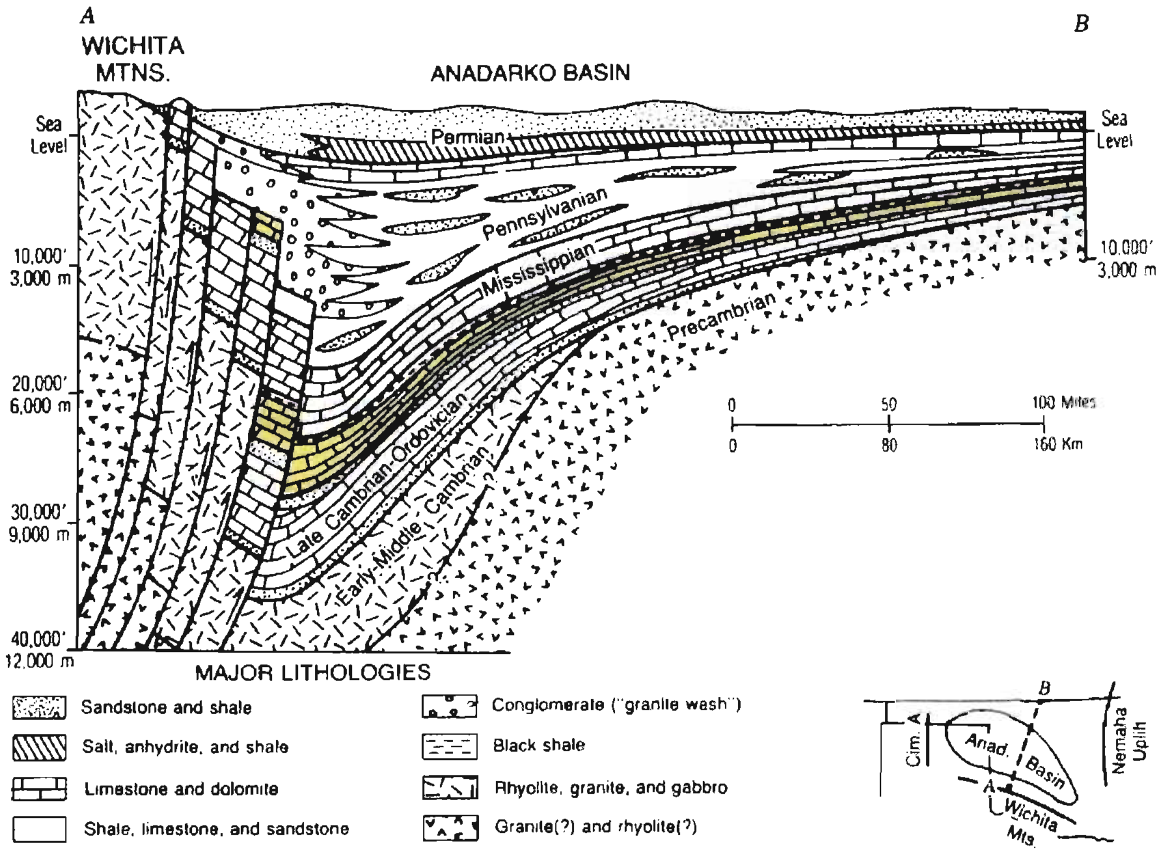


Figure 2. Generalized structural cross section of the Anadarko basin showing the Hunton Group highlighted in yellow. Note truncation of upper units shelfward. Adapted from Johnson (1989, p. 8) and unpublished cross section by H.G. Davis.

Reservoir characteristics of the Hunton were compared with fluid flow characteristics to determine if the Hunton is hydraulically continuous, and if there is a pattern to hydrocarbon accumulation. Migration of formation fluid was examined using pressures from formation tests called drill stem tests or DSTs. Hunton wells with DSTs are shown in red, Plate 3. DSTs are used to test a given interval for the likelihood of economic production. Location of oil and gas cumulative production in the Hunton is shown in Plate 4. During the process of examining formation pressures, a methodology was developed to screen out erroneous DST data. Pressure-depth (P-D) plots and a pressure gradient map were constructed using the DST data.

Total hydraulic head for each well was calculated by adding the pressure head to the elevation head. Head values were used to construct a potentiometric contour map. Arrows drawn perpendicular to these potentiometric contours represent flow directions of the formation fluids within the Hunton Group. In conjunction with the potentiometric map, a permeability index map was used to identify regional flow patterns and likely areas for hydrocarbon accumulations. A permeability index map is a contour map of the ratio of the highest flowing pressure (FP) to the highest shut-in pressure (SIP) for each DST interval. Finally, pressure information was integrated with geological maps and facies distribution in the Hunton. Hence, pressure relationships in the Hunton were linked to rock characteristics, such as porosity and dolomitization.

Previous Work

Al-Shaieb and Puckette (Al-Shaieb et al., 1991) compiled a database of fluid pressures, petrographic thin sections, cores, x-ray diffractometer analyses, cathodoluminescence studies, scanning electron microscope (SEM) photomicrographs, and correlation of facies with electric logs in the Anadarko basin. These data have helped to characterize lithologic units within the basin, and in particular the Hunton Group. From this research an interesting phenomenon was observed in the strata above the Hunton Group, namely the existence of a basinwide, completely sealed, overpressured compartment coined by Al-Shaieb et al., (1994a, p. 55) as the Megacompartment complex (MCC).

"All reservoirs within this complex exhibit pressure gradients that exceed the normal gradient of 0.465 psi/ft," (Al-Shaieb et al., 1994a, p. 55). The top seal zone is between 2290-3050m (7500-10,000 ft) below the surface and is relatively horizontal, dipping slightly to the southwest and appears to cut across stratigraphy. The basal seal is stratigraphically controlled and coincides with the Devonian Woodford Shale (Al-Shaieb et al., 1994a, p. 55). Al-Shaieb et al., (1994b) categorized the different-sized compartments within the Megacompartment complex.

Below the overpressured strata is the normally pressured Hunton Group. The normal pressure gradient of 0.465 psi/ft is the slope of a line connecting pressure-depth plot to the surface (0 depth, 0 pressure) on a pressure depth profile. Puckette (1996, p. 9) referencing Stuart (1970) and Bradley (1975) stated that a saline water column has been used by the petroleum industry because fluids at depth in basins generally increase in salinity. As a result, an average gradient for Gulf Coast basin brine with 100,000 ppm total dissolved solids (TDS) became the benchmark for a normal static gradient. The static gradient is a function of fluid density. On average, pressure gradients in the Hunton do not exceed this normal pressure gradient of 0.465 psi/ft (Figure 3).

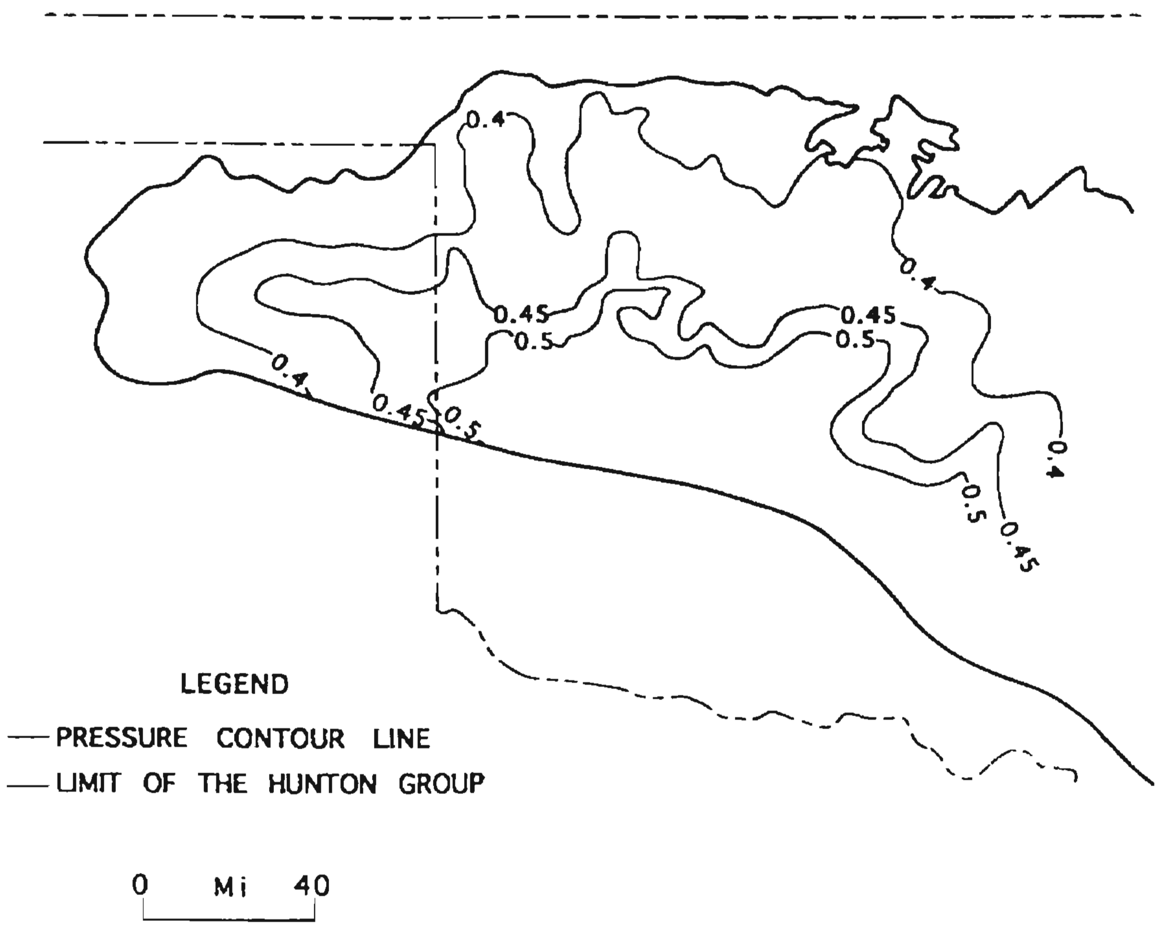


Figure 3. Pressure-depth gradient (psi/ft) of the Hunton Group showing near normal pressures (Puckette, 1996, p. 55 in reference to Al-Shaieb et al., 1994).

A detailed study of reservoirs in the Anadarko basin area near or below the normal pressure gradient of 0.465 psi/ft included the Hunton Group carbonates, which are believed to behave as a regional aquifer (Puckette 1996, p. 74). Jorgensen (1993, p. B45), referring to Cambrian and Ordovician rocks of the Anadarko basin, suggested some regional hydraulic continuity. Dahlberg (1995, p. 152) in reference to Freeze and Frederick, (1967) illustrated a potentiometric map of the Anadarko basin, showing the effects of overpressuring on the strata above the Hunton in the deeper parts of the basin. With the exception of the work of Puckette (1996) and Al-Shaieb et al., (1991) few publications have dealt with the regional pressure architecture and potentiometric surface of the Hunton Group, (see Figure 3 and Figure 4). Bottom hole pressures, as opposed to DST pressures, were used to construct these previous pressure gradient and potentiometric maps, (Al-Shaieb et al., 1991, p. 11).

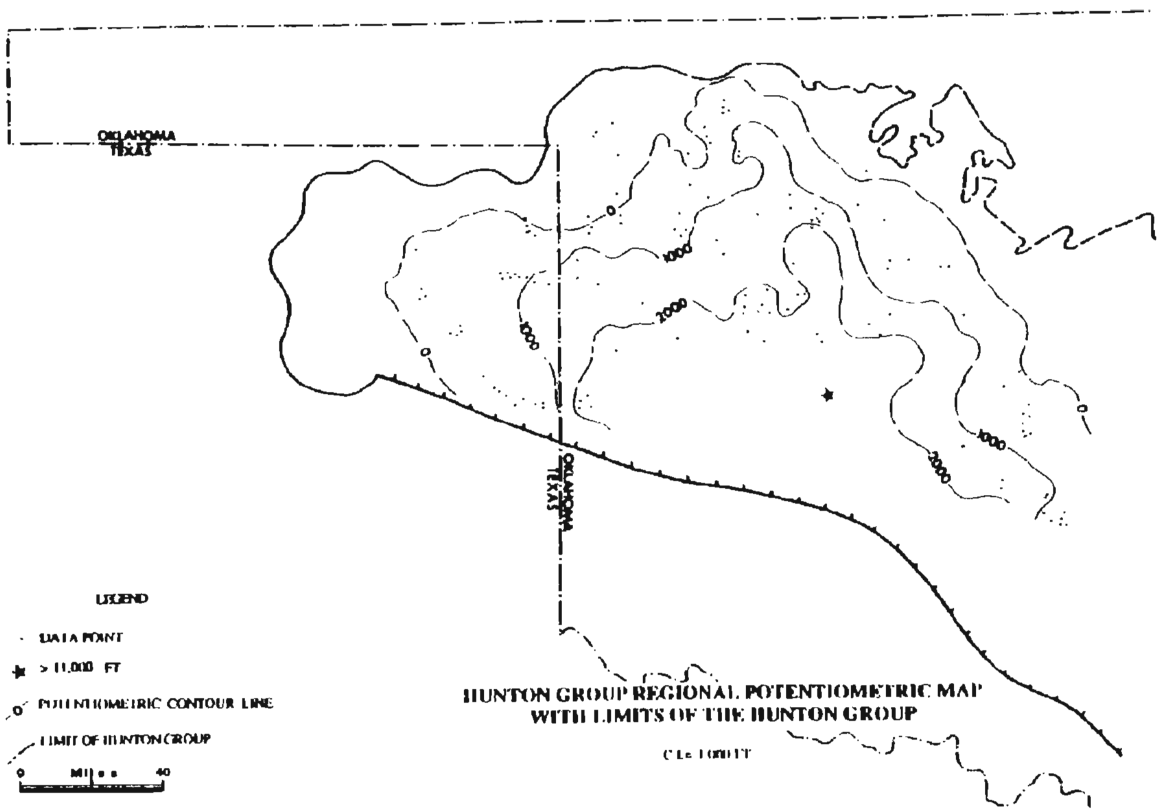


Figure 4. Potentiometric map of the Ord.-Siluro-Devonian Hunton Group (constructed using bottom hole pressures) inferring flow of fluid in the direction of decreasing hydraulic head, to the north and east (perpendicular to contours). The star identifies an anomalous hydraulic head of 11, 655 feet.

CHAPTER II

GEOLOGIC SETTING

Stratigraphy

The stratigraphy of the Hunton Group in Southern Oklahoma is displayed in Figure 5. Overlying the Hunton is the Woodford Shale, a major source rock for the Anadarko basin. Underlying the Hunton is the Sylvan Shale. Two laterally extensive unconformities have been recognized in the Hunton by Amsden (1975, p. 7-9), the Early Devonian (pre-Frisco) and pre-Woodford unconformities. Erosion associated with the pre-Woodford unconformity in the northern Anadarko shelf removed upper units of the Hunton so that the Devonian Woodford Shale rests on the Ordovician Sylvan Shale.

Erosion of Hunton removed more strata in the northern part of the basin than the southern part, thereby exposing older rocks in the north, (Figure 6). The shape and distribution of these depressions suggest that they are remnants of ancient stream channels, (Amsden, 1975, p. 9). The undulatory nature of the top of the Hunton throughout the Anadarko basin is portrayed in stratigraphic cross sections, Plate 1 and Plate 2. A map of the Hunton tops is shown in Plate 5. Thicknesses of the Hunton Group, overlying Woodford Shale, and underlying Sylvan Shale are shown in Plate 6, Plate 7, and Plate 8. Thick Hunton intervals coincide with thinner intervals of the Woodford Shale. The thick intervals of Woodford Shale are believed to be drainage

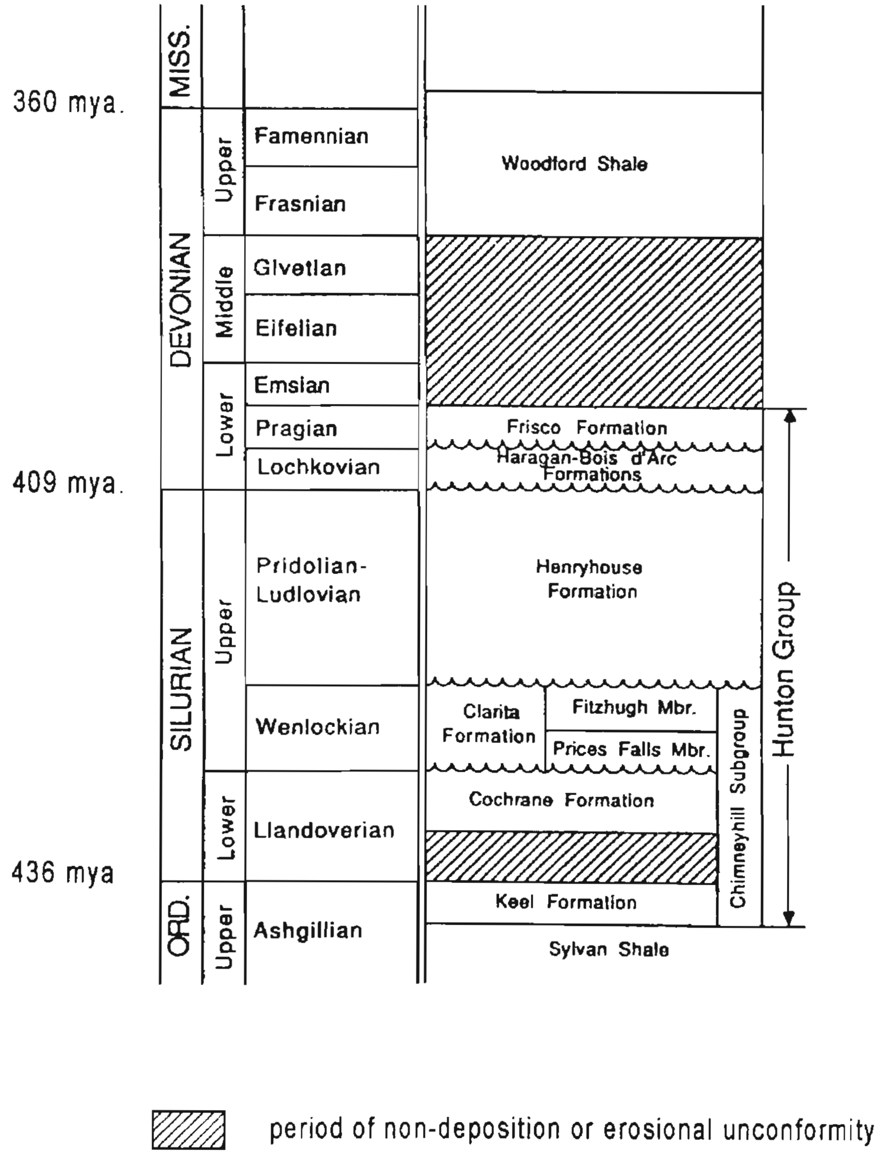


Figure 5. Stratigraphic subdivisions of the Hunton Group in Southern Oklahoma (Al-Shaieb and others 1993a, p. 183 in reference to Barrick and others, 1990).

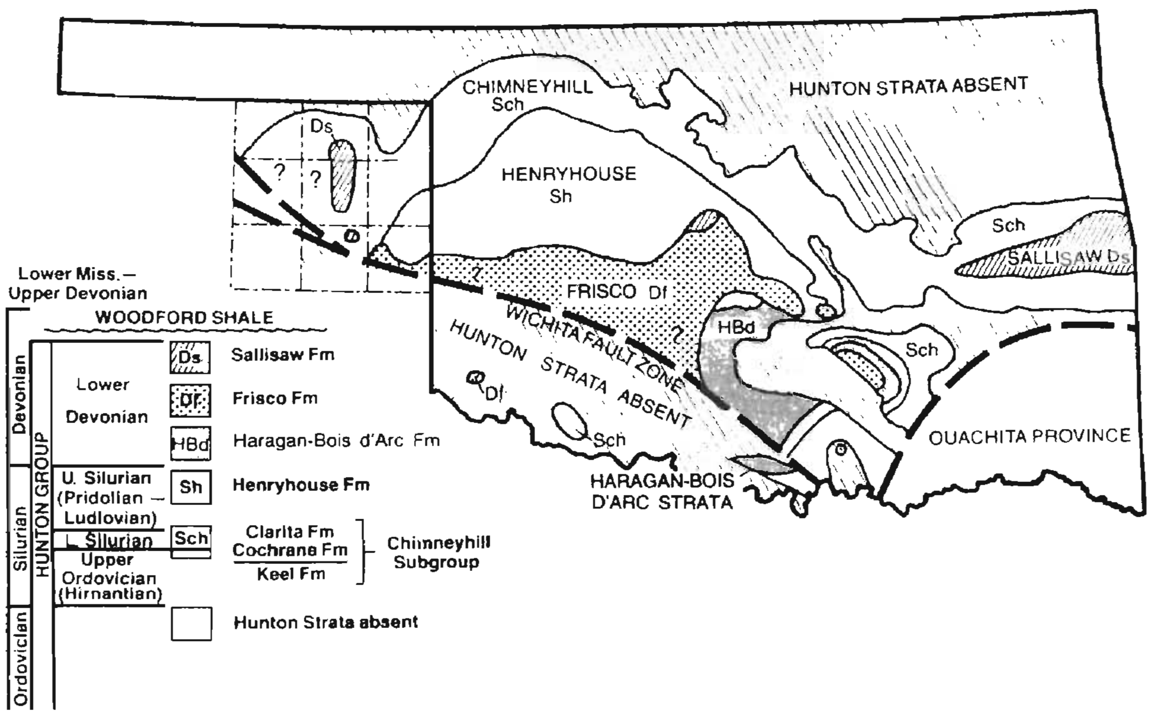


Figure 6. Pre-Woodford subcrop map (Amsden, 1989, p. 146).

channels that were filled during Woodford deposition (Woodford paleodrainage map, Plate 14, discussed in Chapter IV).

Depositional Environment and Facies

The Hunton Group was deposited in a shallow inland sea, during a period of unusually slow subsidence within the Anadarko basin, (Al-Shaieb et al, 1993a, p. 4). Matthews (1992, p. 13) in reference to Reeds (1911) stated that one cause of the variable thickness of the Hunton was differential erosion during and following sedimentation. An extensive karst system developed on the dendritic drainage pattern of the pre-Woodford unconformity in the northern Anadarko shelf. Matthews (1992, p. 83-84) confirms the unconformity in the Arco, Marcum (Woods County), Cox, Annis (Harper County), and the Mackellar Ferguson (Woodward County) cores. These cores consist of Chimneyhill rocks; the Hunton units above were eroded off. "There is a sudden change of lithology with no facies gradation represented in these three cores" (Ibid., p. 84). Other indications of unconformities in the Hunton include the occurrence of karst features, such as collapse breccia features and dedolomitization.

A type log of the Hunton with associated lithologies and an outcrop photograph of the Hunton with the Henryhouse – Haragan boundary are shown in Figure 7 and Figure 8. As shown in Figure 8, the outcrop has individual beds that are part of larger bed sequences that vary in thickness. Each sequence contains several shallowing-upward cycles that typically are composed of mudstones and wackestones at the base to packstones and grainstones near the top of the sequence (Al-Shaieb et al., 1993b, p. 193). Within each shallowing-upward cycle, the beds become thinner and finer grained

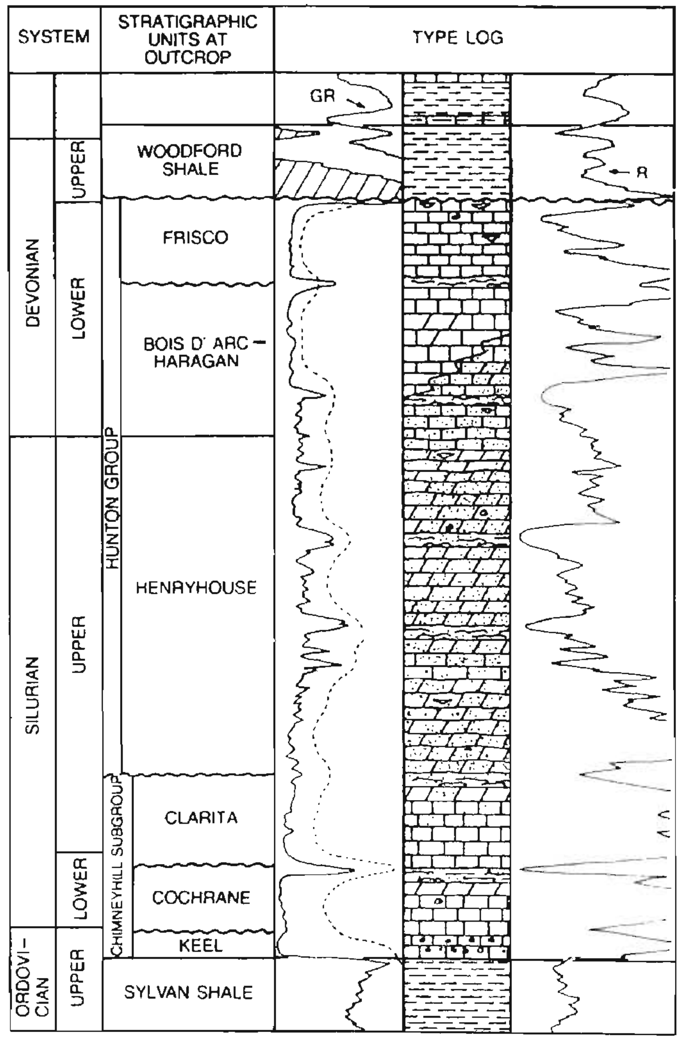


Figure 7. Type log of Hunton Group in central Oklahoma, excluding the Sallisaw Formation (Fritz and Medlock, 1993, p. 163).

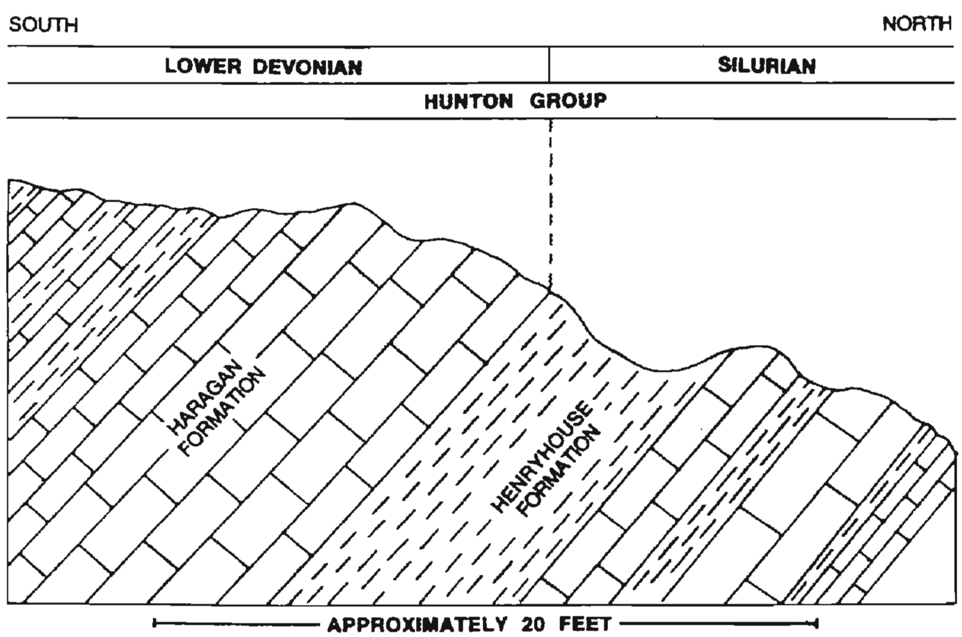


Figure 8. Outcrop of Henryhouse - Haragan/Bois d'Arc on the south flank of the Arbuckle anticline looking toward the west from I-35, mile 43 (Al-Shaieb and others, 1993b, p.193-194).

toward the base, and thicker and courser grained toward the top. "The coarser grained (shallow, high energy) carbonates are more resistant to weathering and form ridges on the land surface. The finer-grained (deeper, low energy) rocks form the soil-covered areas between the ridges." (Al-Shaieb et al., 1993b, p. 194). These sequences are indicative of an overall sea level regression during the Silurian.

Al-Shaieb et al. (1993a, p. 6) recognized three facies within the Hunton. Transitions between these facies can be subtle and difficult to distinguish because of compaction, dolomitization, and dissolution. The Henryhouse Formation is a particularly good example of facies development because it was deposited over much of Oklahoma with no major unconformities (Al-Shaieb et al., 1993a, p. 6 in reference to Shannon, 1962), Figure 9.

Three facies developed in the Henryhouse, designated by Al-Shaieb and others (1993a, p. 6-9) as facies I, II, and III (supratidal, intertidal, and subtidal facies), Figure 10. The supratidal facies I is recognized by its massive appearance, cryptal algal fabric, lack of fossils, and poor porosity. Intertidal facies II, in contrast, has an abundance of pelmatozoan fossils, evidence of burrowing and consequently good porosity. Facies II can be subdivided into lagoonal and oolitic shoal subfacies, IIa and IIb, found in Blaine and Oklahoma Counties. The subtidal facies III has a less abundant, but more diverse fossil assemblage that appear more delicate (preserved) and therefore diagnostic of a lower energy environment. Facies III is more massive and is typically a poor quality reservoir because of its lack of porosity.

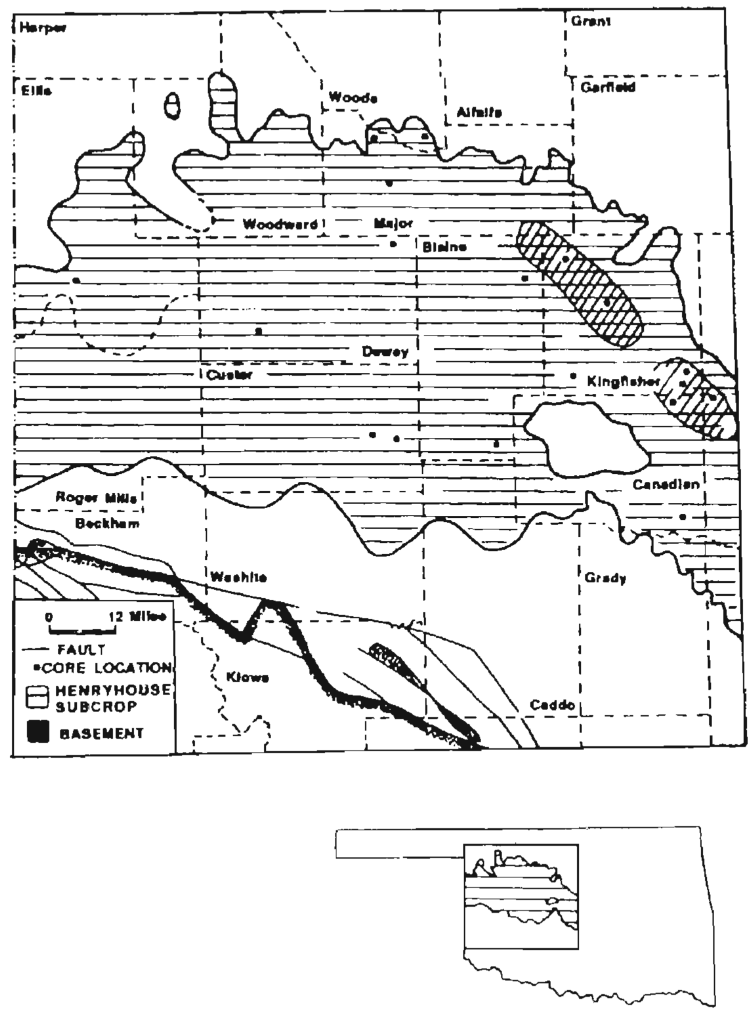


Figure 9. Henryhouse subcrop map; lagoonal and oolitic subfacies are indicated by cross-hatched pattern (Al-Shaieb and others, 1993a, p. 6).

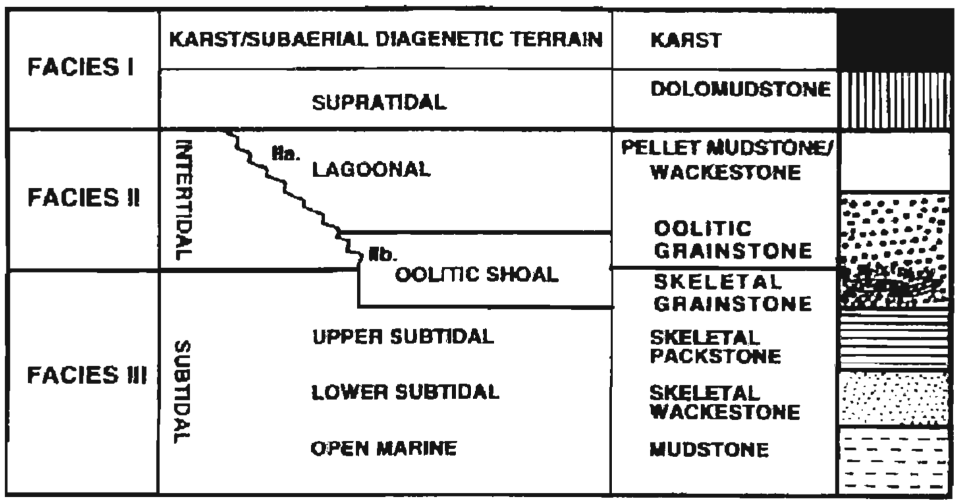


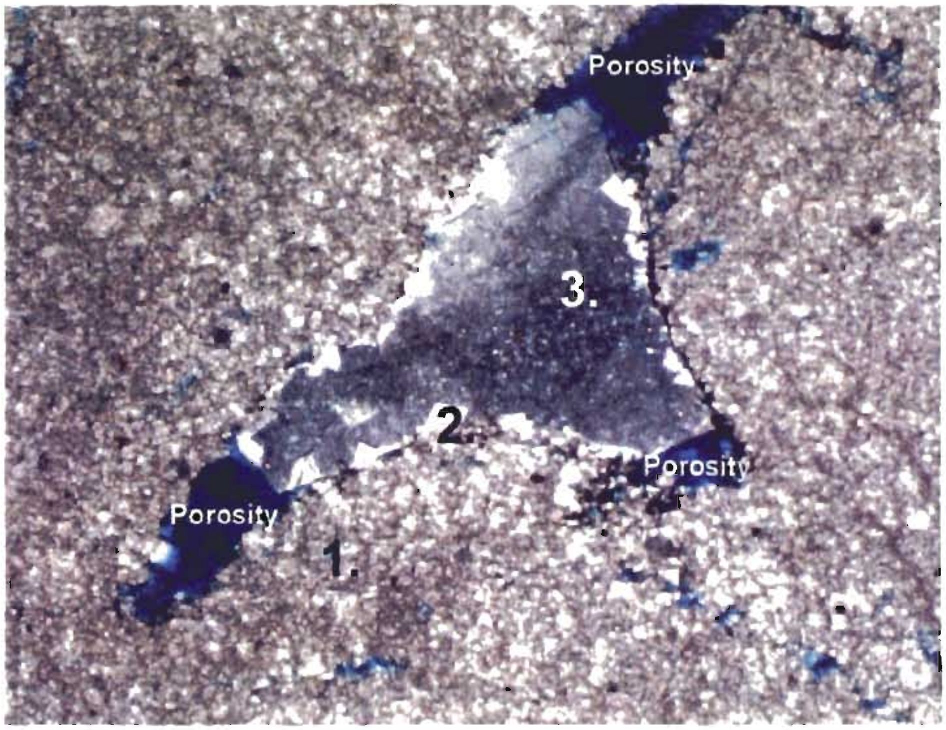
Figure 10. Facies within the Henryhouse Formation (Al-Shaieb and others, 1993a, p. 7).

Dolomitization and Porosity Preservation

Dolomitization is critical to porosity preservation in the Hunton. Three distinct types of dolomite related to three different processes of dolomitization in the Henryhouse Formation have been reported by Beardall (1983, p. 109), and Al-Shaieb (1993, p. 9-11). The types of dolomite are three: 1) brownish, cloudy, hypidiotopic dolomite formed shortly after deposition, at the expense of the micritic matrix due to magnesium-enriched hypersaline brines; 2) white or limpid idiotopic dolomite formed after the hypersaline dolomite, but before significant compaction, due to freshwater/marine water mixing; 3) post compactional mold-, vug-, and fracture-filling dolomite with undulose extinction, baroque dolomite (Beardall 1983, p. 109).

Dolomitization requires an existing porosity network, and therefore formed best in the intertidal facies. Erosional features such as unconformities associated with karstification may have enhanced the existing porosity network. Al-Shaieb et al. (1993a, p. 10) stated that during periods of nondeposition a system of recharge and hydrodynamics may have developed sufficient for formation of dolomite by mixing of marine water and fresh water. The final stage of dolomitization in the Henryhouse, called baroque or saddle dolomite, was recorded generally in crystal lengths measured in millimeters (as opposed to less than a millimeter). Saddle dolomite appears to be a passively precipitated, void-filling cement of deep-burial or hydrothermal origin at shallower depths (Ibid.). A thin section photograph of all three stages of dolomitization within an intertidal facies is shown in Figure 11.

Facies changes in the Hunton are important in predicting porosity development. Four types of porosity developed in the Hunton: moldic, vuggy, intercrystalline, and



1. shortly after deposition, hypersaline brine dolomite
2. pre-compactional, freshwater / marine-water mixing dolomite
3. post-compactional hydrothermal baroque dolomite

Figure 11: Thin section photo (polarized light 40x) of three stages of dolomitization shown in order of formation. Photo of intertidal facies II, dolowackestone with baroque dolomite replacement of brachiopod mold.

fracture porosity. Moldic and intercrystalline porosity are fabric-selective, whereas vuggy and fracture porosity are non-fabric-selective (Choquette and Pray 1970, p. 212). Non-fabric-selective rocks have no discernable relationship between porosity and fabric elements, solid depositional and diagenetic constituents. Porosity in reservoir facies is commonly 5-15%.

In the Henryhouse formation, the reservoir facies contain approximately 6-9% porosity (Al-Shaieb et al., 1993, p. 17 Fig. 22). Carbonate average porosity is difficult to estimate; a core plug or even an entire core may not be enough if large pores are present (Choquette and Pray 1970, p. 211). Tortuosity of fluid flow within carbonate pores is increased by diagenetic and dissolution processes. Porosity is primary or secondary, depending on if it formed during deposition, or as the result of dissolution that enlarged voids. Intercrystalline porosity is either primary porosity preserved by dolomitization, or late secondary dissolution porosity (Al-Shaieb et al., 1993a, p. 16). Most porosity in the Hunton is secondary moldic porosity formed after dolomitizing fluids preserved the primary porosity.

Paleohydrology

Maps by Jorgensen (USGS Professional Paper 1414-B, 1993, p. B23, B25, B26), Figure 12, Figure 13, and Figure 14 show Middle Ordovician, Early Silurian, and Early Devonian paleogeology. The Silurian – Devonian shoreline in these figures parallels the boundaries of known intertidal biofacies. Furthermore, the intertidal facies coincide with the dolomitization fairway in the Anadarko basin presented by Howery (1993, p. 80), Figure 15, and extends northeast beyond the Anadarko basin to the Illinois basin

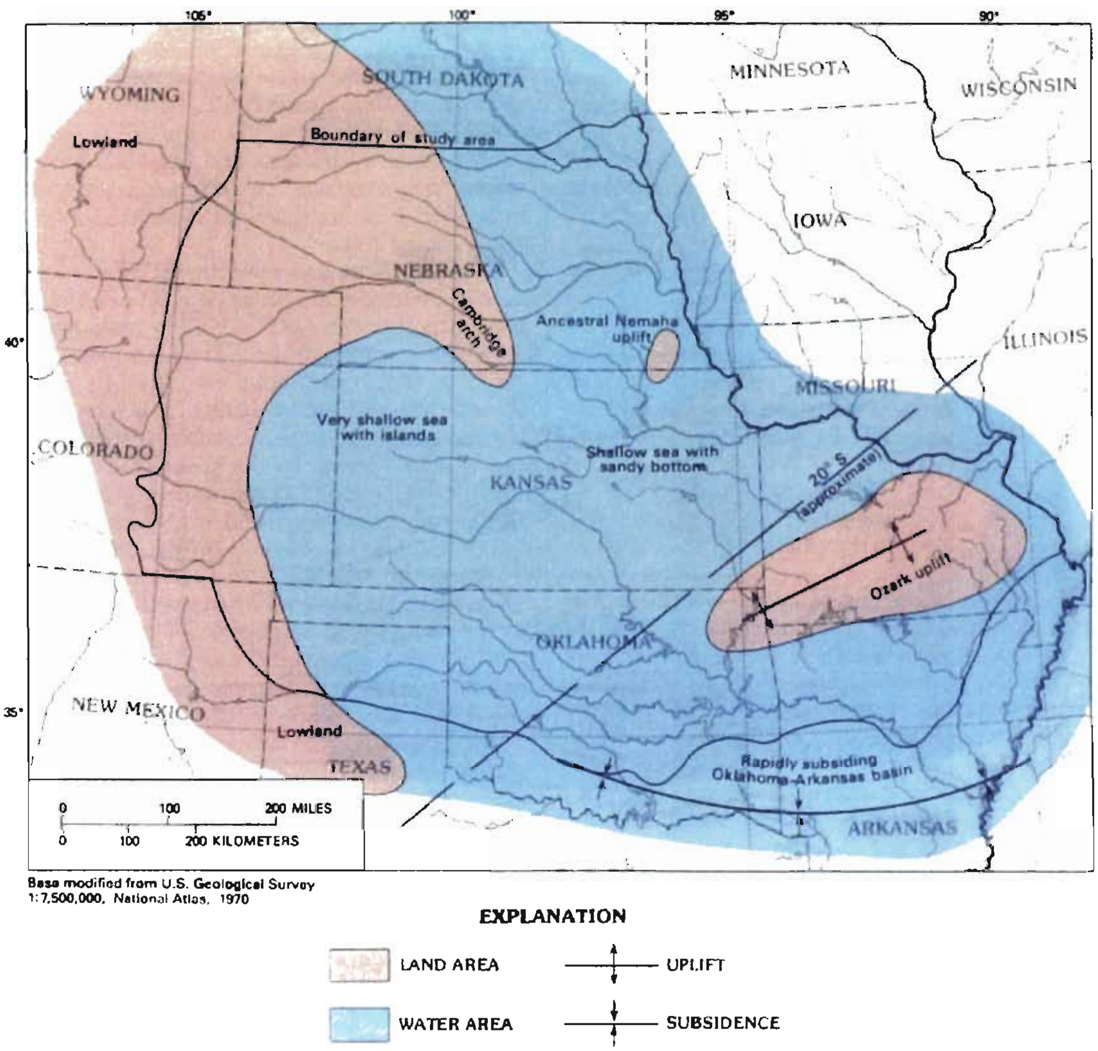


Figure 12. Middle Ordovician paleogeology (Jorgensen et al., 1993, p. B-23).

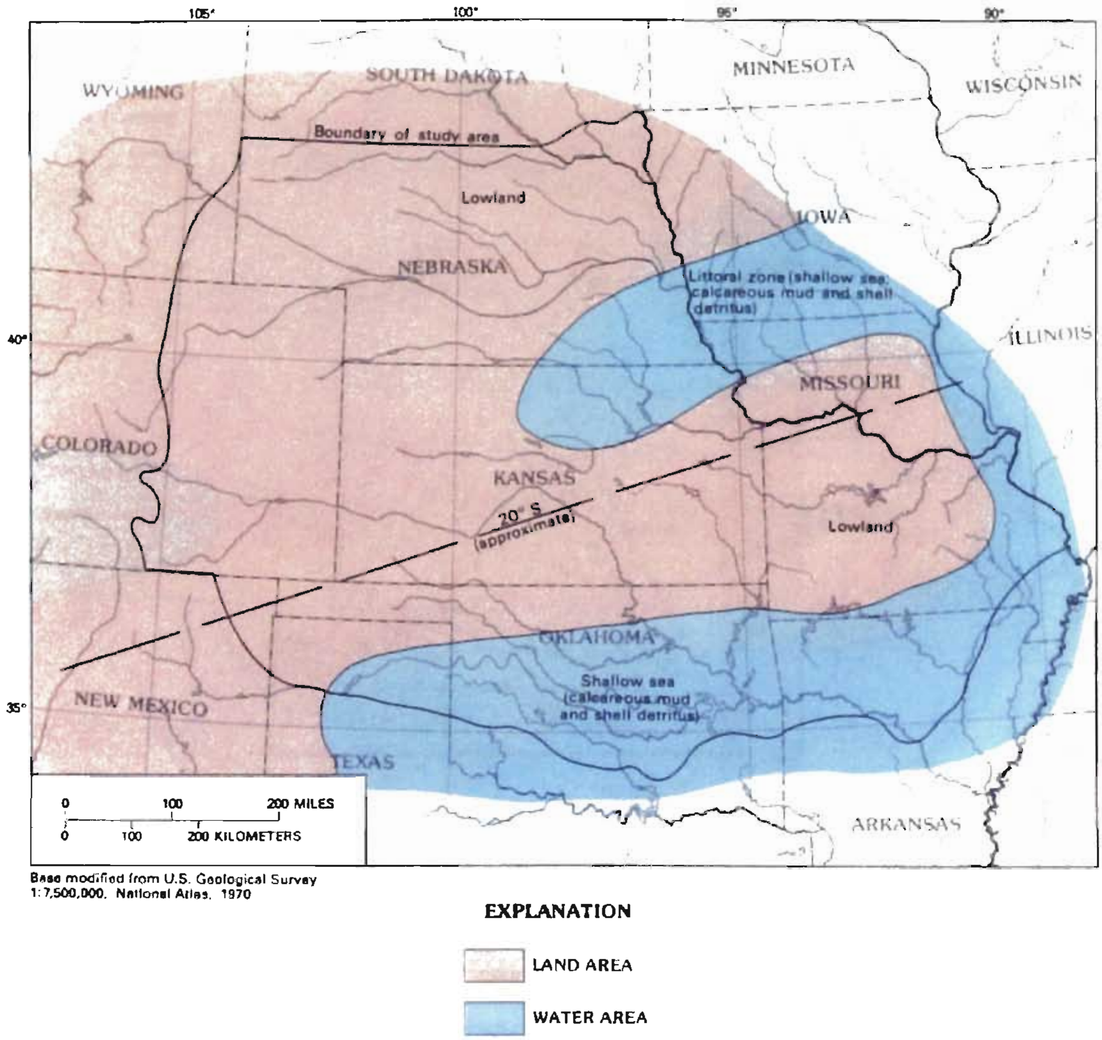


Figure 13. Early Silurian paleogeology (Jorgensen et al., 1993, p. B-25).

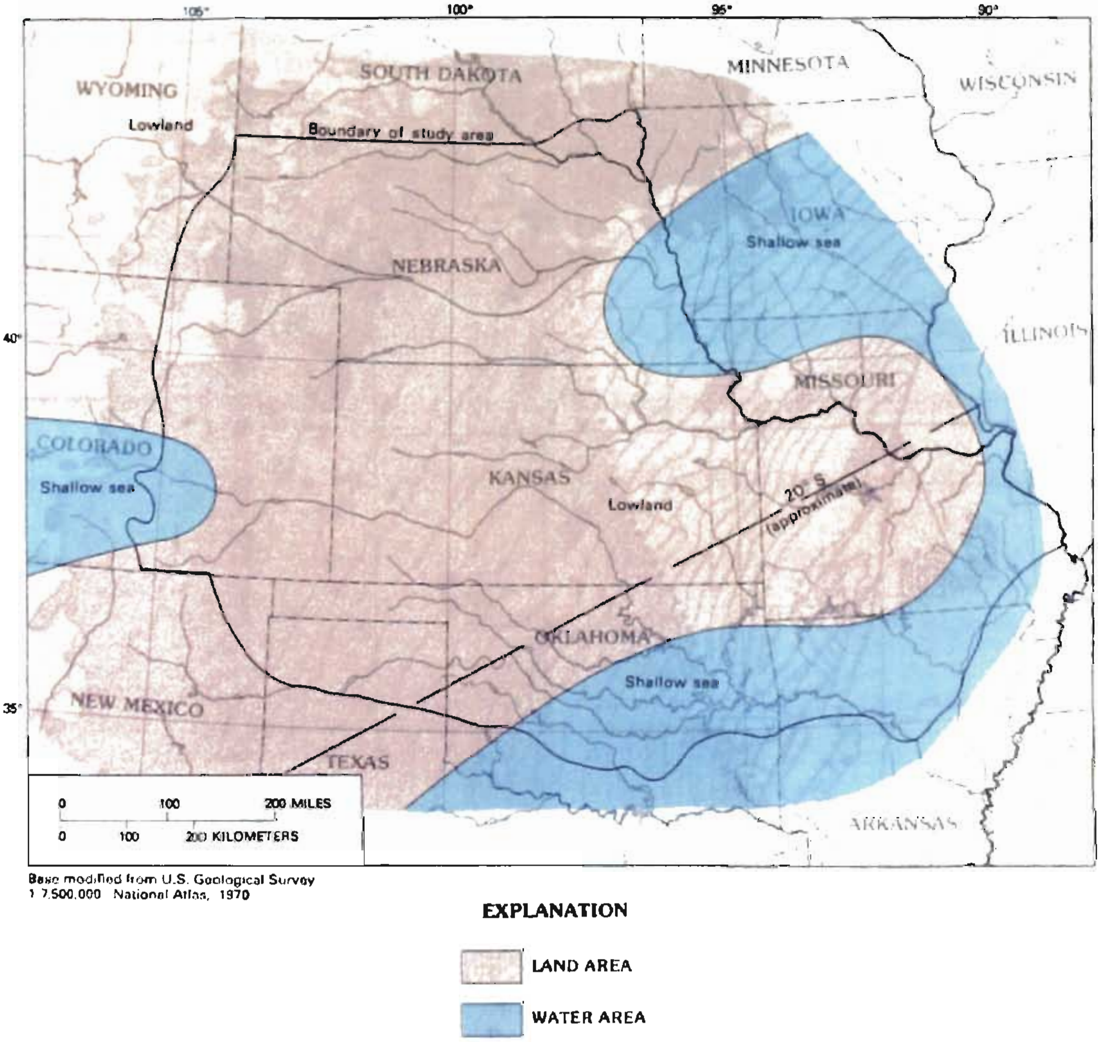


Figure 14. Early Devonian paleogeology (Jorgensen et al., 1993, p. B-26).

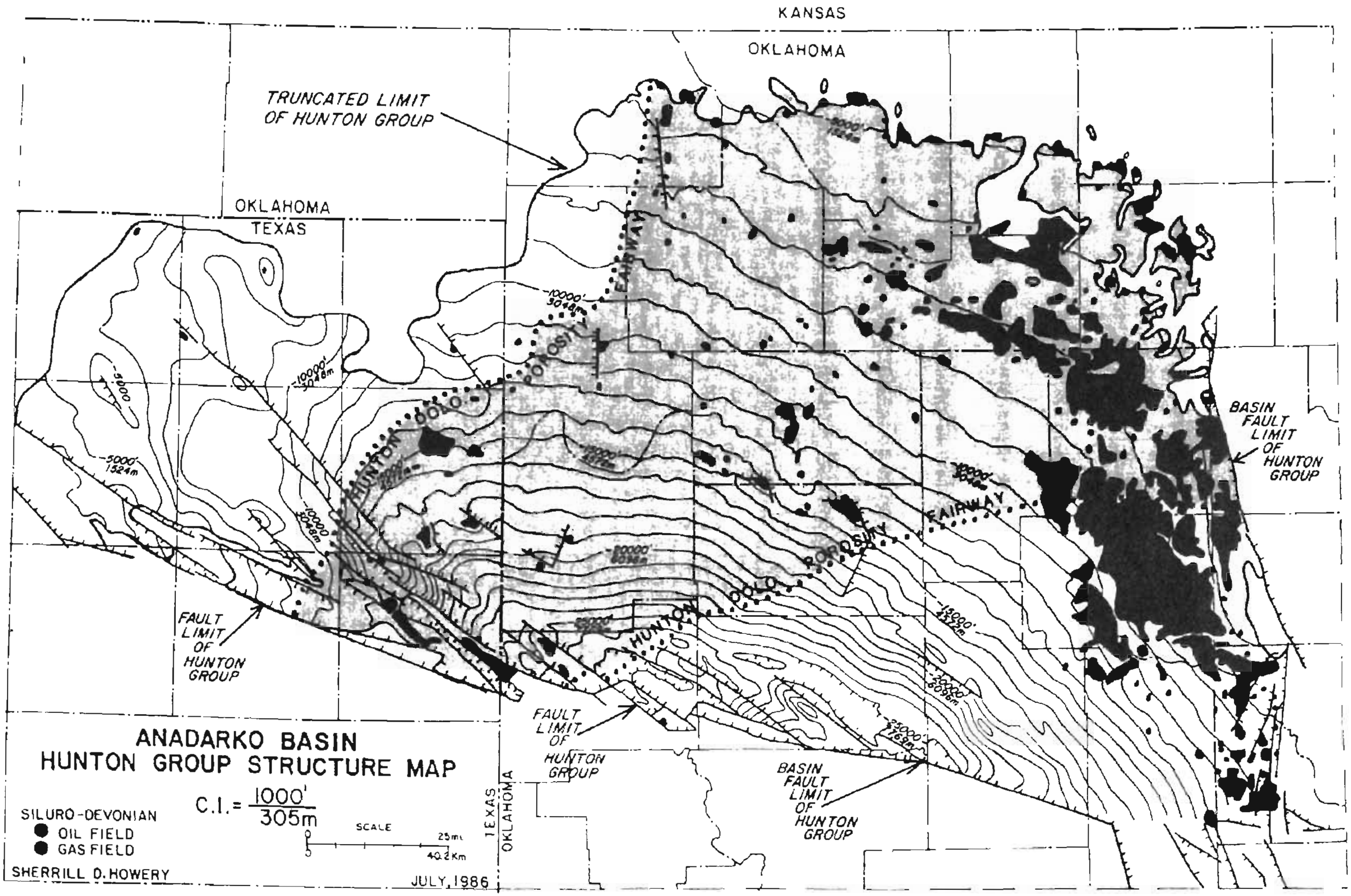


Figure 15. Hunton dolomite porosity fairway, structure on top of Hunton, and Hunton oil or gas fields (Howery, 1993, p. 80).

(Amsden, 1989, p. 146 and Davis, 1989, p. 70-71). A reasonably well-defined limestone/dolomite boundary extends across this region, separating a dolomite province lying to the north and west from a limestone province lying to the south and east (Amsden, 1989, p. 144). Regressing seas subaerially exposed the Hunton in the Silurian and Early Devonian, enhancing porosity and dolomitization near the shoreline where freshwater and marine water mixed (Jorgensen, 1989, p. 176).

High permeability zones represented within the permeability index map, constructed from DST pressures, coincide with the limestone/dolomite boundary and dolomite fairway, Plate 20. An explanation of how DSTs were screened to construct this map and subsequent DST maps is in the following chapters.

CHAPTER III

DEVELOPMENT OF METHODOLOGY

Using Drill Stem Tests

Drill stem tests (DSTs) were the sole source of pressure data for this study. Appendix A explains the mechanics of a drill stem test and how to recognize quality data. The suggestions in Appendix A are primarily from Schlumberger's "Review of Basic Formation Evaluation" by Johnston (1976) which assumes access to the full DST report (rarely available for old wells). The locations of Hunton DSTs in the Anadarko basin are identified in Plate 3 and Appendix B.

The DST is the only evaluation tool that obtains reservoir parameters under dynamic, rather than static, conditions early enough to make a decision regarding well completion (Johnston, 1976, p. i). The DST is accepted as the best and most economical means of "temporarily" completing a borehole (Johnston, 1976, p. i, and van Poollen and Bateman, 1958, p. 90). However, DSTs are not easy to evaluate. Dahlberg (1995, p. 21) stated that assessing the reliability of any subsurface pressure measurement is more an art than a science.

DST data was used to help determine the following reservoir characteristics: formation pressures, either original or depleted pressures, and effective permeabilities in the form of a unit-less permeability index. Hydrogeologic maps were constructed and applied to exploration of the Hunton Group in the Anadarko basin. More than 1,000 Hunton DST intervals (approximately 850 wells, at least 150 with multiple DSTs) in the Anadarko basin were identified using scout tickets (abbreviated well completion reports), Figure 16 and Petroleum Information (PI) digital database, Figure 17. An indispensable guide to deciphering scout ticket abbreviations is "The D&D Standard Oil Abbreviator" (1994).

DST data from a scout ticket is incomplete, because scout tickets lack the pressure-time chart that records pressure changes during a DST (Appendix A). Poorly conducted tests are also a problem. In the 1950's and early 1960's many tests recorded only one shut-in pressure (SIP). Dolan (1957, p. 321) recommends using two shut-in periods for more accurate extrapolation of formation pressure and transmissibility. Most Hunton DSTs were conducted in the 1960's and early 1970's. Bateman, (1974, p. 1) stated that one factor responsible for so many unusable tests is the practice of standardization – attempts to use the same techniques and procedures from test to test. Johnston, (1976, p. 24) developed rules-of-thumb from a statistical analysis of DSTs, but contends that these should serve as *general* guidelines.

Johnston's (1976) guidelines were expanded to include use of incomplete DST data. Calculation of fluid potentials requires an accurate pressure-depth measurement; in this case, the base of the DST interval was used as the depth to the measured pressure. Dahlberg (1982, p. 15) stated that using the midpoint between the top and bottom of the test interval is another option and that the effects of using one depth or another are probably not important. The accuracy of DST measured pressure is ± 1% psi (pounds per square inch) for every 1000 feet, so a pressure measured at 10,000 feet would have

5-2-37 HP MAP NO. ______ SEC. 20-17N-17W WELL CLASS

STATE Oklahoma	COUNTY Dewey	LOC. *S½ N½ S½ NW	D DG (INIT. FIN.)
OPER. Sarkeys, Inc.			
WELL 1-20	FARM Millie	820FSL-1320FWL of NW/4	
POOL PUTNAM		ELEV. 1705GR, 1722DF, 1724KB	
CONT. Frontier (RT)		GEOL.	
API NO. 35-043-20715	PROVINCE	Petroleum Information Corporation	
FR. 7-19-76	SPUD 7-18-76	COMP 4-5-77	
TD 13,720'	FORM Sylvan Sh	PBTD	

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COMPLETION RECORD

PROD. INTERVAL TREATMENT

PRODUCING FM	FROM-TO	TREATMENT
Hunton Lm	13,370-416 w/92	NONE

PROPERTY OF OCGS GEOLOGICAL LIBRARY

PROD FM IP

Hunton Lm IPF 13,295 MCFGPD x 65 BD x 8 BW/72 hrs, 17/64" TC, FTP 2422, Gty 59
IP CAOF 33,889 MCFGPD

CASING RECORD

SIZE	DEPTH	SX	SIZE	DEPTH	SX
10-3/4"	4110	2575	5½" lnr	11,833-13,719	200
7-5/8"	12,132	675			

(1170 1st NAT CTR, Okla City, OK 73102) PTD 13,800' Hunton

LOG TOPS: (KB 1724')

Cottage Grove	7958	(- 6234)	Chester	10,692	(- 8968)
Oswego Lm	8978	(- 7254)	Chester 'Marker'	11,025	(- 9301)
Verdigris Lm	9106	(- 7382)	Miss Lm	12,072	(- 10,348)
Red Fork Sd	9340	(- 7616)	Hunton Lm	12,290	(- 10,566)
Inola Lm	9492	(- 7768)	Sylvan Sh	13,670	(- 11,946)
Morrow Sh	9896	(- 8172)	TD	13,720	(- 11,996)
Morrow Sd	10,358	(- 8634)			

*Corr Loc (Was C NW/4)

(7-27-76) SPUD 7-18-76: Drlg 3257
(8-3) 10-3/4" @ 4110 w/2575; Drlg 4320
(8-10) Drlg 7150 (8-23) Drlg 9564 (8-30) Drlg 10,505
(9-8) Drlg 11,286 (9-17) Drlg 11,991
(9-24) @ 12,132 - Logs: 7-5/8" @ 12,132 w/675; WOC
(10-12) Drlg 13,337
(10-19) DST #1 (Hunton Lm) 13,360-442, op 12, strong blow air immed, WCTS 3, GTS 6, Fest 10,000 MCFGPD, SI 45, op 37, GTS immed, F 6000 MCFGPD/10, 13,000 MCFGPD /15, 16,000 MCFGPD/20, 17,500 MCFGPD/25, (Cont'd)

5-2-37 HP

Figure 16. Hunton scout ticket with "quality DST," continued next page.

*-37 HB SHEET NO. 2 SEC. 20-17N-17W

STATE Okla COUNTY Dewey LOC *S½ N½ S½ NW

OPER. Sarkeys, Inc. 820 FT/FR S LINE

WELL 1-20 FARM Millie 1320 FT/FR W LINE

18,000 MCFGPD/30, 18,250 MCFGPD/37, reversed out rec, ISIP 5042/45, 1st IFP 3072, FFP 4698, 2nd IFP 3929, FFP 4563, FSIP 5042/98, IHP 6838, FHP 6759, BHT 196; Drlg 13,670

(10-26) No cores
Drlg Comp 10-19-76
TD 13,720 - Logs, DI, FDC, GRL, CALP
5-1/2" lnr 11,833-13,719 w/200; WOCT

(11-15) DOC: 2-7/8" tbg w/pkr @ 12,242
PERF (Hunton Lm) 92/13,370-416 - did not treat
F 16,320 MCFGPD/no time, 1/2" TC, FTP 2800
F 5,690 MCFGPD/no time, 1/4" TC, FTP 3500, SITP 3900

(2-25) F 4300 MCFGPD/15 hrs, 1/4" TC, FTP 3450
F 3130 MCFGPD/17 hrs, 12/64" TC, FTP 3390, CP 2750

(3-1) F 4691 MCFGPD/no time, 15/64" TC, FTP 3325, CP 3275
F 5113 MCFGPD x 10 BW/no time, 15/64" TC (Cont'd)

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Figure 16 (cont'd). Hunton scout ticket with "quality DST."

petroROM Well Report
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--------------------------- General Information -------------------------------

State	: OKLA	Final Status	: GAS
County	: DEWEY	Total Depth	: 13720
Field	: PUTNAM	Spud Date YYYYMMDD	: 19760718
Operator Name	: SARKEYS	Comp Date YYYYMMDD	: 19770405
Well Number	: 1-20	Hole Direction	: VERTICAL
Lease Name	: MILLIE		
API Number	: 35043207150000		
Section or Equiv	: SEC 20	Init Lahee Class	: D
Township	: N017	Final Lahee Class	: DG
Range	: W017	Permit Number	:
Spot	: N2 S2 NW	Elevation	: 1724 (KB)
Base Meridian	: INDIAN (18)		
Geologic Province	: ANADARKO BASIN		
Formation at TD	: (203SLVN) SYLVAN		
Oldest Age Pen	: ORDOVICIAN CINCINNATIAN (203)		

Producing Formation: 269HNTN HUNTON

---------------------- Additional Location Information -----------------------

Footage Location : 820FSL 1320FWL QTR SEC L
Location Narrative: 5 MI E WEBB, OK

Latitude	: 35.93752	Latitude (Bot)	:
Longitude	: 99.03935	Longitude (Bot)	:

Latitude & Longitude Source: USGS

--------------------------- Initial Potential Tests ---------------------------

Test	Form	Top	Base	Oil Rate	Gas Rate	Wtr Rte	FTP	BHP	Ck	M	BHT
0001	269HNTN	13370	13416		13295 MCFD				17	F	

------------------------------ Production Tests -------------------------------

Test	Form	Top	Base	Oil Rate	Gas Rate	Wtr Rte	FTP	BHP	Ck	M	BHT
0001	269HNTN	13370	13416		16320 MCFD		2800		32	F	
0002	269HNTN	13370	13416		5690 MCFD		3500		16	F	
0003	269HNTN	13370	13416		4300 MCFD		3450		16	F	
0004	269HNTN	13370	13416		3130 MCFD		3390		12	F	
0005	269HNTN	13370	13416		4691 MCFD		3325		15	F	
0006	269HNTN	13370	13416		5113 MCFD	10 BW			15	F	
0007	269HNTN	13370	13416		5134 MCFD	8 BW	3350		15	F	
0008	269HNTN	13370	13416	65 BC	13295 MCFD	8 BW	2422		17	F	

------------------------------ Formation Tops ---------------------------------

Form	Depth	Source	Show
405CGGV	7958	LOG	
404OSWG	8978	LOG	
404VRDG	9106	LOG	
404RDFK	9340	LOG	
404INOL	9492	LOG	
402MRRW	9896	LOG	
402MRRW	10358	LOG	
354CSTR	10692	LOG	
354CSMK	11025	LOG	
359MPLM	12072	LOG	

Figure 17. Petroleum Information (PI) data of a "quality" Hunton DST, continued.

269HNTN	12290	LOG	IP TEST-G
203SLVN	13670	LOG	

------------------------------- Formation Tests -------------------------------

Test	Type	Form	Top	Base	Hydrostatic Init.	Hydrostatic Final	Flowing Init.	Flowing Final	Shut In Init.	Shut In Final	Open Time	Cush Amt
0001	DST	269HNTN	13360	13442	6838	6759	3929	4563	5042	504	37M	

Material to Surface

Test	Amount	Unit	Type	Time	Amount	Unit	Type	Time	Amount	Unit	Type	Time
0001			CUSH	3M			GAS	6M	1000	MCFD	GAS	
0001	6000	MCFD	GAS	10M	13000	MCFD	GAS	15M	16000	MCFD	GAS	20M
0001	17500	MCFD	GAS	25M	18000	MCFD	GAS	30M	18250	MCFD	GAS	37M

-------------------------------- Log Data --------------------------------

Type	Top	Base
ILD		13720
DN		13720
GR		13720
CA		13720

------------------------------- Casing Data -------------------------------

Size	Depth	Cement
10 3/4	4110	2575
7 5/8	12132	675

------------------------------- Liner Data -------------------------------

Size	Type	Cement	Top	Base
5 1/2		200	11833	13719

---------------- Actual Bottom Hole From Surface Location ----------------

Meas Depth	True Vert Depth	Closure Ft Deg Min	N/S E/W Footage	State Code	County Code

------------------------ Actual Bottom Hole Narrative ------------------------

--------------------------- Drilling Narrative ---------------------------

Date	Remarks

Figure 17 (cont'd). Petroleum Information (PI) data of a "quality" Hunton DST. Under *formation tests*, initial and final shut-in pressures are close in value (note the final shut-in pressure of 504 is a rare typo and should be 5042). Final flowing pressure is greater than initial flowing pressure indicating no short-term reservoir depletion. Initial and final hydrostatic pressures are close in value and greater than shut-in pressures (no significant mud loss that could affect DSTs pressures). Large recovery of formation fluids, i.e. gas suggests good permeability which is also shown by ratio of final flowing pressure to final shut-in pressure, 4563 psi to 5042 psi which is 0.90. Gas to surface in 6 minutes is an indicator of a strong blow and good permeability.

an accuracy of ± 100 psi. The accuracy of the DST pressure was used to help decide a contour interval for the potentiometric map (Plate 10 and Figure 34, discussed later).

Formation Fluid Recoveries

DSTs with adequate formation fluid recoveries have pressures that approach original reservoir pressures. A test with an adequate fluid recovery is defined to be formation fluid at the surface or within the drill pipe (author's definition). Formation fluid is defined as oil, water, or gas and is represented by terms GCSW (Gas Cut Salt Water) or MCSW (Mud Cut Salt Water), for example. For a full listing of the abbreviations used in DST terminology refer to the D & D Standard Oil Abbreviator (1994) compiled by the Association of Desk and Derrick Clubs. Terms such as SGCM (Slightly Gas Cut Mud) were not used as an indicator of recovered formation fluid, because it was assumed that the primary fluid recovery in such terms was mud not formation water, oil, or gas. DSTs conducted in high permeability rocks have better fluid recoveries, and pressures more likely to approach original reservoir pressures (Puckette, 1996, p. 30). Extremely permeable formations may reach static equilibrium within a few minutes (Puckette, 1999, personal communication).

The average pressure gradient for DSTs with formation fluid recovery is 0.42 psi/ft compared to 0.25 psi/ft for those without fluid recovery (60% difference). Gas-bearing reservoirs may flow gas to the surface (GTS) within minutes, and oil-bearing reservoirs may flow gas to the surface in an hour, producing tens to thousands of feet of oil or oily fluid in the drill pipe. Water-bearing zones normally yield several hundred to several thousand feet of water in the pipe. Boreholes deeper than 8,000 feet require a water cushion inside the drill pipe (to prevent crushing of the drillstem by the mud hydrostatic pressure) and may flow the water cushion to the surface ahead of formation fluids (Puckette, 1996, p. 31). John Forster of IHS Energy is quantifying and normalizing DST recoveries so they can be mapped (1999, personal communication).

Fluid recoveries are related to the ratio of flowing pressure to shut-in pressure. The closer the flowing pressure (FP) is to the shut-in pressure (SIP) the more permeable the formation (see Appendix A for explanation). John Forster of IHS Energy has successfully used the ratio of the FP to SIP as a permeability indicator (1999, personal communication). The average FP/SIP for DSTs with formation fluid recoveries is 67% greater than DSTs without recoveries (0.53 compared to 0.35); implying fluid recoveries are from the more permeable zones.

Screening Drill Stem Tests from Scout Ticket Data

A flexible and comprehensive screening strategy was developed for evaluating DST scout ticket data. Bair (1985) showed that a strict method of screening DSTs is not effective. Bair (1985, p. 201) used a screening process based on the duration of the initial shut-in time, final shut-in time and agreement of FSIP with ISIP with no more than 5 percent difference. Bair's process was ineffective at screening abnormal DST pressures for regional potentiometric mapping purposes. Ultimately, "most of the refinement in the data was due to culling depressured DSTs" (Bair, 1985, p. 210).

One of the more difficult tasks in constructing a potentiometric map of the Hunton was interpreting the extreme variability in pressures, which may vary by as much as three orders of magnitude within one township (6 miles by 6 miles). A representative potentiometric map requires DST pressures close to original (pre-production) pressures. When lacking these original pressures, assumptions have to be made to estimate them. John Forster of IHS Energy suggested the following two assumptions: (1) the highest SIP, either initial or final, is the closest to initial reservoir pressures and (2) the highest SIP within a defined spatial window, one township for example, is most representative of initial reservoir pressures.

For each DST in the PI database (an example shown in Figure 17) there is one set of initial and final flowing pressures, one open flow time, water cushion, and fluid recoveries (usually in feet). The initial or final shut-in time is not included in the PI database. Approximately 30% of the Hunton DSTs examined in the PI database and scout tickets had only one shut-in period and in turn, one flow period associated with them. DSTs with only one shut-in period may have recorded in the PI database the initial first flow pressure and the final first flow pressure (see B and C, Figure A1 (pressure-time chart) in Appendix A). For DSTs with two shut-in pressures (C and F, Figure A1 in Appendix A), the final first flow pressure and the final second flow pressure may be recorded in PI database. No consistency was observed in reporting flowing pressures; for example, reported flowing pressures may include pressures only in the second flow period. However, the PI database usually reported the highest flowing pressure, making construction of the FP/SIP ratio for the permeability index map relatively easy.

After identifying DST wells, the well headers were exported into a comma delimited ASCII (American Standard Code for Information Interchange) file and imported into an Excel spreadsheet file. DST data of the Hunton Group were cut-andpasted into the spreadsheet (from the PI database) for DST data screening. Appendix B is the screened DST data set.

The strategy for screening data uses a three-tiered approach, level 1 being the most general and level 3 being the most specific. Level 1 screening is the most important phase of data screening because it is constructing the data table to be used in subsequent screening levels. Level 1 screening is organizing all useable data, such as pressure data from DSTs. DSTs with no recorded pressures were deleted in level 1 screening. However, these data could have been retained and mapped (mostly along the eastern Anadarko shelf). Unusable data have no horizontal or vertical coordinates and are excluded from the data table. All PI data had horizontal coordinates, but a few points had no depths associated with DST intervals, and were excluded from the data table. Judgements on data validity are withheld in level 1 screening.

Organization of data in level 1 screening requires formatting data by rows, each row representing a data point in three-dimensional space. To maintain data integrity during sorting, well headers must be copied on a unique row corresponding to each DST interval (Figure 18). When sorting according to API (American Petroleum Institute) number, unique well identifier, multiple zoned DSTs are recognized by consecutive rows of identical well headers. Each column in the spreadsheet represents a unique parameter such as well number, operator, depth to DST, and initial or final DST pressure (Figure 18 and Appendix B).

Level 2 screening is analyzing data within a row. Level 2 screening techniques involve using parameters within a row for calculations and qualifying parameters within a row. Such techniques are common in calculations of potentiometric heads, FP/SIP,

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35043207630000	-99.12354	35.81694	MARLIN OIL	ROUNDS	1	ALEDO	DEWEY	N016	W018	33	1931	KB	19780602	15677	GAS	402MRRW
35043207740000	-99.01512	36 10806	TEXAS O&G	JONES H	1	CESTOS SE	DEWEY	N019	W017	21	1878	GR	19770510	13100	GAS	354CSTR
35043207740000	-99.01512	36 10806	TEXAS O&G	JONES H	1	CESTOS SE	DEWEY	N019	W017	21	1878	GR	19770510	13100	GAS	354CSTR
35043208410000	-98.93542	36 0453	COX EDWIN	PANNELL	1	PUTNAM	DEWEY	N018	W016	8	1657	DF	19771130	12355	GAS	402MRRWU
35043209780000	-99.06603	35 90996	HELMERICH	GORE	1-36	PUTNAM	DEWEY	N017	W018	36	1740	KB	19790919	14050	2 GAS	404OSWG
35043210020000	-99.03132	35 97548	CHAMPLIN E	THOMPSEN /	1	PUTNAM	DEWEY	N017	W017	5	1729	KB	19800605	13470	GAS	269HNTN
35043210180000	-99 05237	35.86334	MONSANTO C	WILLIAMS	1-18	PUTNAM	DEWEY	N016	W017	18	1917	KB	19800415	14644	GAS	404RDFK
35043210180000	-99 05237	35.86334	MONSANTO C	WILLIAMS	1-18	PUTNAM	DEWEY	N016	W017	18	1917	KB	19800415	14644	GAS	404RDFK
35043210860000	-99 19243	36.08311	HILLIARD O	KENNEDY	1	CESTOS SW	DEWEY	N019	W019	35	2064	KB	19800914	13350	GAS	402MRRW
35043212120000	-99 1016	35.99649	DYCO PET	GORE	1-34	PUTNAM	DEWEY	N018	W018	34	1984	GR	19810510	13880	D&A-G	
35043212880000	-99.07485	36.01826	ARCO O&G	THOMSEN UN	2	PUTNAM	DEWEY	N018	W018	24	1858	KB	19811018	13370	D&A	
35043218270000	-98.8004	36.06322	STONE PET	PARMENTER	1-4	HUCMAC NW	DEWEY	N018	W015	4	1929	KB	19831209	11685	OIL	354CSTRL
35043219770000	-98 65415	35.86688	HELMERICH	BOYD	1-14	EAGLE CITY S	DEWEY	N016	W014	14	1824	KB	19841123	12490	D&A-G	
35043219780000	-99.33853	35.88626	BRACKEN EX	STOUT BENJ	2-4	LEEDEY	DEWEY	N016	W020	4	2106	KB	19850420	18588	GAS	269HNTN
35045000840001	-99.67407	36.16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000840001	-99.67407	36.16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000840001	-99 67407	36 16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000840001	-99.67407	36.16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000910001	-99.38793	36.04858	BROWN TOM	CREE ESTAT	1-12	WILDCAT	ELLIS	N018	W021	12	2030	DF	19710211	15074	D&AWG	
35045000910001	-99.38793	36.04858	BROWN TOM	CREE ESTAT	1-12	WILDCAT	ELLIS	N018	W021	12	2030	DF	19710211	15074	D&AWG	
35045200500000	-99.70211	36 48419	PAN AMERIC	HAINES UNI	1	UNNAMED	ELLIS	N023	W023	7	2293	DF	19660901	10830	GAS	402MRRW
35045200870000	-99.85688	36 18198	WOODS PET	OBLANDER	1	WILDCAT	ELLIS	N020	W025	27	2495	KB	19670801	14422	D&A-G	

Level 1 (formatting downloaded data from Petroleum Information database).
Level 2 (basic calculations using data on each row).
Level 3 (comparing data from different rows).
Header abbreviations are defined in Appendix B.

Well Header Table

Figure 18. DST Data Screening Levels (Well Header and DST Tables).

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35043207630000	269HNTN	15282	15677	6719	6877	6877	1043	0.44	117	1915	1915	0.278	tight				YD	FmR	OK
35043207740000	269HNTN	11924	12080	5833	5668	5833	2342	0.48	1801	1864	1864	0.320		multi-zn	L	h			
35043207740000	269HNTN	12338	12400	3952	3924	3952	-2023	0.32	2141	2141	2141	0.542		multi-zn	H	l			
35043208410000	269HNTN	11865	12039	5163	4336	5163	721	0.43	1616	1729	1729	0.335							
35043209780000	269HNTN	13612	13670	5030		5030	-1113	0.37	53		53	0.011	tight						
35043210020000	269HNTN	13070	13470	5780	5865	5865	872	0.44	1406	1594	1594	0.272	tight						
35043210180000	269HNTN	14175	14260	6904	6849	6904	2504	0.48	4011	2220	4011	0.581		multi-zn	L	h			
35043210180000	269HNTN	14112	14160	4718		4718	-2097	0.33	4662	4662	4662	0.988		multi-zn	H	l			
35043210860000	269HNTN	12978	13350	6010	5983	6010	1639	0.45	2887	5983	5983	0.996					Y	FmR	OK
35043212120000	269HNTN	13550	13650	3787	5787	5787	779	0.42	4592	5787	5787	1.000					Y	FmR	damaged
35043212880000	269HNTN	12980	13370	5393	5697	5697	740	0.43	1800	1800	1800	0.316							
35043218270000	269HNTN	11230	11361	4813	4791	4813	919	0.42	4746	4791	4791	0.995					Y	FmR	OK
35043219770000	269HNTN	11936	12036	4866	5314	5314	1216	0.44	886	850	886	0.167	tight						
35043219780000	269HNTN	16700	16832	7208		7208	775	0.43	3042	3417	3417	0.474							
35045000840001	269HNTN	13425	13476	5763		5763	1388	0.43	3287	3623	3623	0.629		multi-zn	L	m		FmR	No FSIP
35045000840001	269HNTN	13370	13425	5848	5836	5848	1621	0.44	4712	4284	4712	0.806		multi-zn	H	h	Y	FmR	OK
35045000840001	269HNTN	13498	13499	500	5610	5610	1036	0.42					tight	multi-zn		l			
35045000840001	269HNTN	13431	13432	5700	5600	5700	1296	0.42					tight	multi-zn		m			
35045000910001	269HNTN	14345	14467	6394	6117	6394	1314	0.44	1687	2075	2075	0.325		multi-zn	H	l	Y	FmR	OK
35045000910001	269HNTN	14350	14450	6505	6007	6505	1569	0.45	1687	1770	1770	0.272	tight	multi-zn	L	h			
35045200500000	269HNTN	10520	10560	4400	4186	4400	1195	0.42	4072	4110	4110	0.934					Y	FmR	OK
35045200870000	269HNTN	14039	14063	5633	5693	5693	675	0.40	2832	2832	2832	0.497							

Level 1 (formatting downloaded data from Petroleum Information database).
Level 2 (basic calculations using data on each row).
Level 3 (comparing data from different rows).
Header abbreviations are defined in Appendix B.

DST Table

Figure 18. DST Data Screening Levels (Well Header and DST Tables).

Oklahoma State University Library

pressure gradients, determining validity of scout ticket data, and qualifying formation fluid recoveries (FmR). The abbreviation, FmR, for formation fluid recovery is a qualifier that is used to designate formation fluid recovered at the surface or within the drill pipe. Any number of qualifiers can be added and used in combination when sorting data. For example, *if-then* statements can be used in Excel spreadsheets to define criteria for determining a tight formation or a DST suspected of being erroneous (Figure 18).

Level 3 screening involves making comparisons between rows. Calculations and analyses made in level 2, such as potentiometric heads and FP/SIP, are compared vertically and horizontally to identify the most representative ones for mapping (explained in subsequent sections). A qualifier "Y" (Yes) is added in a unique column to designate the potentiometric head to be used for mapping. Another example of level 3 screening is the addition of qualifiers "H" (High), "M" (Middle), and "L" (Low) in a single column to designate pressure gradient comparisons within multiple zoned DSTs (Figure 18).

In summary, the strategy developed for DST screening can be applied to any spatial and temporal data set. Level 1 screening is construction of a data table, row by row; each row represents a data point in three-dimensional space. In level 1 screening, judgements on data validity are withheld and all data are included except data with incomplete coordinates. Level 2 screening is analyzing data within a row using calculations and qualifiers. Level 3 screening involves spatially and temporally evaluating data points by making comparisons between rows and using more qualifiers. This strategy produces a data table that can be sorted easily using numerous screening parameters.

Appendix A, Mechanics of Drill Stem Tests, explains conditions for determining a "quality" test: DST pressure near true formation pressure (author's definition). A "quality" DST has some of the following characteristics: ISIP > FSIP and close in value to each other, hydrostatic pressure (HP) > shut-in pressure (SIP), two shut-in periods with pressures in reasonable agreement, and flow and shut-in times close to suggestions by Johnston (1976, p. 22-23). Recovery of formation fluid, a good blow to surface, and FP/SIP > 0.5 are indications that a test may be in a high permeability formation and more likely to represent true formation pressures. Figure 16 and Figure 17 is a well that has a "quality" test, in scout ticket and PI database.

DSTs that do not fall into the "quality" category may have some of the following characteristics: FSIP>>ISIP, HP < SIP, large mud recovery compared to formation fluid recovery, large discrepancy between ISIP and FSIP, one SIP, no flow period, and short shut-in time (see Appendix A). Low FP or SIP, weak blow to surface or no blow, and no fluid recovery are indications of a low-permeability formation. Experienced geologists have shown that it is more difficult to obtain accurate formation pressures in low permeability formations than otherwise. Figure 19 and Figure 20 are of a questionable test (data from scout ticket and PI database). Analyses of DSTs from scout tickets are subjective and depend on good geological sense.

Geologic Database and Computer Contour Maps

Petroleum Information (PI) data and Dwight's cumulative production Hunton data were downloaded into the geological mapping and database program, Geographix. Only well data that partially or fully penetrated the Hunton Group were downloaded into

5-4-41

MAP NO | SEC 18-16N-17W | WELL CLASS

STATE Oklahoma COUNTY Dewey LOC SW SW SE NW | D DG (INIT / FIN)

OPER Monsanto Co.

WELL 1-18 FARM Williams | 125FSL-1395FWL of NW/4

POOL PUTNAM ELEV. 1900 GR, 1915 DF, 1917 KB

CONT Rine (RT) GEOL

API NO 35-043-21018 PROVINCE

FR 8-31-79 SPUD 9-9-79 COMP 4-15-80

TO 14,644 FORM Hunton PBTD 10,400

Petroleum Information. Corporation. A Subsidiary of A. C. Nielsen Company

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COMPLETION RECORD

PROD INTERVAL TREATMENT — PRODUCING FM / FROM - TO / TREATMENT

Cherokee 9957-10,058 OA w/32 1500 GA
Frac 52,000# sd

PROD FM IP

Cherokee IPF 184 MCFGPD + 24 BO + 2 BW/24 hrs, Gty 50
GOR 7667-1

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CASING RECORD

SIZE	DEPTH	SX	SIZE	DEPTH	SX
20"	43	5 yds	7"	11,949	400
9 5/8"	3899	1500	PTD 14,500 Hunton		

~~(3545 NW 58th, Okla City, OK 73112. %Bruce E. Roll)~~

LOG TOPS: (KB 1917)

Heebner	7096	(5179)	U Red Fork Sd (Cherokee)		
Douglas	7281	(- 5364)		9944	(- 8027
Toronto Lm	7400	(- 5483)	L Red Fork Sd	10,046-123	(- 8129)
Tonkawa	7736	(- 5819)	Inola Lm	10,130	(- 8213)
Cottage Grove	8405	(- 6488)	Atoka	10,294	(- 8377)
Hogshooter	8645	(- 6728)	13 Finger	10,516	(- 8599)
Checkerboard	8932	(- 7015)	Morrow	10,587	(- 8670)
Cleveland	9128	(- 7211)	"Gore" (Clem) Sd	11,104	(- 9187)
Oswego	9570	(- 7653)	Morrow Hamilton Sds		
Verdigris	9684	(- 7767)		11,276-500	(- 9359)
Pink Lm	9864	(- 7947)	Chester	11,590	(- 9673)
Red Fork	9910	(- 7993)	Hunton	14,184	(- 12,267)
			TD	14,644	(- 12,727)

(9-7-79) SPUD w/CT: 20" @ 43 w/5 yds
SPUD w/RT 9-9-79: 9 5/8" @ 3899 w/800
DV Tool 970 w/700, Drlg 3905

(11-16) @ 11,950 - Logs
1st Run: 3892-11,945
(DI, SFL, GRL, CNL/FDC, GRL, CWL, HDT
fr 7000-14,640) (cont'd)

5-4-41

Figure 19. Hunton scout ticket with "Questionable DST," continued next page.

SEC 18-16N-17W

STATE [redacted] Dewey LOC SW SW SE NW

OPER Monsanto Co. 125 FT FR S

WELL 1-18 FARM Williams 1395 FT FR W

(DI, SFL, GRL, CWL, BHC-GRL, HDT),
BHT 170
7" @ 11,949 w/400, drlg 12,241

(12-23) DST #1 (Hunton) 14,112-160, 5000' WC, op 15, SI 60, op 120, SI 240, rec 5000' WC, 90' mud, ISIP 4718, IFP 4664-4662, FFP 4662-4662, FSIP pkr failed, BHT 250

DST #2 (Hunton) 14,175-222, 5222' WC, op 5, pkr failed rec 5222' WC, 372' mud + 930' wtr. no press

DST #3 (Hunton) 14,175-260. 5000' WC, op 20, SI 60, op 90, SI 120, rec 5000' WC, 90' mud, ISIP 6904, IFP 4011, FFP 2220, FSIP 6849, IHP 6821, FHP 6739, BHT 254

TD 14,640 - Logs to 14,644
2nd Run: 11,800-14,644
(DI, SFL, GRL, NL/FDC-GRL, CWL, HDT)
BHT 262

CIBP 11,826 capped w/cmt to 11,817 (cont'd)

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LOG TOPS: (KB 1917)

(1-16-80) 2 7/8" Tbg w/PSA 11,339

PERF (Morrow) 16/11,478-486 20/11,442-452 16/11,412-420. 2500 GA (7½%) + 60 ball sealers, Max BP 3300, ATP 3200 @ 4 BPM, ISIP 2400, 2050/5 mins, 1950/10 mins, 1800/15 mins (132 BLWTR). S/71 BLW + 50-75 MCFGPD/9 hrs, SITP 1650/13 hrs

PERF (Morrow) 20/11,376-386. RBP @ 11,465 S/12 BFPH + 100 MCFGPD/5 hrs, SITP 1700/13 hrs

(2-1) Pull RBP. Set CIBP @ 11,470. Frac 50,000# sd + 30,000 gals Apollo-gel, Max TP 5550, ATP 5100 @ 12 BPM (792 BLTR). PSA 10,831

PERF (Morrow) 18/10,949-958 40/11,004-024 26/11,056-069 20/11,104-114 S/47 BLW/4½ hrs, rec NS. no treatment rptd

Pull tbg & pkr @ 10,831. CIBP 10,400 w/PSA 9888

PERF (Cherokee) 10/10,048-058. S/30 BLW, SITP 1600/13 hrs. S/56 BF (25% cond)/5 hrs, S/dry

PERF (Red Fork) 22/9957-68

5-4-41 (cont'd)

Figure 19 (cont'd). Hunton scout ticket with "Questionable DST," continued next page.

~~WT SHEET NO~~

STATE Okla COUNTY Dewey SEC 18-16N-17W

LOC SW SW SE NW

OPER Monsanto Co. 125 FT FR S LINE

WELL 1-18 FARM Williams 1395 FT FR W LINE

S/12 BF (25-50% cond)/3¼ hrs, SITP 1225/13 hrs

(2-19) 1500 GA (7½%) + 25 ball sealers
Max TP 3500, STP 3300 @ 4½ BPM, ISIP 2250
2200/15 mins (100 BLTR)
F 10 BLW & died; S/88 BLW/7 yds, S/dry
SITP 3800/62 hrs.
Frac 52,000# sd + 13 ball sealers + 40,000 gals wtr,
Max TP 5750, ATP 5500 @ 11 BPM, ISIP 2850,
2750/15 mins (1019 BLTR). F 185 MCFGPD + 23 BF
(85% cond)/23 hrs, 16/64" TC, FTP 100-200

(2-29) F 177 MCFGPD + 23 BC/24 hrs, 16/64" TC, FTP 125

(5-1) Drlg Comp 12-23-79. No cores rptd
COMPLETED 4-15-80
Cherokee IPF 184 MCFGPD + 24 BO + 2 BW/24 hrs,
Gty 50, GOR 7667-1; Perfs 9957-10,058 OA

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Completion issued 5-27-80

Figure 19 (cont'd). Hunton scout ticket, "Questionable DST."

petroROM Well Report
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--- General Information ---

State	: OKLA	Final Status	: GAS
County	: DEWEY	Total Depth	: 14644
Field	: PUTNAM	Spud Date YYYYMMDD	: 19790909
Operator Name	: MONSANTO CO	Comp Date YYYYMMDD	: 19800415
Well Number	: 1-18	Hole Direction	: VERTICAL
Lease Name	: WILLIAMS		
API Number	: 35043210180000		
Section or Equiv	: SEC 18	Init Lahee Class	: D
Township	: N016	Final Lahee Class	: DG
Range	: W017	Permit Number	:
Spot	: SWSWSENW	Elevation	: 1917 (KB)
Base Meridian	: INDIAN (18)		
Geologic Province	: ANADARKO BASIN		
Formation at TD	: (269HNTN) HUNTON		
Oldest Age Pen	: SILURIAN-DEVONIAN (269)		

Producing Formation: 404RDFK RED FORK
404CHRK CHEROKEE

--- Additional Location Information ---

Footage Location : 125FSL 1395FWL QTR SEC L
Location Narrative:

Latitude : 35.86334 Latitude (Bot) :
Longitude : 99.05237 Longitude (Bot) :

Latitude & Longitude Source: USGS

--- Initial Potential Tests ---

Test	Form	Top	Base	Oil Rate	Gas Rate	Wtr Rte	FTP	BHP	Ck	M	BHT
0001	404RDFK	9957	9968	24 BO	184 MCFD	2 BW				F	
0001	404CHRK	10048	10058								

--- Production Tests ---

Test	Form	Top	Base	Oil Rate	Gas Rate	Wtr Rte	FTP	BHP	Ck	M	BHT
0001	402MRRW	11412	11486		75 MCFD					S	
0002	402MRRW	11376	11386		100 MCFD					S	
0003	402MRRW	10949	11386							U	
0004	404CHRK	10048	10058	14 BC						S	
0005	404RDFK	9957	9968	6 BC						S	
0005	404CHRK	10048	10058								
0006	404RDFK	9957	9968	20 BC	185 MCFD		200		16	F	
0006	404CHRK	10048	10058								
0007	404RDFK	9957	9968	23 BC	177 MCFD		125		16	F	
0007	404CHRK	10048	10058								

PDT Treatment

Test	Top	Base	Volume	Meas	Amount	T/P	PSI	Inj	Type	Nbr	Agent	Add
0001	11412	11486	2500	GALS				4	ACID			
0003	11376	11386	30000	GALS	50000	LBS		12	SGFR		SAND	
0006	9957	10058	1500	GALS				5	ACID			
0006	9957	10058	40000	GALS	52000	LBS		11	SWFR		SAND	

Note: There Are Detail Perforations Associated With These Production Tests

Figure 20. Petroleum Information (PI) data of a "questionable" Hunton DST, continued.

Formation Tops

Form	Depth	Source	Show
406HBNR	7096	LOG	
406DGLS	7281	LOG	
406TRNT	7400	LOG	
406TNKW	7736	LOG	
405CGGV	8405	LOG	
405HGSR	8645	LOG	
405CCKB	8932	LOG	
405CLVD	9128	LOG	
404OSWG	9570	LOG	
404VRDG	9684	LOG	
404PKLM	9864	LOG	
404RDFK	9910	LOG	IP TEST-O & G
404CHRK	9944	LOG	IP TEST-O & G
404RDFKL	10046	LOG	
404INOL	10130	LOG	
403ATOK	10294	LOG	
403TRFG	10516	LOG	
402MRRW	10587	LOG	
354CSTR	11590	LOG	
269HNTN	14184	LOG	FM TEST-NO SHOWS

Formation Bases

Form Code	Depth	Source
404RDFKL	10123	LOG
402MRRW	11500	LOG

Formation Tests

					Hydrostatic		Flowing		Shut In		Open	Cush
Test	Type	Form	Top	Base	Init.	Final	Init.	Final	Init.	Final	Time	Amt
0001	DST	269HNTN	14112	14160			4662	4662	4718		2H	5000
0002	DST	269HNTN	14175	14222								5222
0003	DST	269HNTN	14175	14260	6821	6739	4011	2220	6904	6849	1H30M	5000

				Pipe Recovery					
Test	Amount	Unit	Desc	Amount	Unit	Desc	Amount	Unit	Desc
0001	5000	FT	WB	90	FT	M			
0002	5222	FT	WB	372	FT	M	930	FT	W
0003	5000	FT	WB	90	FT	M			

Log Data

Type	Top	Base
ILD	3892	11945
GR	3892	11945
NEC	3892	11945
DN	3892	11945
ILD	7000	14640
GR	7000	14640
AVC	7000	14640
ILD	11800	14644
GR	11800	14644
NE	11800	14644
DN	11800	14644

Figure 20. Petroleum Information (PI) data of a "questionable" Hunton DST, continued.

---------------------------------- Casing Data ----------------------------------

Size	Depth	Cement
20	43	633
9 5/8	3899	800
7	11943	400

----------------- Actual Bottom Hole From Surface Location -------------------

Meas Depth	True Vert Depth	Closure Ft Deg Min	N/S E/W Footage	State Code	County Code

------------------------- Actual Bottom Hole Narrative -----------------------

----------------------------- Drilling Narrative -----------------------------

Date Remarks

Figure 20 (cont'd). Petroleum Information (PI) data of a "questionable" Hunton DST. Upon first inspection of "formation tests", shut-in pressures appear to be those of a good test because the ISIP is slightly higher than the FSIP. After further inspection, however, the initial flowing pressure (4011 psi) is observed to be significantly higher than the final flowing pressure (2220 psi), indicating limited reservoir extent, reservoir damage, or both. The ISIP (6904 psi) and FSIP (6849 psi) are higher than the mud hydrostatic pressures of 6821 psi and 6739 psi, indicating leakage of mud around the packer, which could cause inaccurate shut-in pressures. Approximately 90 feet of mud recovered in the third DST and no formation fluid recovery is evidence of a low permeability, damaged, limited, or depleted formation. In this case, no formation fluid recoveries make determination of accurate reservoir pressures questionable.

Geographix, to minimize database size. Wells that partially or fully penetrate the Hunton were identified using a query in PI database. County names within the study area were entered into the PI database with a list of formation codes that correspond to formations within the Hunton Group. Using this query method, more than 10,000 wells with a Hunton top were identified in the study area (Plate 3). Hunton DSTs were identified using the query system in PI by entering Hunton formation codes in the formation test section of the query boxes. Within the study area, 798 wells with DSTs in Oklahoma and 118 in Texas were identified, Plate 3. Several DST intervals had no associated pressures.

Formation tops were included in the PI data. Formation tops in PI are estimations by the well operator and should be avoided when possible (Jeanne Allen, Devon Energy, 1999, personal communication). For purposes of creating isopach maps GDS tops were available for all counties within the study area except Blaine, Caddo, Canadian, Grady, Kingfisher, Major, and Woods counties. In constructing thickness maps with Geographix, the GDS tops were given priority over PI tops. GDS data only for the Woodford, Hunton Group, Sylvan, and Viola formations were imported from a "dummy" project into the Hunton project.

The method of computer contouring, called interpretative contouring, (Jones and Hamilton, 1992) was used to map the Hunton Group. "This method allows the incorporation of the geologist's interpretation and experience, plus regional information. Interpretative contouring allows use of geologic license, with no inherent assumptions of constant slope, constant spacing, etc" (Jones and Hamilton 1992, p. 1). Amsden (1975) produced many Hunton maps that demonstrate the inconsistent nature (thickness for example) of the Hunton Group in the subsurface. Gayle Riggs, geologist with Devon Energy Corporation, emphasizes the interpretative nature of geology in that different interpretations may honor the same data (1999, personal communication).

The best computer contour maps of the Hunton thickness, on a regional scale, are produced using a variably spaced grid. Unlike a hand-contoured map, a computer-contoured map is generated from grid nodes, not original observation points. Grid nodes are approximations of the observation points. By default, Geographix computes a square grid. For sparse data, distribution that is not equidistant in all directions, this default grid may be too general. When using a default parameter, such as grid spacing, it is common to see a closed contour where there is no data. The default grid size calculated by Geographix was approximately 9300 feet in the "x" and "y" direction. However, most of the maps (thickness maps and permeability index maps) in this study were made using a grid size of 7500 feet in the x-direction and 9000 feet in the y-direction.

The north-south rectangular grid size biased the computer generated contours to coincide with the north-south erosional patterns on the Hunton that are evident on the Woodford Shale paleodrainage map, Figure 21 (Howery, 1993, p. 81). Hunton tops were contoured with a square grid to express Hunton regional strike and dip (Plate 5). The gradient map (Plate 9) also was contoured using a square grid (9300 by 9300 feet) to emphasize the pressure gradient that increases basinward. All computer-contoured maps were visually modified to better honor data trends.

The gridding technique used to contour all Hunton maps is called minimum curvature, "an iterative solution based upon a continuous, localized polynomial to produce a surface having the property of "minimum curvature", defined in Geographix

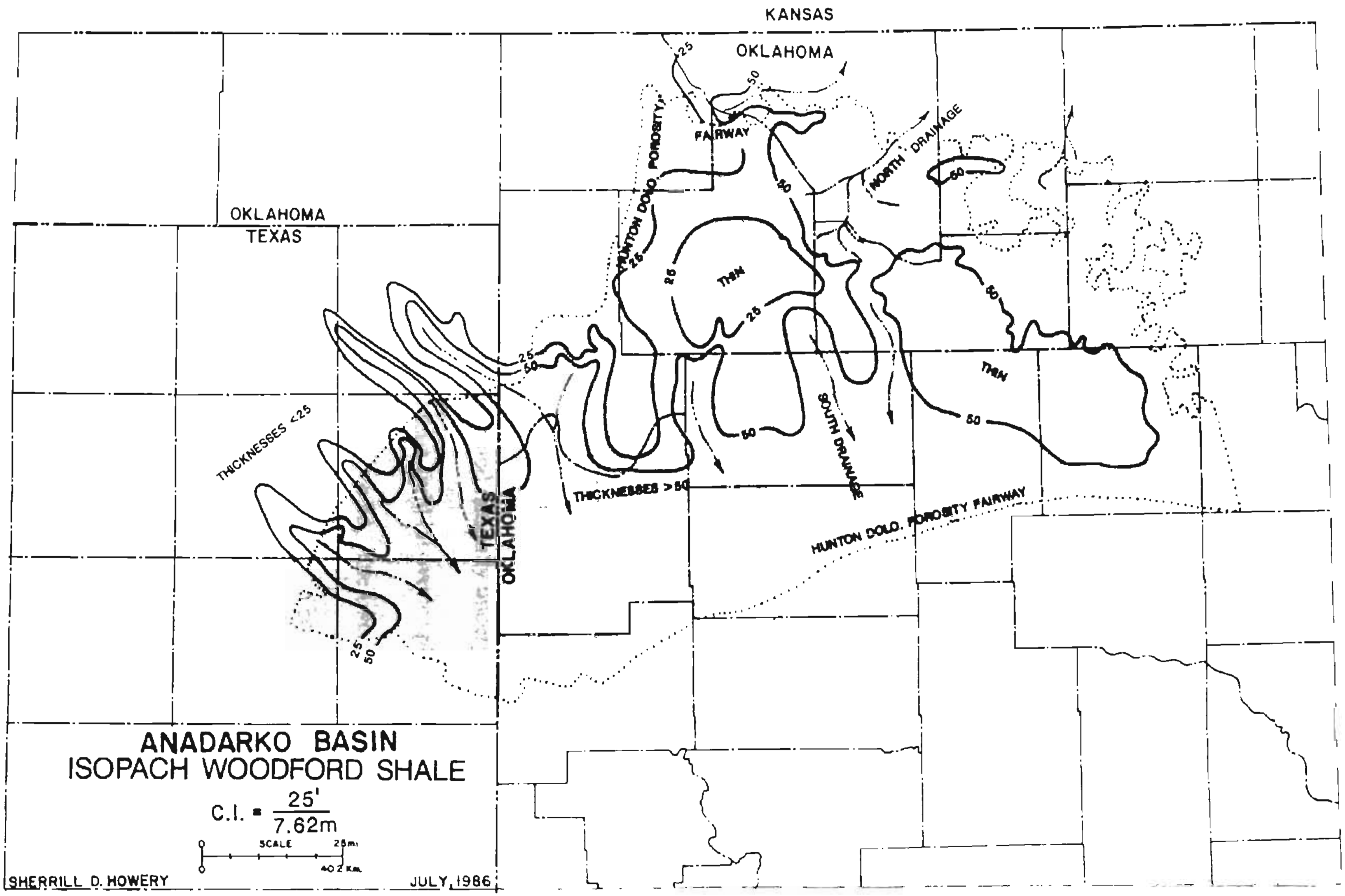

Figure 21. Woodford Shale paleodrainage showing areas >25 feet thick and Hunton dolomite porosity fairway (Howery, 1993, p. 81).

installation and technical reference, 1994, p. 6-6). An explanation of this technique is beyond the scope of this study. From an empirical standpoint, however, this gridding method was most representative of hand-contoured geological maps of the Hunton by Howery (1993, p. 78, 80) and Amsden (1975).

Pressure–Depth Plots and Gradient Map

Analysis of pressure architecture within the Hunton begins by plotting reservoir pressures against their depth below the surface (Puckette, 1996, p. 46). The base measured depth of the DST interval was used as the depth to measured pressure. Common gradients for subsurface fluids are shown in Figure 22 (Dahlberg, 1995, p. 99). The normal hydrostatic gradient of water with a total dissolved solids (TDS) concentration of 100,000 parts-per-million (ppm) is 0.465 pounds-per-square inch (psi) per foot (ft). An unfiltered plot of over 1,000 DST intervals within the Hunton showing a significant percentage of pressures that plot below the normal hydrostatic gradient of 0.465 psi/ft is represented in Figure 23. Reasons for these abnormally low pressures may be erroneous data, reservoir depletion, and naturally underpressured reservoirs.

Filtered Hunton DSTs with formation fluid recoveries plot closer to a straight line, Figure 24, than the unfiltered data in Figure 23. The filtered P-D plot represents pressures from more permeable rocks that are less likely to be rapidly depleted compared to lower permeability formations. The straight-line correlation near the 0.465 psi/ft gradient suggests predominantly hydrostatic conditions and hydraulic continuity in the Hunton. Hydrodynamic conditions would show up as a deviation from the hydrostatic gradient. A deviation above the hydrostatic gradient with a flatter slope would indicate

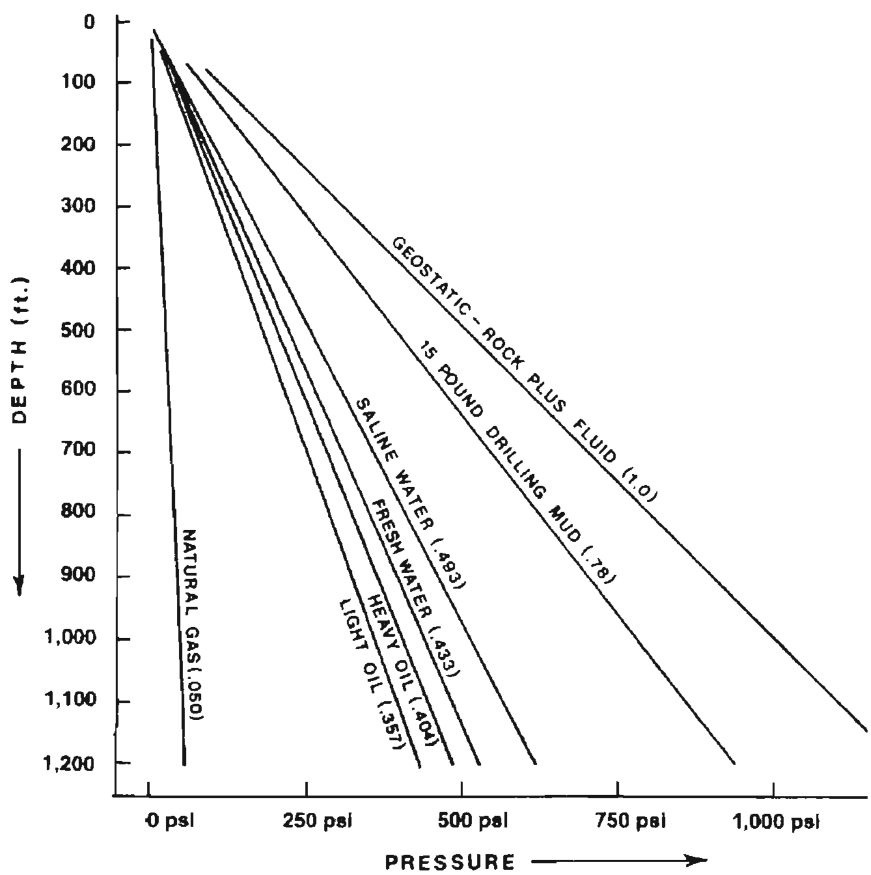

Figure 22. Pressure - depth gradient plot for common subsurface fluids (Dahlberg, 1995, p. 99).

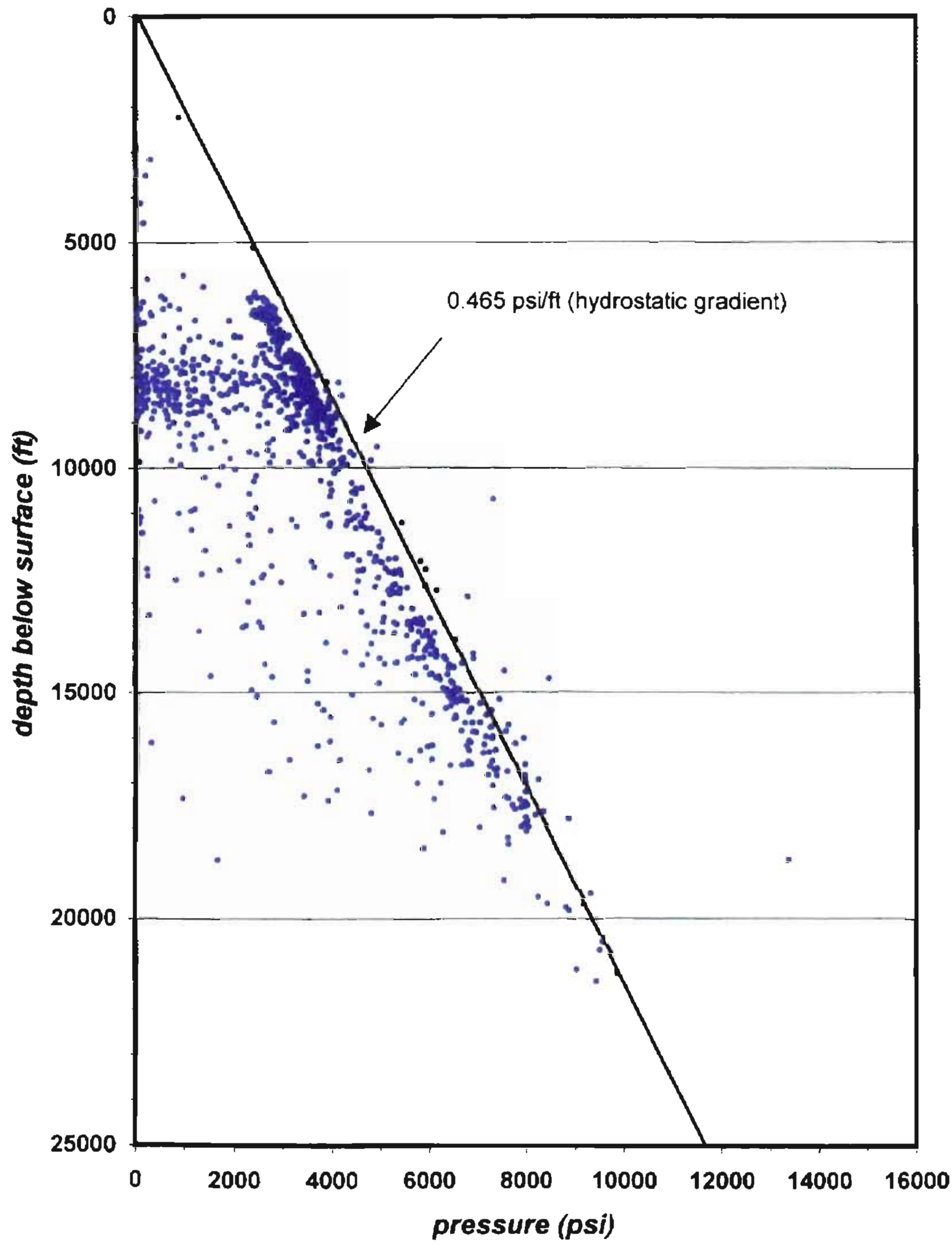

Figure 23. P-D Plot of unfiltered Hunton DST pressures in the Anadarko basin.

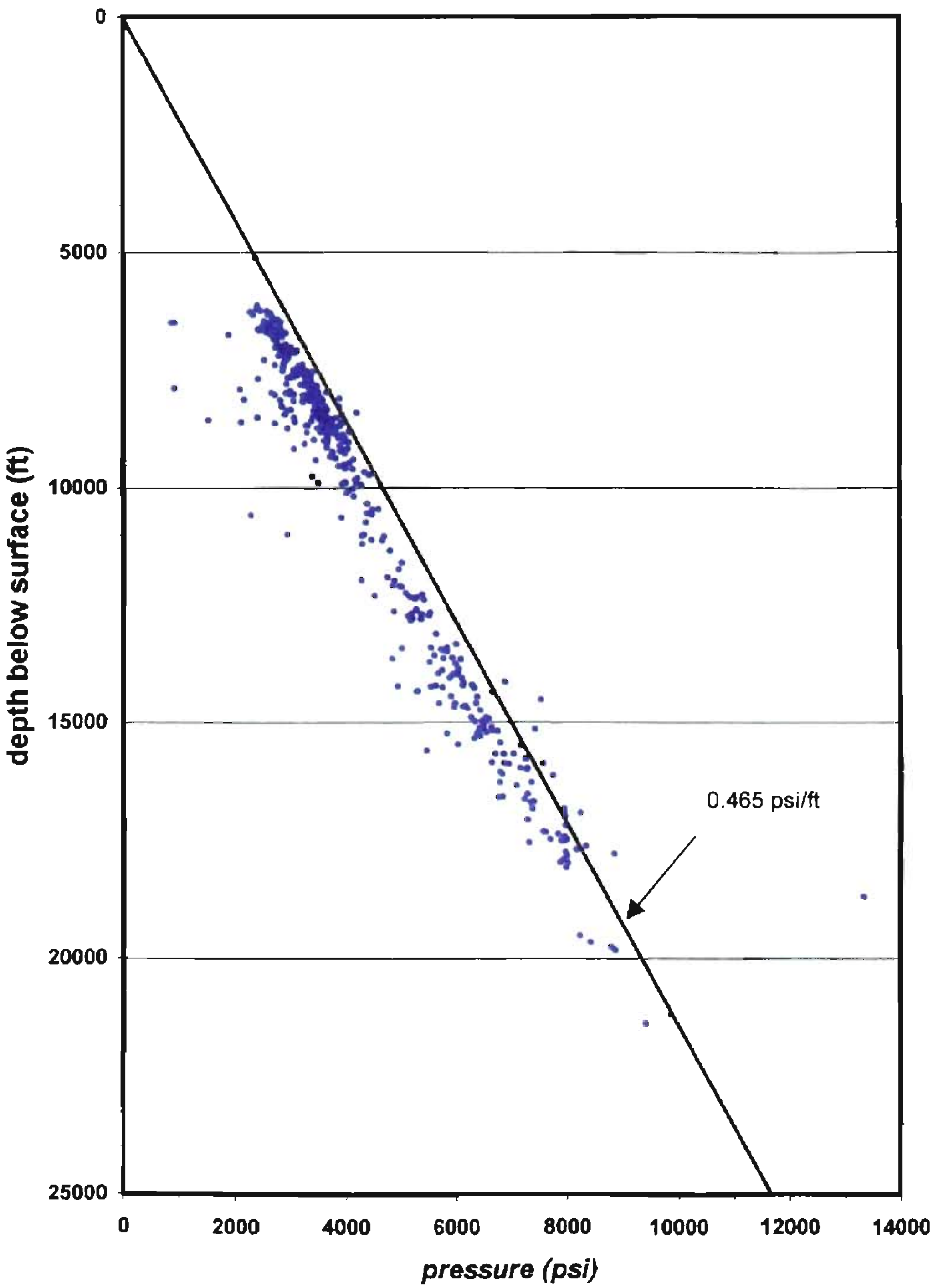

Figure 24. P-D Plot of DST pressures with formation fluid recoveries (filtered data).

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upward flow within the formation; a steeper slope below the hydrostatic gradient would indicate downward flow.

Plate 9 is a pressure gradient map constructed using DSTs with adequate formation fluid recoveries. If a DST had multiple test intervals, then the largest pressure gradient was used to represent the gradient at that longitude and latitude. Ideally, pressure gradients should be plotted in three-dimensions. The gradient map shows higher pressures in the deep Anadarko basin, and lower pressures in the shallow shelf.

Dahlberg (1995, p. 161-163) stated that 0.465 psi/ft is the recommended fluid gradient for an average salinity of the water column above the point of interest. The actual average regional fluid gradient is impossible to determine, and it is rarely the case not to use a general fluid gradient such as 0.465 psi/ft (Dahlberg, 1982, p. 164). General fluid gradients will vary depending on the overall salinity of formation water in a hydrogeologic unit. The Hunton Group was treated as a single hydrogeologic unit acting as a confined aquifer, overlain by the Woodford Shale and underlain by the Sylvan Shale. On a basinwide-scale over geologic time, considering the Hunton as a single hydrodynamic unit is a valid assumption, as shown in similar studies by Toth (1980). Salinity in the Hunton Group is assumed to average 100,000 ppm TDS and 0.465 psi/ft. Close agreement of plotted pressures-depths with the 0.465 psi/ft slope confirms the validity of using a 0.465 psi/ft average fluid gradient.

Potentiometric Surfaces

An average fluid gradient is necessary to calculate potentiometric elevation (Dahlberg, 1995, p. 161); the elevation fluids would rise in an open hole in the absence of drilling mud. The potentiometric map is a map of fluid potential energy. Just as a ball on a table has more potential energy than a ball on the ground, a tall column of fluid has more potential energy than a short column. To obtain a true measure of the fluid potential, one needs to measure the elevation to which a column of fluid would rise in a well that penetrates a confined aquifer. A confined aquifer is bounded above and below by impermeable strata. For the potentiometric surface to have any validity, it must be from the same hydrogeologic unit or aquifer. Arrows drawn perpendicular to the potentiometric contours are an indication of the direction of groundwater flow.

Groundwater flows from a high hydraulic head (potential) to a low hydraulic head. A contour map of hydraulic heads is a potentiometric surface. "The concept of potentiometric surface is only rigorously valid for horizontal flow in horizontal aquifers. The condition of horizontal flow is met only in aquifers with hydraulic conductivities that are much higher than those in the associated confining beds." (Freeze and Cherry, 1979, p. 49). Hydraulic head is a function of the pressure head plus the elevation head and has dimensions of length (L) measured in units of feet (ft) above a datum, usually sea level.

Equation 1: $$H_T = H_P + H_Z$$

where

H_T = total hydraulic head, elevation of top of fluid column (L)

H_P = pressure head, height of fluid column above measured pressure (L)

H_Z = elevation head, elevation of measured pressure in reference to a datum (L)

Freeze and Cherry (1979, p. 23) gave dimensions and common units for basic groundwater parameters.

If the pressure heads are the same and elevation heads differ, then fluid will move from a high elevation head to a low elevation head, as the case with variable topography and a horizontal aquifer of infinite extent. Moreover, if the elevation heads are equal, fluid will move from high-pressure head to low-pressure head, such as, flat topography of infinite extent and a tilted aquifer. Vertical distances are generally small in comparison to horizontal ones so an aquifer of infinite horizontal extent is an accurate assumption. Assuming a single-phase, constant-density, isothermal fluid groundwater flow depends on total hydraulic head. For horizontal flow of an otherwise homogeneous fluid, small variations in temperature and density will be dominated by variations in head (Nicholl, 1999, personal communication).

In regard to Darcy's Law, King Hubbert (1940, p. 793) stated that "a liquid can with equal facility be made to flow from a region of higher to one of lower pressure, or from a region of lower to one of higher, quite arbitrarily." Hydraulic head is the driving force of groundwater flow shown in Darcy's experiment (Freeze and Cherry, 1979, p. 15), Figure 25. Darcy determined the following empirical relationship:

Equation 2:

$$q = -K\frac{dh}{dl}$$

<u>where</u>

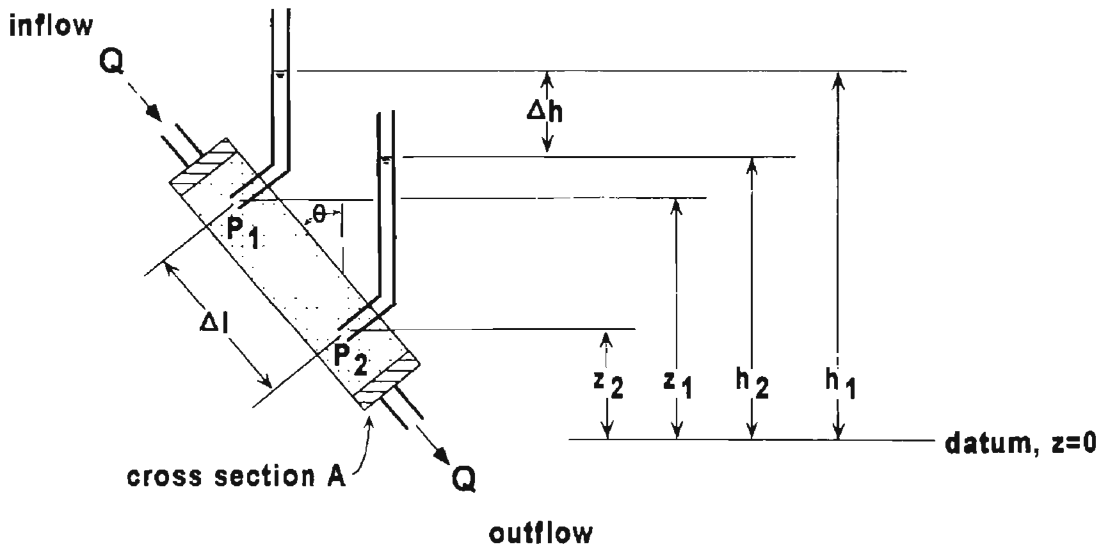
q = $\frac{Q}{A}$ specific discharge of fluid through cylinder, measured in length/time (L/T)

Q = total discharge (L^3/T) and;

A = cross sectional area of cylinder (L^2)

K = hydraulic conductivity, function of permeability and fluid viscosity, units (L/T)

$\frac{dh}{dl}$ = hydraulic gradient, no units



A circular cylinder of cross section A is filled with sand, stoppered at each end, inflow and outflow tubes at each end, and a pair of manometers. Water fills the tube and saturates the sand until the inflow rate Q equals the outflow rate Q.

<u>where</u>:

$z = 0$ is an arbitrary datum elevation,

Δl is the distance between manometers,

z_1 and z_2 are elevations of the manometer intakes,

P_1 and P_2 are the pressures at the manometer intakes, and

$\Delta h = h_2 - h_1$, difference in elevation of the fluid levels,

Darcy's Law can be expressed, where (K is hydraulic conductivity, a function of the intrinsic properties of the porous media) as:

$$\frac{Q}{A} = -K \frac{\Delta h}{\Delta l}$$

Figure 25. Darcy's Experiment, the above relationship is true for all angles of theta, adapted from Freeze and Cherry (1979, p. 15-16). Note the column of water above P2 is greater than the column above P1, indicating that flow is from a low pressure (P1) to a high pressure (P2).

h = hydraulic head (elevation of fluid levels) and;

l = distance between manometer intakes

"Darcy's Law is valid for groundwater flow in any direction in space" (Freeze and Cherry, 1979, p. 16). The specific discharge, q, has the dimensions of velocity or flux and is sometimes known as Darcy velocity or Darcy flux. The specific discharge is an easily measured macroscopic velocity that is an average of microscopic velocities of the groundwater flow paths within the rock matrix (Freeze and Cherry, 1979, p. 17). The microscopic groundwater velocities are most likely impossible to measure. Darcy's Law is not limited to only formation water. Hubbert (1957, p. 47-48), in reference to Klinkenberg, (*The permeability of porous media to liquids and gases*, 1941) shows that at reservoir pressures greater than 300 psi, gases obey Darcy's Law.

In practice, the total hydraulic head, H_T, is calculated from pressure measurements in fluid saturated rocks using *Equation 1*, ($H_T = H_P + H_Z$).

Equation 3:

$$H_T = \frac{P}{gradP} + Z$$

where

H_T = total hydraulic head, elevation to which fluids rise in the well (L)

P = pressure from DST (highest SIP), lbs/in^2 or psi, force per unit area (F/L^2)

$gradP$ = $D_w g$ static pressure gradient (0.465 psi/ft) 100,000 ppm TDS water, (F/L^2/L).

D_w = density of water throughout fluid column and;

g = is acceleration of gravity

Z = ($Z_{sur} - Z_{dep}$), elevation head relative to sea level at measured pressure, feet, (L)

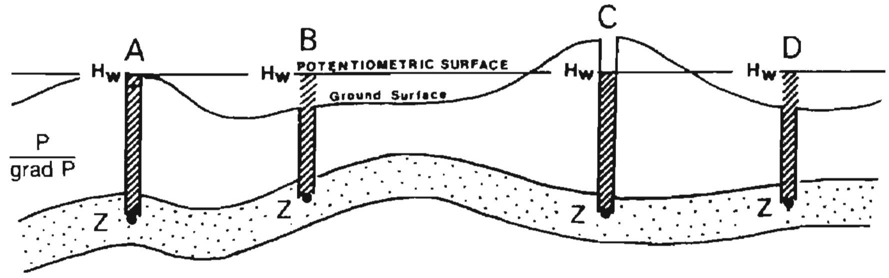
Z_{sur} = surface (kelly bushing, derrick floor, or ground) elevation and;

Z_{dep} = below surface, DST base measured depth of DST interval

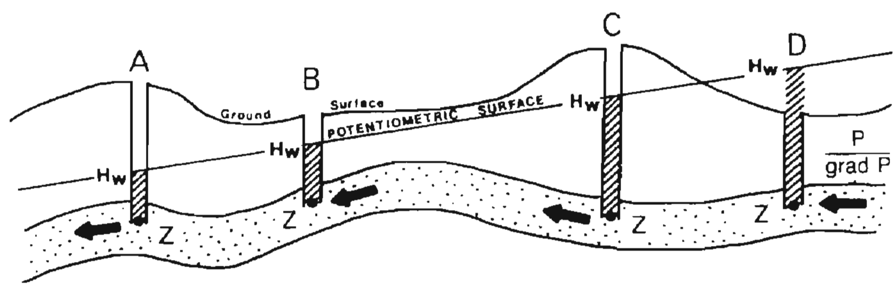
The elevation to which fluid rises in a well is dependent on the pressure at the point of entry and on the fluid density. Less dense fluids will rise higher because a greater amount of fluid is required to balance the internal pressure. The term *gradP* is an average pressure gradient, 0.465 psi/ft, of the formation fluids for a brine of 100,000 ppm TDS (total dissolved solids). The constant quantity, *g*, can be removed from the above equation so that the total hydraulic head, H_T, serves as a practical approximation of fluid potential Φ, (Dahlberg 1995, p. 134). Appendix C is a proof by Hubbert at the request of Dahlberg, (1982, p. 135-136) that demonstrates the difference between fluid pressure (*P*) and fluid potential (Φ). Cross sections of hydrostatic and hydrodynamic conditions are shown in Figure 26 (Dahlberg 1995, p. 134, 135). H_w, hydraulic head of water in these figures, is the same as the total hydraulic head, H_T, discussed previously.

A Potentiometric map (from DST pressure data of the Hunton Group) was constructed using the following steps.

1) The highest shut-in pressure (SIP) of a "quality" test (DST pressure near true formation pressure) and the base measured depth of the DST zone was input into Dahlberg's Equation (*Equation 3*) where H_T (total hydraulic head) relative to sea level is the unknown being solved, *P* is the highest SIP for any given well location, *GradP* is 0.465 psi/ft, and *Z* is the subsea elevation of the pressure gauge. A spreadsheet was used to carry out these calculations, (see Appendix B).
2) A comma delimited ASCII file was constructed using selected spreadsheet data. The ASCII file consisted of three data columns (longitude, latitude, and H_T) that were imported into GeoGraphix and plotted. H_T values were compared by overlaying an imaginary grid on the study area and choosing the highest H_T in a predefined grid



Hydrostatic condition and flat potentiometric surface



Hydrodynamic condition and tilted potentiometric surface

Figure 26. Cross section of hydrostatic and hydrodynamic conditions and their relation to the potentiometric surface (Dahlberg, 1995, p. 134-135).

block as most representative of the original hydraulic head. The purpose of this step was to remove low hydraulic heads from depleted reservoirs. One township (6 miles by 6 miles) was used as a grid block in which to choose the single highest H_T.

3) The highest hydraulic head values, *highest* H_T, were hand-contoured using geologic interpretations (assumes variable slope contours and data spacing). Extremely high values of hydraulic head (see Figure 4) were assumed to be compartmentalized, thus having a minimum effect on the regional potentiometric surface.

Closely spaced contours (areas with steep hydraulic gradients) in the hand-contoured potentiometric map Plate 10 and Figure 34, may indicate low-permeability zones that act as barriers to flow, discussed in Chapter IV.

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Permeability Index

John Forster of IHS Energy (1999, personal communication) suggested a method of using DSTs to construct a map showing the intrinsic flow characteristics of reservoir rocks. Jason Hamilton (1999, personal communication) suggested the term permeability index to name Forster's method. Forster's idea has the advantage of removing the 'time factor' in a DST, which is the time a DST was performed relative to reservoir production. In heavily developed reservoirs, DST pressures show signs of depletion, making prediction of original reservoir pressures difficult. A potentiometric map requires near original reservoir pressures to calculate original hydraulic heads to predict where petroleum accumulations may exist.

A permeability index map is a ratio of the highest flowing pressure to the highest shut-in pressure, FP/SIP, and is independent of when the DST was taken. The differences between the flowing pressures and the shut-in pressures furthermore reflect the permeability of the formation itself (Dahlberg 1995, p. 23). In highly permeable formations, the flowing pressure will be close to the shut-in pressure. Conversely, in low- permeability formations the flowing pressure will be significantly lower than the shut-in pressure. For the most part, this relationship holds true because of the mechanics of a DST, explained in terms of borehole damage (Appendix A).

Van Everdingen (1952, p. 47) stated that the effect of a reduction in permeability immediately around the borehole, due to the skin effect, is proportional at all times to the rate of production from the formation. Hence, even in the worst-case scenario, the FP/SIP ratio should remain the same, whether borehole damage exists or not. Furthermore one would expect that this ratio would remain nearly the same whether the reservoir is depleted or not. Precautions, however, were still applied to guard against assuming higher permeability indexes in areas that are known to have moderate permeabilities. Inaccuracies in pressure-gauge measurements at low pressures may justify these precautions.

Two permeability maps were constructed using GeoGraphix: 1) an unfiltered map of all the DST data with flowing pressures (FP) and shut-in pressures (SIP) that could be used for a FP/SIP, and 2) a filtered permeability index map, with pressures lower than an arbitrary value of 500 psi with FP/SIP ratios above 0.3 removed from the mapped data set. Both maps are shown as Plate 11 and Plate 12. The map of filtered data, Plate 12, is a conservative estimate of permeability indexes. The robustness of using this ratio, however, is shown by the fact that both permeability index maps appear similar, even after over 100 points were culled to make the filtered map. In conclusion, using this filter suggests that permeability index maps in the Hunton are relatively unaffected by depletion pressures and from damaged boreholes. The permeability index map coincides with current geological properties of Hunton rocks, demonstrated in Chapter IV.

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CHAPTER IV

APPLICATION OF HYDRODYNAMICS TO EXPLORATION IN THE HUNTON GROUP

Potentiometric Maps and Hydrocarbon Traps

Potentiometric maps are used to predict hydrocarbon traps. Closely spaced contours on a potentiometric map may indicate decreasing permeability and a potential trap. A trap is a dynamic system, explained by Roberts (1980, p. 218) as an apparatus for creating an oil or gas deposit, not just for holding it. He identifies a hydrocarbon trap as having the following six characteristics:

1. A trap is a paradox because it must leak to function as a trap.
2. A trap is a forced-draft, flow-through system.
3. A trap is a center of deep-water-discharge.
4. A trap is an active focal mechanism, not a passive, sealed, dead-end container.
5. A trap is a hydrocarbon separator, in a sense a filter.
6. A trap is an imperfect and hydrochemically noisy system.

The most important function of a trap is to leak water while retaining hydrocarbons (Roberts, 1980, p. 217). Though traps have a similar function, not all traps are the same.

Identifying hydrocarbon traps in the Hunton is difficult. There are three types of hydrocarbon traps. (1) A stratigraphic trap results from lithologic changes such

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as a pinch-out or truncation of permeable facies against less permeable facies. (2) A structural trap is the result of folding or faulting, (*Dictionary of Geological Terms*, 1984, p. 495, 499). (3) A hydrodynamic trap results from fluid movement and accumulation of fluid potential energy lows associated with a stratigraphic or structural trap. Generally, stratigraphic traps are more difficult to predict than structural traps in the Hunton because stratigraphic traps are difficult to recognize on seismic logs. Hydrodynamic analyses may help locate these subtle stratigraphic traps.

Petroleum will accumulate in potential energy lows in a manner analogous to mountain-water flowing to the potential energy lows of the coastal plain. The potential energy low in the subsurface, however, usually will be at a higher elevation than the potential energy high. For example, in a hydrostatic environment the potential energy low for oil and gas, due to buoyancy forces, may be below the crest of an anticline in which the oil-water contact would be horizontal (Figure 27). In a hydrodynamic environment the potential energy low may be on the flank of an anticline, as in Figure 27 (Dahlberg, 1995, p. 44). Oil-water contacts are tilted in hydrodynamic traps. Internal force imbalances will cause hydrocarbons to come to rest in areas of potential energy lows that are surrounded by higher energy levels and/or impermeable hydrocarbon barriers (Hubbert, 1953, p. 1957). Application of hydrodynamics to exploration of the Hunton Group is not new.

Menke (1986, p. 19) in reference to Logsdon and Brown (*Hunton, hottest play in Oklahoma*, 1967) stated that higher porosity dolomitic facies may have a water-drive mechanism. Understanding water-drive mechanisms is accomplished by using stratigraphic production maps and potentiometric maps to reveal why hydrocarbons exist

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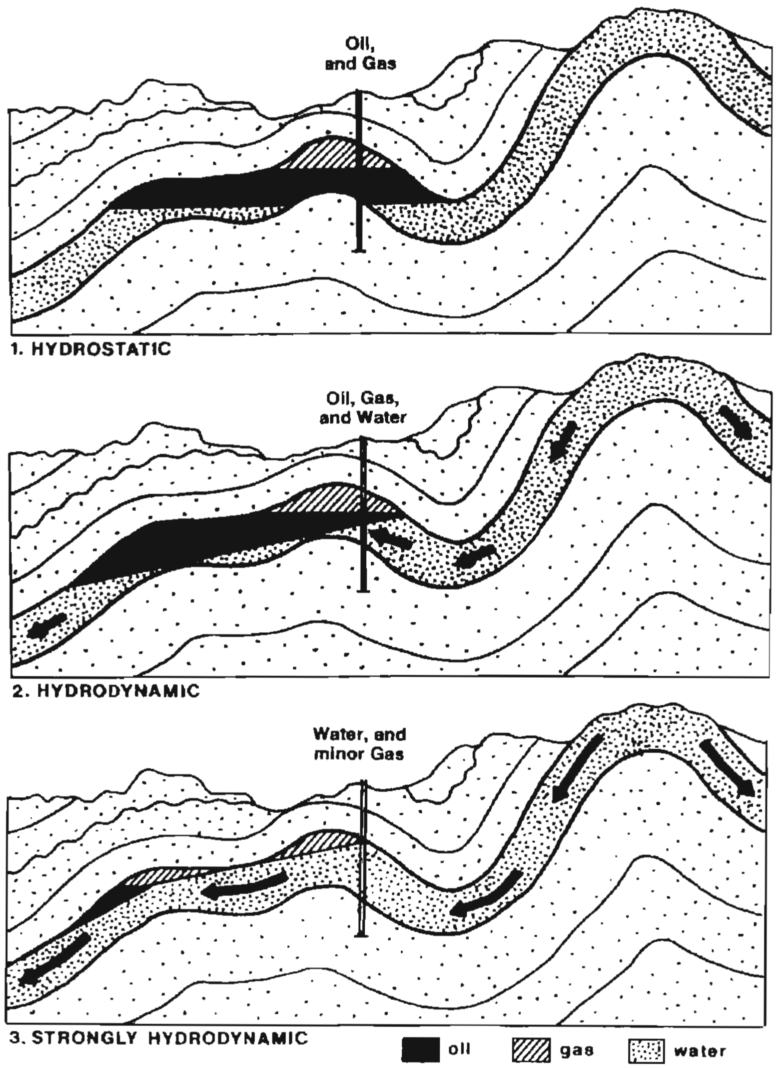

Figure 27. Hydrocarbon traps in hydrostatic and hydrodynamic conditions (Dahlberg, 1995, p. 44). Note tilting of oil-water contact.

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in some areas and other areas do not exist (Larson, 1988, p. 1043). Hill and Clark (1980, p. 239) outlined several Anadarko basin producing trends: (1) east-Nemaha Ridge, (2) north-truncation of Hunton in isolated erosional remnants, (3) ancient shelf break of basin north of deep basinal axis where faulting caused by down-warping of basin created linear pattern of structural traps through Roger Mills, Dewey, and Custer Counties, and (4) near Amarillo-Wichita Uplift.

According to Hill and Clark (1980, p. 239) 43% of known hydrocarbon traps in the Hunton are stratigraphic and 57% structural. The majority of Siluro-Devonian production to date is associated with rather well defined structural and/or truncation-style traps. Yet the trapping mechanism in these settings depends to a large extent on the development of particular depositional facies within the carbonates (Wilson et al., 1990, p. 151). Recognition of these facies boundaries is critical to identifying Hunton reservoirs. Wilson et al. (1990) used cores and electric logs to identify these facies; so did Al-Shaieb et al. (1993).

Hunton Reservoir Models and Variations in Permeability

Various geologic models have been developed to predict Hunton facies. Davis (1989, p. 65) developed a working model to illustrate Hunton porosity development related to paleohighs. As sea level decreased in Early Devonian time, Hunton limestone became subaerially exposed, enhancing porosity and increasing dolomitization. The contoured gross Hunton porosity isopach map illustrates the strong tendency of leached dolomite to be preferentially developed on structure (Ibid., p. 71). Isopach maps Plate 13, Plate 14, Plate 15, and Plate 16 show the Hunton thickness and

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thickness of confining units in relation to Hunton permeability index. By comparing these thickness maps to the permeability index map, trends in permeability can be correlated to areas of thicker Hunton and thinner Woodford Shale. Sylvan Shale is thinner than the Woodford Shale, and thickness changes in the Sylvan are subtler and more difficult to evaluate.

Associations of Hunton thickness with the permeability index map are most pronounced in Roger Mills, and Dewey Counties (Plate 13). The highest permeabilities, indicated with red in Plate 13, are associated with increasing Hunton thickness, most likely paleotopographic highs. The Woodford Shale paleodrainage map, Plate 14 and Plate 15, show a strong correlation between Woodford thinning and Hunton permeability index in Ellis, Roger Mills, and Dewey Counties, further supporting the idea of permeability being enhanced near paleotopographic highs.

Thinning of the Hunton with a decrease in permeability is a scenario for a large hydrocarbon trap, known as the Sooner Trend (in Blaine and Kingfisher Counties). Permeability decreases on the potentiometric map, Plate 17, are indicated as a steepening of the hydraulic gradient (decrease in contour spacing). An increased hydraulic gradient (closely space potentiometric contours) may indicate decreases in Hunton thicknesses, in addition to facies changes. In fact, Menke (1986, p. 19) in reference to Logsden and Brown, (Hottest play in Oklahoma, 1967) recommended mapping large areas of the Hunton to recognize subtle geologic changes in thickness and facies. Transitions between facies are commonly gradational and subtle (Al-Shaieb et al., 1993a, p. 6).

Menke (1986, p. 62) in reference to a detailed study of Cheyenne Valley field in Major County stated: "...the porosity trends do not occur directly on the crests of the

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thicks, but rather on the flanks." The flanks of thicks may have been more highly dolomitized if they were near the freshwater and marine interface. Menke (1986) developed porosity maps of zones within the Hunton using cores and density logs calibrated to limestone of the total feet of density porosity greater than six percent. Six percent is considered to be sufficient for commercial reservoirs.

Potentiometric maps overlain on structure maps have been used to predict hydrocarbon traps, (Mike Lacey, Devon Energy, 1999, personal communication). Similarly, the Hunton potentiometric map overlain on the permeability index map was used to identify barriers to flow, seen as closely spaced contours (steepening hydraulic gradient and permeability index), as in Plate 17. Dahlberg (1995, p. 137) provided a conceptual model for the effect of a decrease in permeability on the potentiometric surface (Figure 28). Oil and gas are trapped against barriers formed by abrupt decreases in permeability, shown as a rapid shift in color from red to blue for example, in Plate 18.

Flow of formation fluids is predominantly to the north and east, where large reserves of hydrocarbons accumulated in the Sooner Trend. Few hydrocarbon producers are in the high permeability zones (red), unless structurally trapped. Most producers are in the green to light blue areas and along the edges of high permeability zones against decreases in permeability (Blaine County and Kingfisher County), seen in Plate 18. On a field scale, variations in the permeability index correlate with reservoir facies.

Integrating Reservoir Facies with DST Pressures

An example of integrating DST pressures with reservoir characteristics is possible in Cheyenne Valley field. Menke (1986) completed a subsurface study of the

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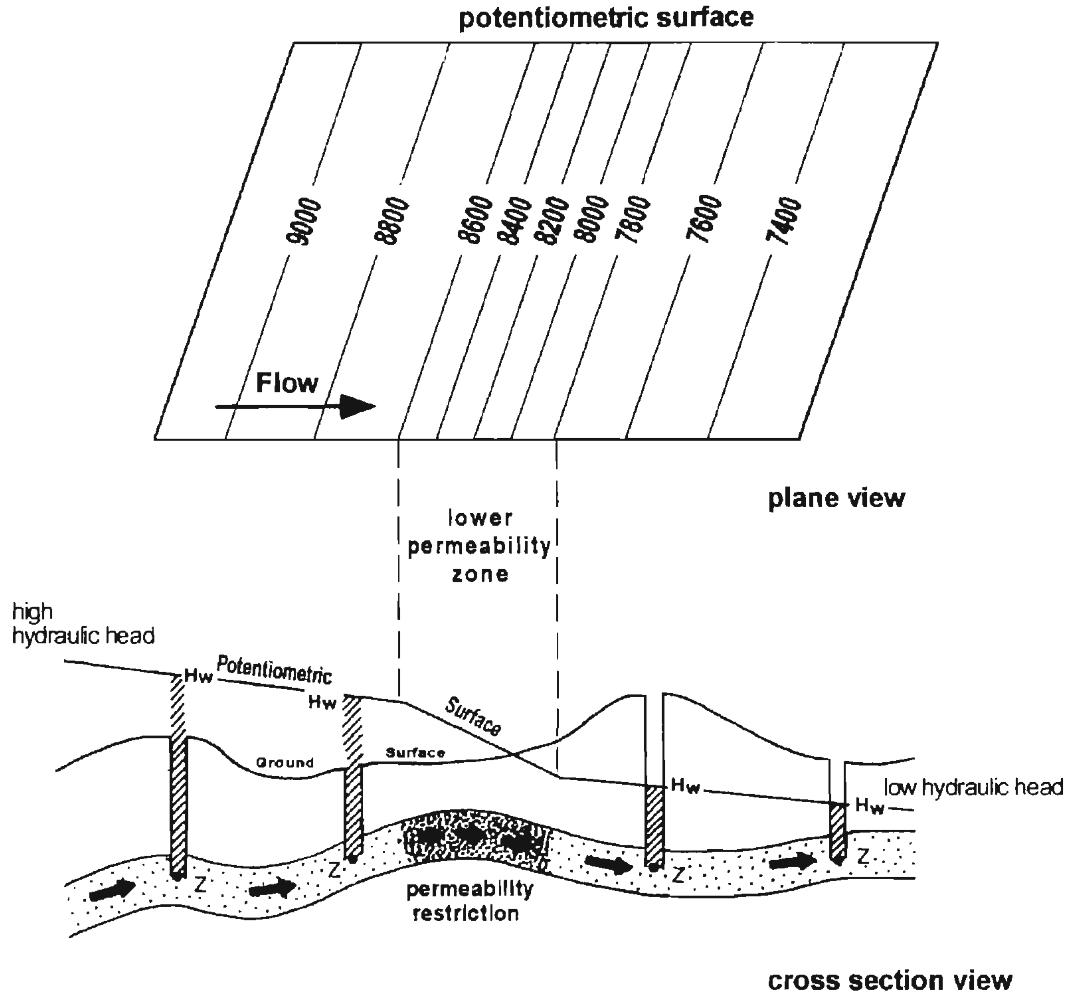

Figure 28. Effect of decrease in permeability on potentiometric surface, seen in plane view and cross section. Note steepening of potentiometric surface in low permeability zone and flow perpendicular to contours, from high hydraulic head to low hydraulic head (adapted from Dahlberg, 1995, p. 137).

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Hunton Group in the Cheyenne Valley field, Major County and mapped two Hunton facies, Zone B-3 and Zone B-4 (Figure 29). Menke (1986) constructed facies and porosity maps for these two zones that correspond with the Hunton Permeability Index Map, Figure 30, Figure 31, Figure 32, and Figure 33. Menke's orange intertidal zones correspond to the green or light green areas on the permeability index map in Cheyenne Valley field and are indicative of zones with good permeability and porosity. Brown and blue subtidal areas on Menke's original maps correspond to light blue and dark blue areas on the permeability index map in Cheyenne Valley field. Menke mapped several zones within the Hunton section, whereas the Hunton was assumed to be one hydraulic unit in the permeability index map.

The Hunton was treated as one hydraulic unit in the permeability index map by choosing the highest permeability index in a multi-zoned DST (primarily because high permeability zones are the zones of interest). Another limiting factor for construction of the permeability index map is that most wells did not have multiple zoned DSTs. Treating the Hunton as one hydraulic unit, however, is based upon the observation by Toth (1980, p. 161) that in geologically mature drainage basins, the rock framework tends toward hydraulic continuity. A three dimensional approach for mapping permeability indexes would compare the low permeability and high permeability intervals in multiple zoned DSTs. Such a study would be required when looking for hydrocarbon prospects.

A more accurate correlation between Menke's maps and the permeability index may be possible upon closer examination of DST intervals in multiple zoned tests (vertically matching up each facies used by Menke (1986) with the nearest

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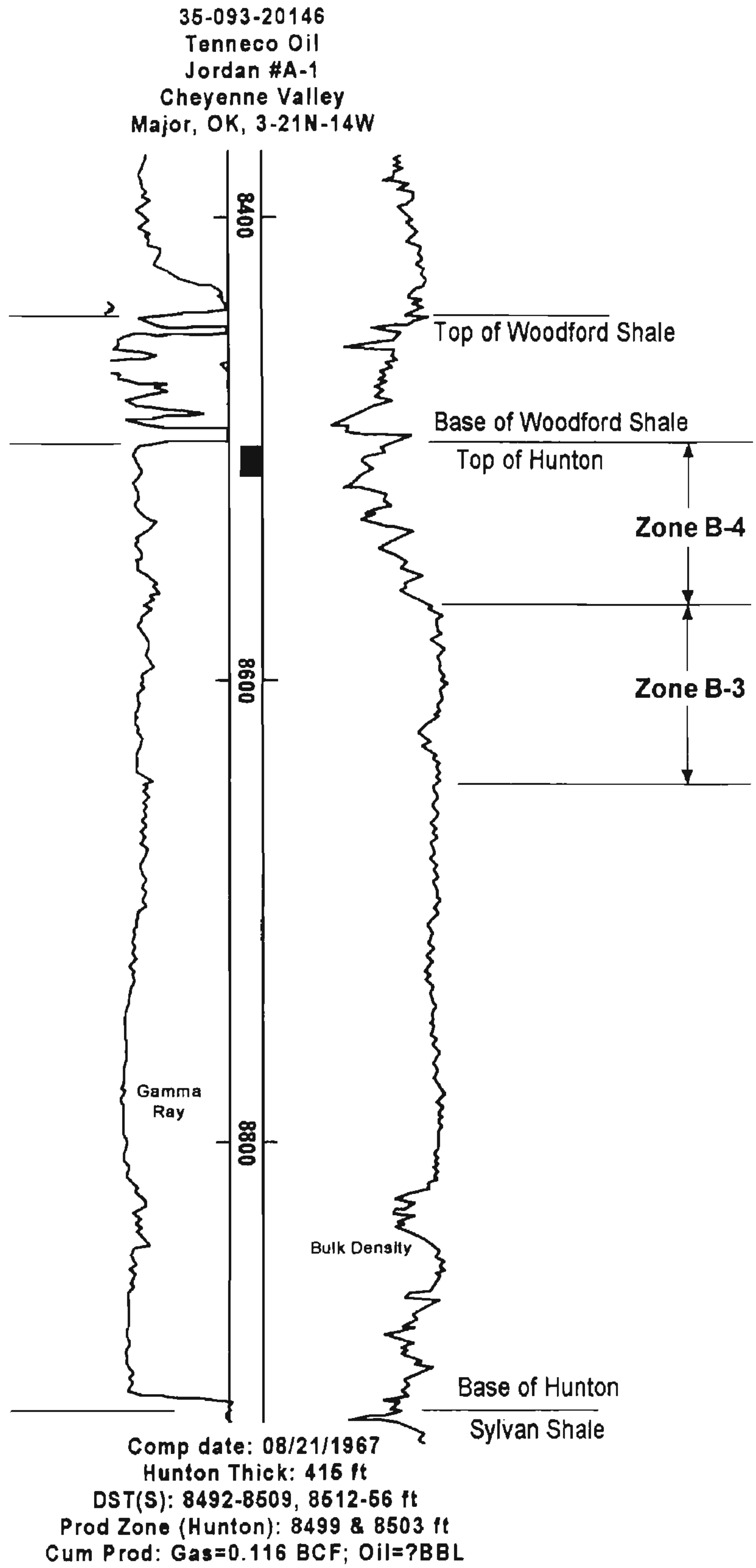

Figure 29. Electric log of Hunton Group in Cheyenne Valley Field with Upper Zone B-4 and Lower Zone B-3, adapted from Menke (1986).

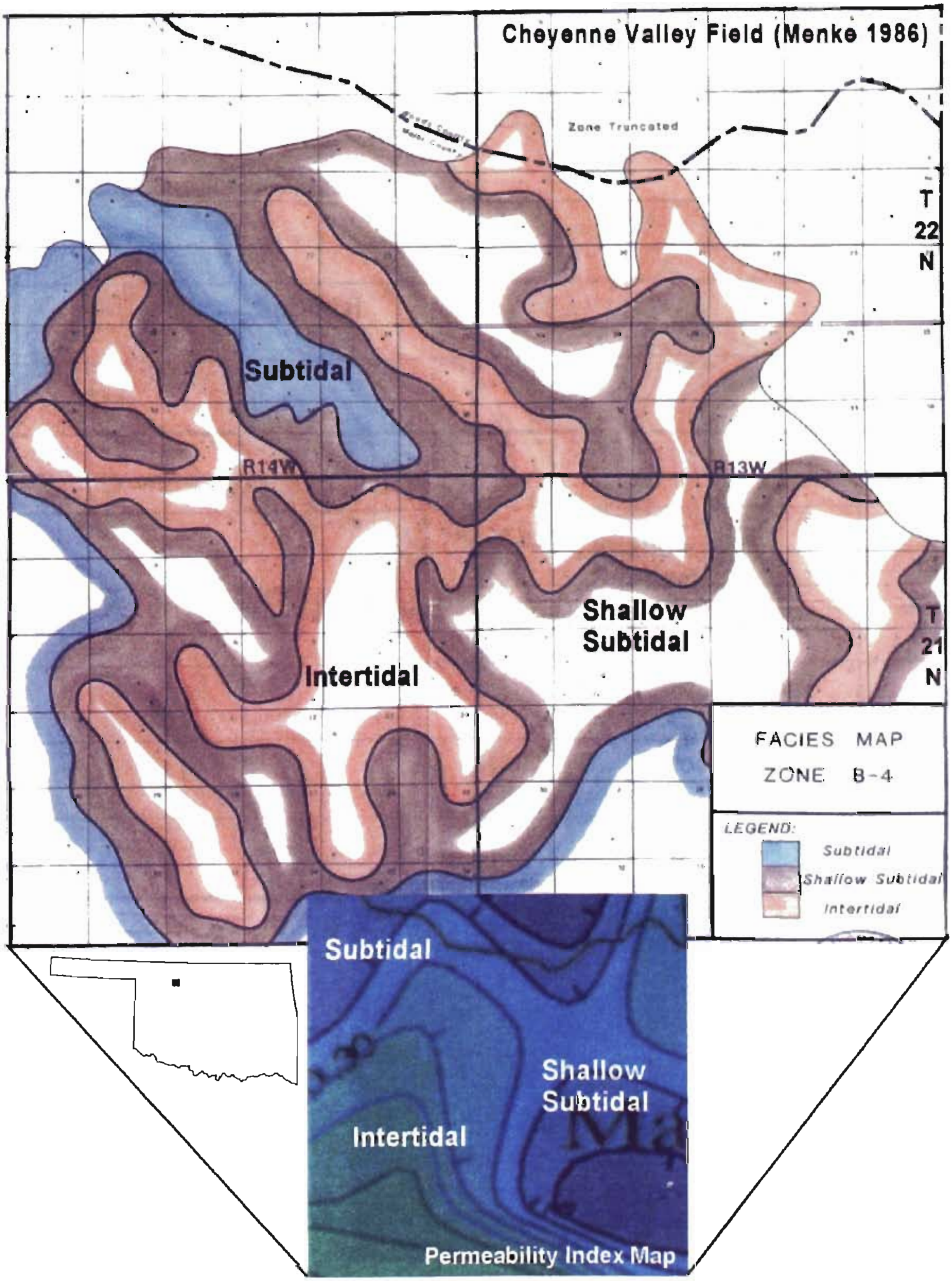

Figure 30. Upper Hunton Zone B-4 (Menke, 1986) compared to permeability index map. Blue zone on Menke's map T. 22 N., R. 14 W. corresponds to blue on the permeability index map. Orange and brown zones in Menke's map correspond to green and light blue in the permeability map.

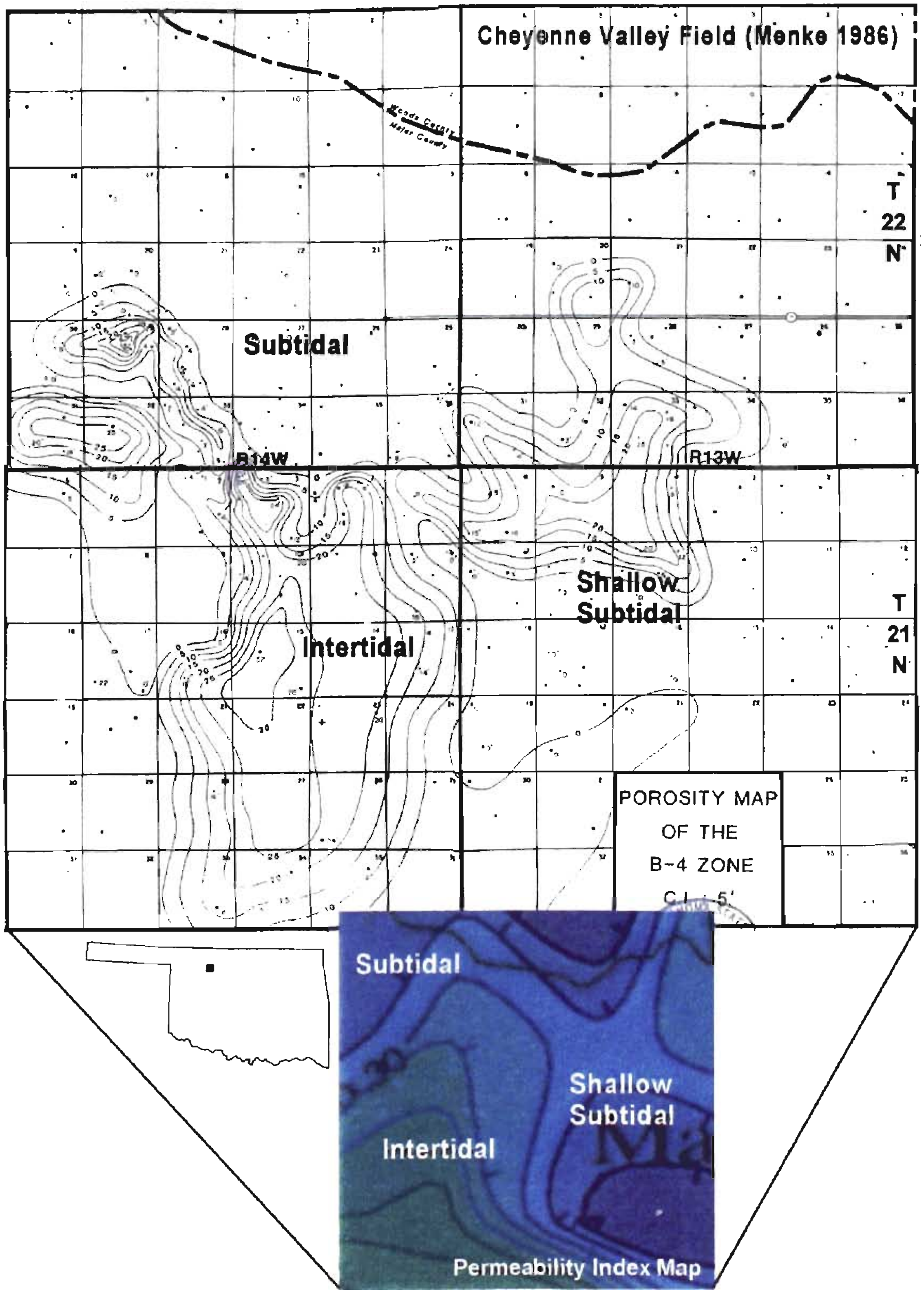

Figure 31. Upper Hunton Zone B-4 porosity map (Menke, 1986) compared to permeability index map. Maximum porosity of 25-30% corresponds to intertidal zones.

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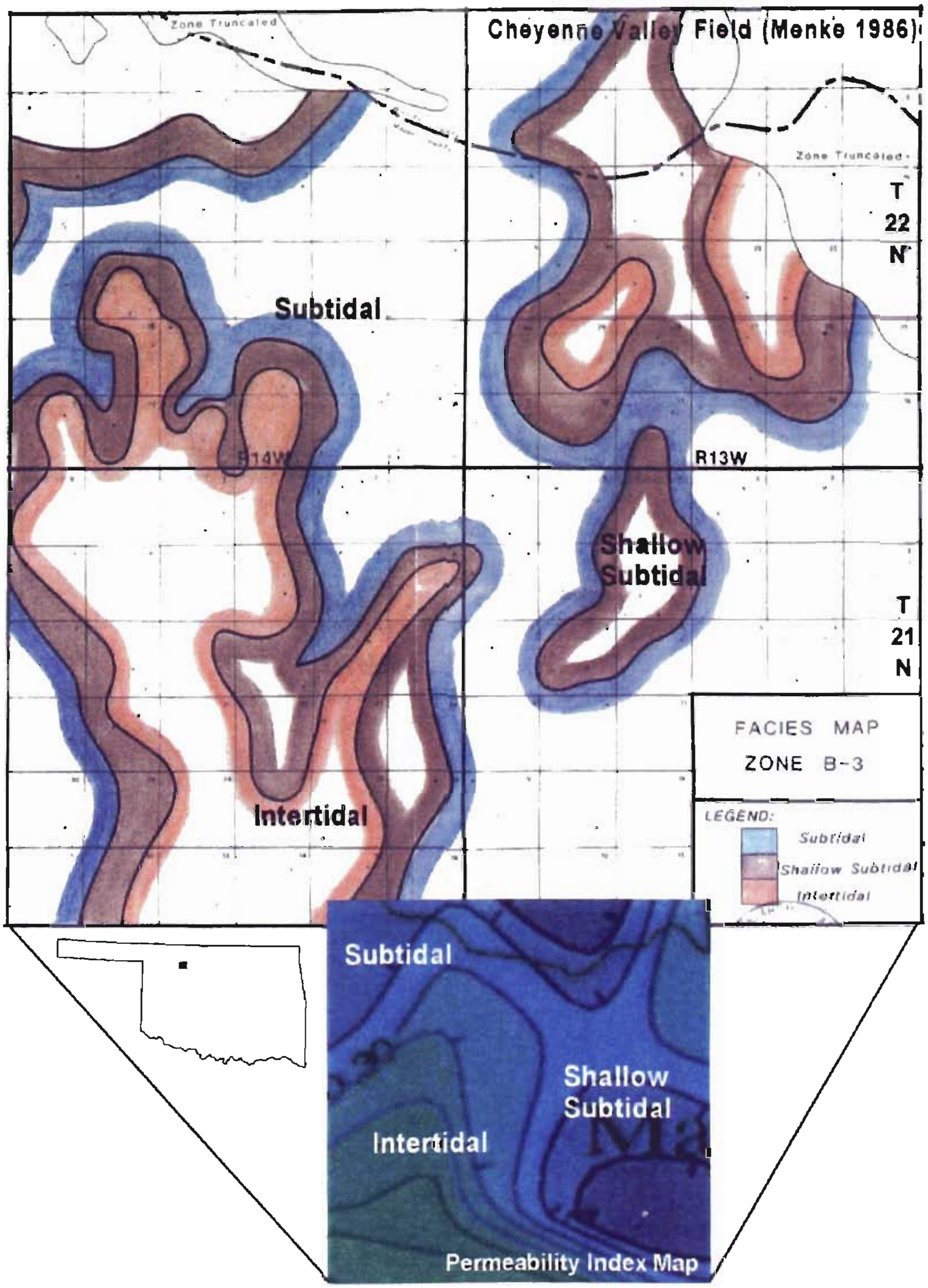


Figure 32. Lower Hunton Zone B-3 (Menke, 1986) compared to permeability index map. Blue subtidal zones on Menke's map T. 22 N., R. 14 W. and T. 21 N., R. 13 W. correspond to blue on the permeability index map. Orange intertidal zones in Menke's map T. 22 N., R. 14 W. and T. 21 N., R. 14 W. correspond to green on the permeability index.

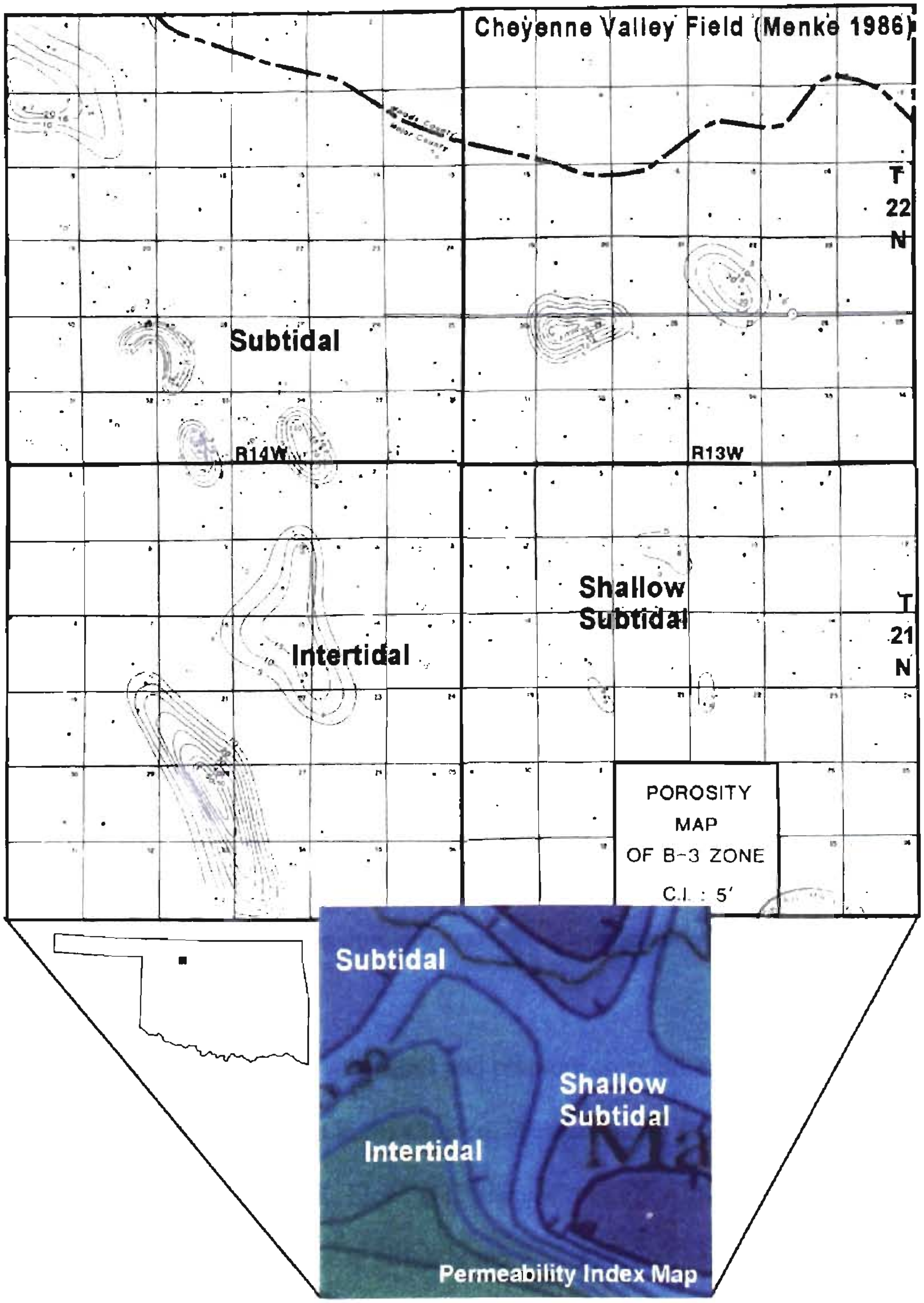


Figure 33. Lower Hunton Zone B-3 porosity map (Menke, 1986) compared to permeability index map. Green zones on the permeability index map correspond to intertidal zones on Menke's porosity map.

corresponding DST interval). Nevertheless, the permeability index map still compares with Menke's (1986) individual facies maps, Zone B-4 and Zone B-3 (orange areas on Menke's original map correspond to green area on the permeability index map), Figure 30 and Figure 32. Densely spaced DSTs, such as in the Cheyenne Valley field, yield good correlation of rock facies and reservoir pressures. Porosity can be seen in thin section from the Resource Investment Corporation (RICO) Davis No. 1 well near Cheyenne Valley.

The RICO Davis No. 1, is located just a few miles southeast of Cheyenne Valley field, in the Okeene NW field, Section 10, T. 20 N., R. 12 W., (South Major County). This area has numerous DSTs. Using surrounding DSTs, the RICO Davis plots within the green on the permeability index map. Thin sections made from a RICO cored interval show dissolution and moldic porosity (Figure 34). Most of the moldic porosity resulted from dissolution of fossil fragments. The reservoir in this interval is classified as a dolowackestone, according to Dunham classification (Dunham, 1980). The estimated FP/SIP for RICO (from examination of the color contours on the permeability index map) is 0.5 and thin section porosity near 7%. Correlation of rock facies and DST pressures is good in this area.

Conversely, quality reservoir facies and pressure correlation is not possible in areas of sparsely spaced DSTs as in the Conoco, Woman Going Uphill Well No. 1 located at Section 17, T. 13 N., R. 11 W. (SE Blaine County). Although this area is green on the permeability index map (slightly more blue-green than the RICO location), the Conoco Woman core is characteristic of a subtidal open marine facies, with no porosity seen in thin section, as shown in Figure 35. More DST data are needed in this

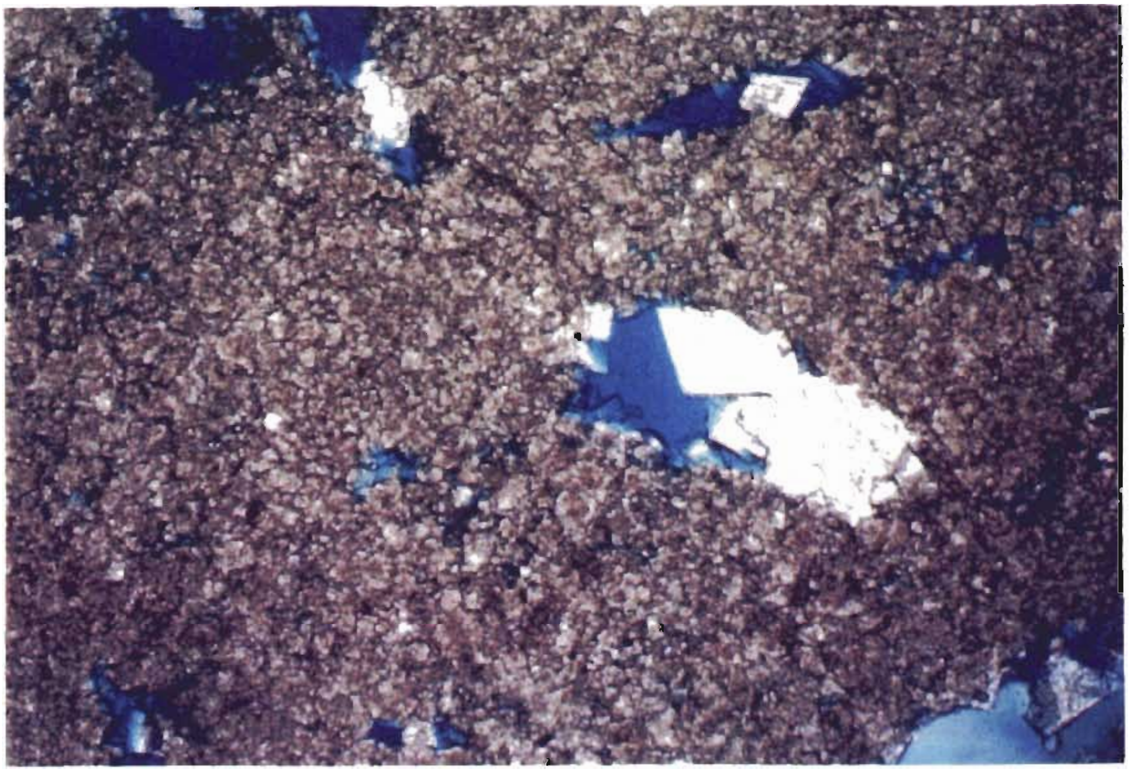


Figure 34. Resource Investment Corporation (RICO) Davis 8578 feet, intertidal facies II, dolowackestone, baroque dolomite infilling vuggy porosity, 40x, continued next page.

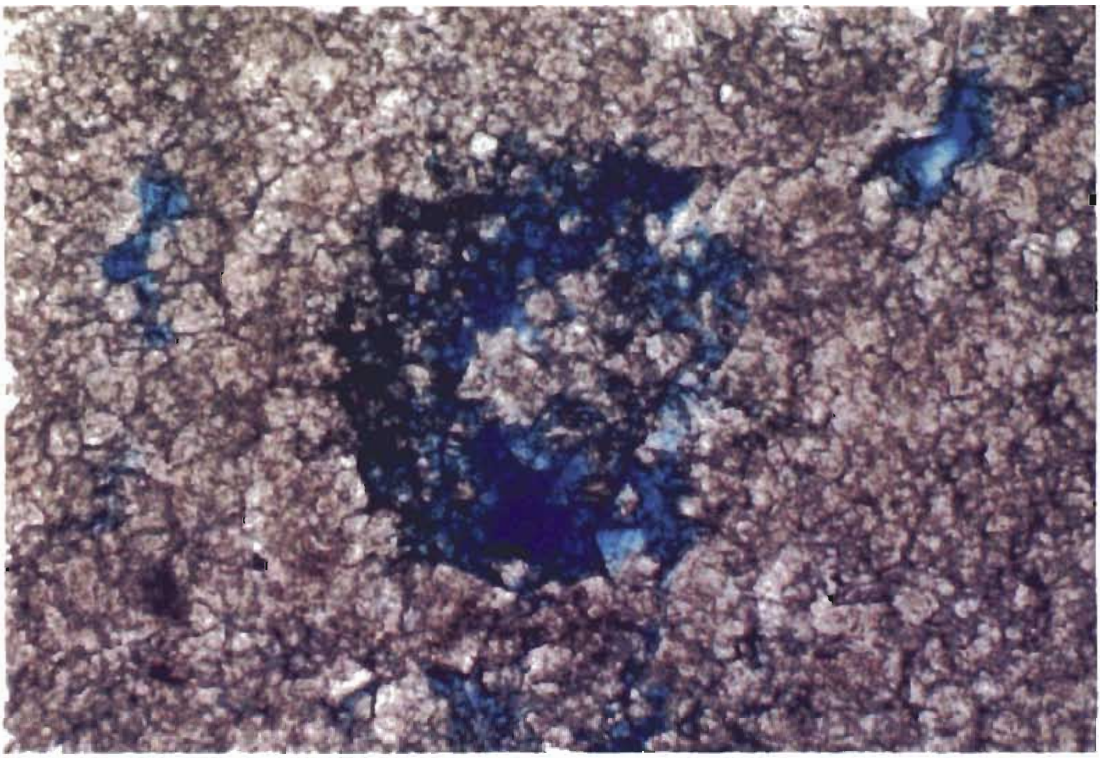


Figure 34 (cont'd). Resource Investment Corporation (RICO) Davis 8578 feet, intertidal facies II, dolowackestone, moldic porosity from dissolution of echinoid fragment, 100x, continued next page.

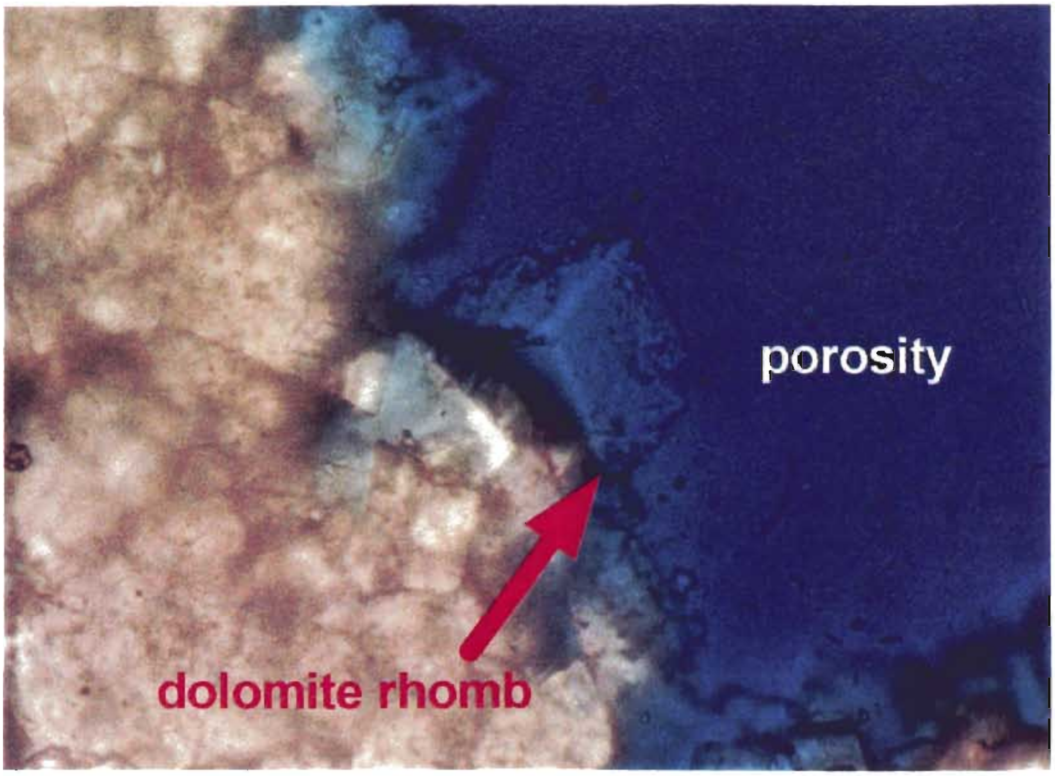


Figure 34 (cont'd). Resource Investment Corporation (RICO) Davis 8578 feet, dissolving dolomite rhomb, 400x.

Figure 35. Conoco Woman 13,763 feet, subtidal facies III, dolomudstone with baroque infilling of mold, no porosity, continued next page.

Figure 35 (cont'd). Conoco Woman 13,763 feet, subtidal facies III, dolomudstone with baroque infilling of mold, no porosity, 100x.

area to determine whether subtle changes in the permeability index signify large differences in porosity and permeability. No correlation of facies and pressures is possible near the Conoco, Woman well.

Implications for Exploration

Producing zones are found within a wide range of permeability indexes. Average permeability indexes of producing wells are less than indexes of non-producing wells, 0.407 compared to 0.447, implying that production is not from the rocks of higher permeability. In fact, at most places the Hunton is a tight limestone with primary porosity less than 3% (Brevetti et al., 1985, p. 3). Production can be established in secondary porosity created by natural fracturing with a total porosity of less than 2%. Drilling experience shows the Hunton to be primarily low permeability rock (George Davis, Devon Energy, 1998, personal communication).

Within hydrocarbon traps, vertical and horizontal permeabilities may differ, thereby affecting the fluid flow rate. For a functioning trap with deep-water-discharge, the upward flow rate may exceed the lateral flow rate (Roberts, 1980, p. 220). Toth (1980, p. 160) quoting Meinhold (1971) stated that numerous examples over the world show that large accumulations exist in regions of groundwater discharge, accompanied by geothermal and hydrodynamic anomalies that can be explained only as the results of groundwater moving in open hydrodynamic systems. Rice et al. (1988, p. 52) provides geochemical evidence that gas from the Woodford Shale has migrated from the deeper part of the Anadarko basin into the Sooner Trend.

Exploration strategies may differ depending on proximity to the shelf or deep basin. For example, the Anadarko Shelf is an ideal location for hydrocarbon accumulation. Flow is primarily to the north and east, as shown by the potentiometric map (Plate 10 and Figure 36). Flow up structural dip, and abrupt thinning of the Hunton produces conditions for petroleum to settle in a potentiometric low or quasistagnant zone. On the other hand, caution must be used when predicting petroleum updip because Hunton reservoirs may decrease in thickness updip or terminate (Tom Farrell, 1999, personal communication). An overall sea level regression, discussed in Chapter II, would imply that the intertidal zone (highest porosity zone) moved basinward. Reservoir thickness may increase basinward.

Permeability indexes may help determine reservoir location. The rate of change of the permeability indexes is more important than their absolute value when identifying flow barriers. In the absence of structural traps, hydrocarbon accumulations are found along the boundaries between the higher permeability facies and low permeability ones in the direction of regional groundwater flow (Plate 18). Production in fields with high permeability indexes (0.8) may be structurally trapped as in Washita Creek and Buffalo Wallow fields in Hemphill County, Texas (Plate 18 and Plate 19).

An example of using hydrodynamics to identify stratigraphic traps can be seen by reference to Cheyenne Valley field. A production map was combined with a potentiometric map, permeability index map and Menke's (1986) facies map to show producing trends in Cheyenne Valley field (Figure 37). Most of the producing wells in Cheyenne Valley are along boundaries of low and high permeability facies, in T. 22 N., R. 14 W. These facies are reflected in the permeability index map as a steepening of the

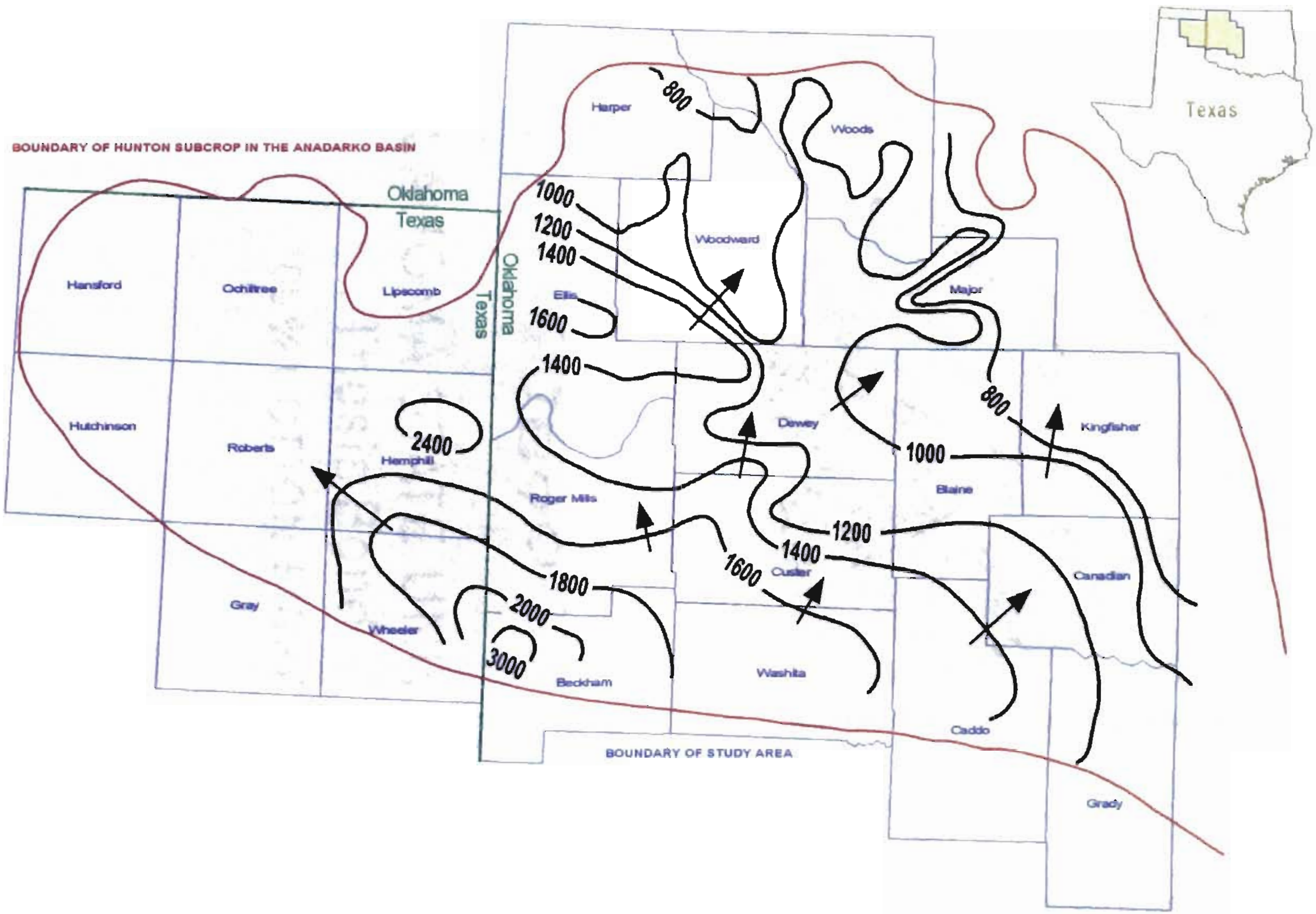
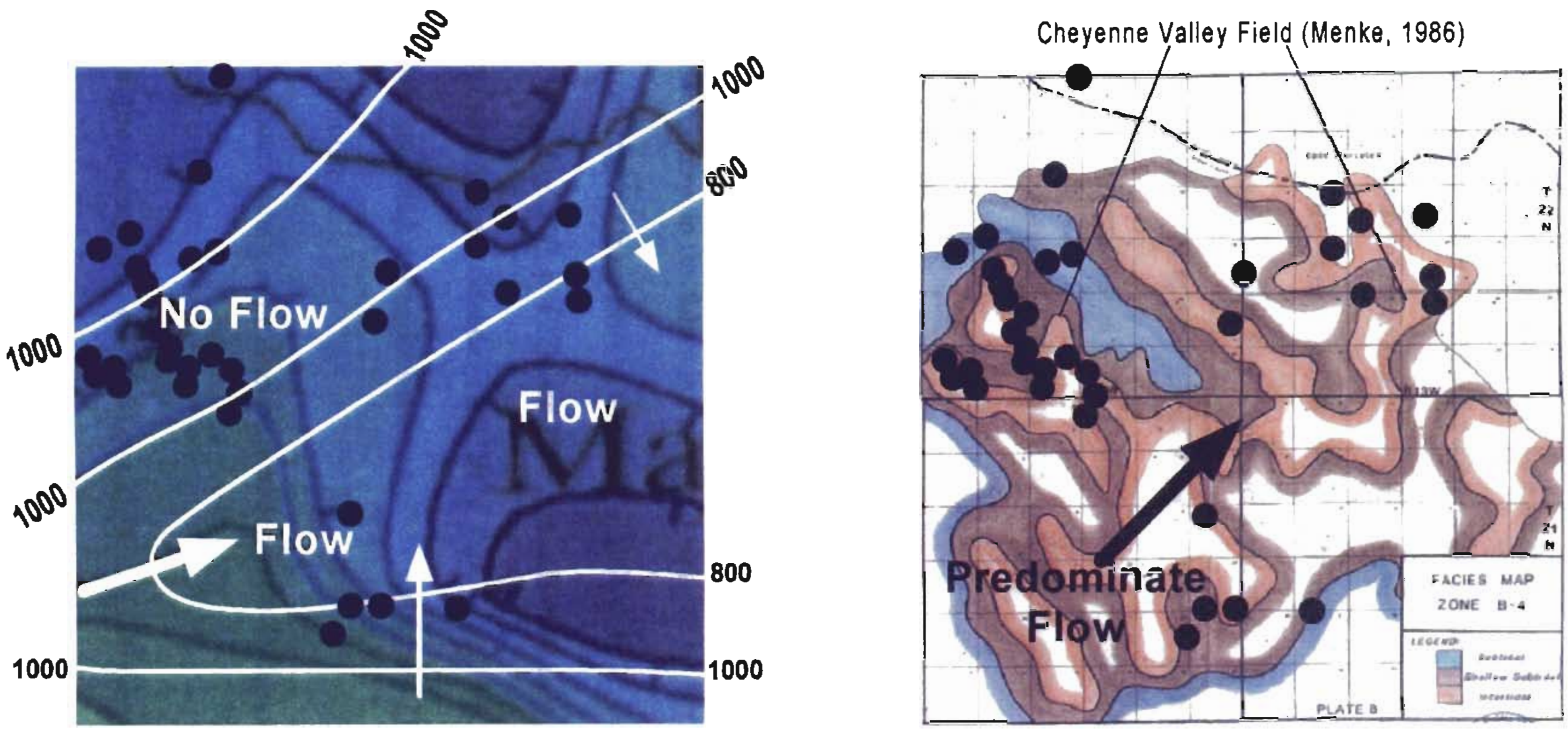


Figure 36. Potentiometric surface in feet above sea level of the Hunton Group in the Anadarko basin. Arrows indicate fluid flow direction.



Hunton permeability index and potentiometric map (C.I. = 200 feet) with producing wells

Upper Hunton facies map with producing wells

INTEGRATION OF FLUID FLOW WITH GEOLOGY

Figure 37. Overlay of potentiometric map on permeability index map shows accumulation of hydrocarbons in zones of no flow or hydrostatic conditions. Producers are along the boundaries of lower permeability and higher permeability facies. Predominate flow is northeast suggesting hydrocarbons were flushed from the intertidal facies T21N R14W, updip.

permeability indexes, shown as a transition from green to blue across short distances. The potentiometric contours shown in white indicate the flow direction.

Flow is perpendicular to the potentiometric contours and primarily to the northeast in the direction of regional flow. Moreover, potentiometric contours shown in Figure 37 designate the shift in permeability from high to low. The potentiometric surface is approximately 1000 feet above sea level in T. 22 N., R. 14 W. and is relatively flat indicating no flow or hydrostatic conditions. The hydrostatic conditions coincide with a petroleum accumulation in T. 22 N., R. 14 W. Toth (1980, p. 160) stated that a correlation exists between the position of petroleum deposits and regional groundwater flow patterns.

Hydrocarbons are associated with low or nonexistent lateral hydraulic gradients combined with saddles or closed minima of fluid potential explained by Toth (1980). Oil and gas fields have been found associated with ascending limbs and stagnant zones of groundwater flow in the following regions discussed by Toth (1980, p. 142, 158, 160): Caspian region (from Bars et al., 1961, Fig. 2, p. 652), Persian Gulf (from Chiarelli, 1973, Fig. 100, p. 177), and Devonian I Hydrogeologic Group Red Earth region, northern Alberta, Canada (Toth, 1978, figs. 16 and 30). Hitchon (1971, p. 675) stated that in quasistagnant regions where gravity segregation is effective, petroleum will tend to accumulate.

Significant trends in production are seen in the P-D plot, Figure 38:

1) depleted reservoirs,
2) a gap in producing wells with DSTs at 7,000 to 8,000 feet,
3) lower production between 10,000 and 13,000 feet, and

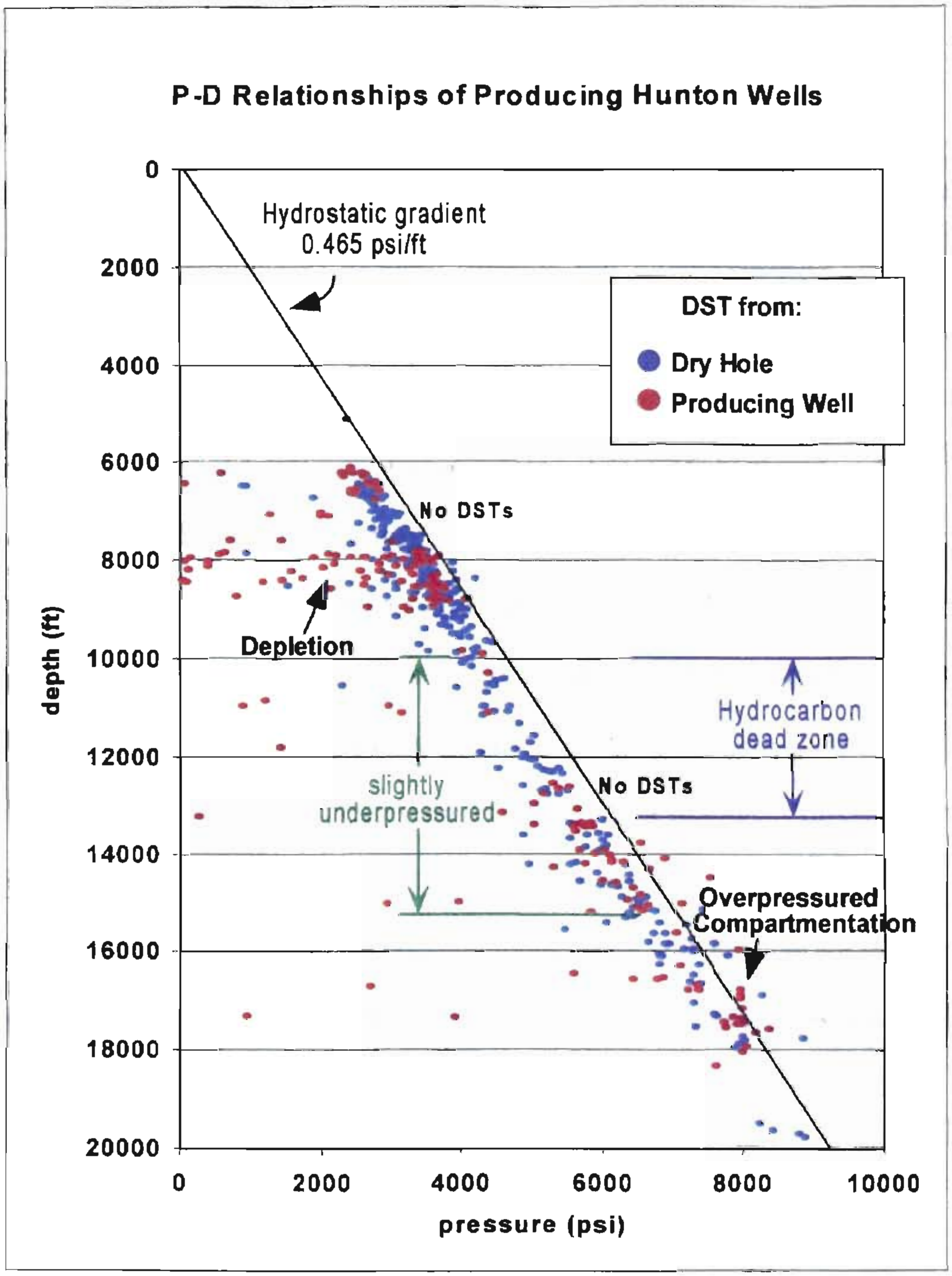


Figure 38. Note depletion at 8-9,000 feet, gaps in DST data (esp. at 7,500 ft), hydrocarbon dead zone between 10-13,000 feet, and overpressuring and compartmentalization between 17-18,000 feet.

4) overpressured compartmentalization of wells in the deeper basin.

Smith et al. in the *Shale Shaker* (1999, p. 95) states that a carbonate 'dead zone' is present in the Hunton between 10,000 and 13,000 feet, from which production is virtually nonexistent. Below 13,000 feet production increases substantially, at a rate far beyond what gas compressibility would imply (Ibid., p. 96). Smith concludes that increases in reservoir thickness with depth more than compensate for any porosity decreases with depth. Al-Shaieb et al. (1993a) showed that porosity is related to depositional environment and dolomitization and does not necessarily degrade with depth. Dolomitized zones can have porosity up to 15% (Brevetti et al., 1985, p. 3).

The Hunton in the deep Anadarko appears to be slightly underpressured, except for local overpressured compartments (Figure 38). The average pressure gradient in the Hunton plots closer to a freshwater gradient of 0.433 psi/ft than to a brine gradient of 0.465 psi/ft (100,000 ppm total dissolved solids). USGS Water Resources Investigations Report 86-4355 lists numerous Hunton wells with TDS concentrations in excess of 100,000 ppm TDS. Many of these TDS concentrations above 100,000 ppm are from the Anadarko shelf, not from the deep basin. TDS concentrations in the deep basin may be lower than concentrations in the shelf.

TDS concentrations of waters in the shelf margin are commonly above 100,000 ppm (compared to concentrations in the deeper basin that may be below 100,000 ppm). Observation by Roberts (1980, p. 219), of basins worldwide, suggest that hydrocarbon traps are zones of deep-water-discharge and likely to have higher TDS concentrations. Concerning the Hunton, petroleum accumulations not explained by lateral flow may, in fact, be explained by upward flow of formation water from deeper Hunton strata.

Demonstration or dismissal of this idea is subject to another report and would require a three-dimensional transient analysis of the Hunton.

Pressures within the Hunton are normal to subnormal and plot along a straight line with the exception of local compartmentalized overpressured zones deeper in the basin. Most of the reservoir depletion from production occurs in the upper shelf margin, shown by the P-D Plot (Figure 38). Locations of major Hunton oil and gas fields are shown in Plate 4 and Plate 19. Actual production in the Hunton Group is difficult to estimate because of numerous multiple perforated zones in the Sooner Trend.

Hunton wells in the deeper Anadarko basin in Oklahoma and the Texas Panhandle mostly are perforated in single zones. Smith et al. (1999, p. 96) stated that the perforated-to-saturated thickness ratio decreases with increasing reservoir thickness, implying that increased perforation intervals in the deeper Hunton could improve production. Of 42 Hunton fields evaluated by Smith et al. (Ibid., p. 91) there are 672 single Hunton completions and 458 commingled completions.

Most production in the Hunton comes from dolomitized Henryhouse– Haragan–Bois d'Arc strata (Al-Shaieb, 1999, personal communication). Howery (1993, p. 77, 79) used the term 'dolomitic fairway' to describe these zones of dolomitization within the Hunton (Figure 14 and Plate 20). Howery stated that 80% of Hunton oil and gas production comes from the uppermost 100 feet of the Hunton in the dolomitic fairway which he defines as a "continuous NE-SW trending band, nearly orthogonal to the basin axis, that contains Hunton reservoir porosity, not specific to any formation, and where the dominant lithology is dolomite rather than limestone." Amsden (1975, p. 56) stated that many oil and gas reservoirs in Upper Ordovician and Silurian rocks in western Oklahoma and the Texas Panhandle are porous dolomites.

Amsden emphasized, however, that not all Hunton porosity is associated with dolomite as shown by porosity in the low-magnesium limestones of the Frisco Formation of Early Devonian age. Porosity in Lower Devonian limestones is primary porosity whereas porosity in some of the Silurian dolomites is related to diagenetic events (Ibid., p. 56). The Hunton rocks that Amsden tested range in porosity from near zero to almost 20%, and have a permeability range of three orders of magnitude, from less than 0.1 to 211.28 md, millidarcy's (Amsden, 1975, p. 59).

Hydraulic Continuity of the Hunton Group

The straight-line plot on the P-D graph and the continuous nature of the potentiometric map suggest hydraulic continuity within the Hunton over geologic time. The P-D graph is characteristic of predominantly hydrostatic conditions. According to Toth (1987, p. 49) hydrodynamics is based upon the observation that in geologically mature drainage basins the rock framework is hydraulically continuous. In the Anadarko basin, there appears to be two unique flow regimes: the underpressured deep basin and the normally pressured shelf margin. The saddle-like nose extending from east to west on the potentiometric map (Figure 36 and Plate 10) approximates the boundary between the shelf margin and the deeper basin. Observations suggest that the Hunton in the northern Anadarko shelf, because of karstification, is more hydraulically continuous than the deeper basin.

Pressure declines on the P-D graph (Figure 23, Figure 24, and Figure 38) indicate that the Hunton in the northern Anadarko shelf is being depleted. This is interpreted as a sign of good hydraulic continuity. Matthews (1992) confirmed karstification in the northern shelf in core and reservoir fluid recoveries. Permeability development suggested by the permeability index map shows two distinct fairways of permeability that correspond to producing fairways. The main producing fairway trends SW-NE from the Mills Ranch field in Wheeler County Texas to the Sooner Trend area in Major and Kingfisher Counties (Plate 19). The second producing trend is more E-W on the northern shelf, in Harper and Woods Counties and includes fields such as Lovedale and Hopeton North (Plate 19). Porosity in these areas is more related to karstification of the Chimney Hill Formation than to dolomitization, as discussed by Matthews (1992). The regional producing trend corresponds with the dolomitic fairway shown in Plate 20 and with known intertidal facies and good permeability. This trend contains the top 10 Hunton reservoirs according to Howery (1993 p. 77).

An accurate hydrodynamic analysis is dependent on detailed geological data. Davis (1991, p. 127) stated: "Fluid movements are determined by the geology and by the physical state of the fluids themselves. A good hydrodynamic analysis is absolutely dependent upon a good geological model. Hydrodynamic analysis provides a method of integrating the geological data by evaluating the interaction between different components of the geological model and migrating fluids." Distinguishing between the effects of geology and the intrinsic characteristic of fluids on their movement helps predict where the largest hydrocarbon accumulations are likely to be found (Figure 39). Toth and Rakhit (1988) discussed the effect of permeable rocks on mapping simulated

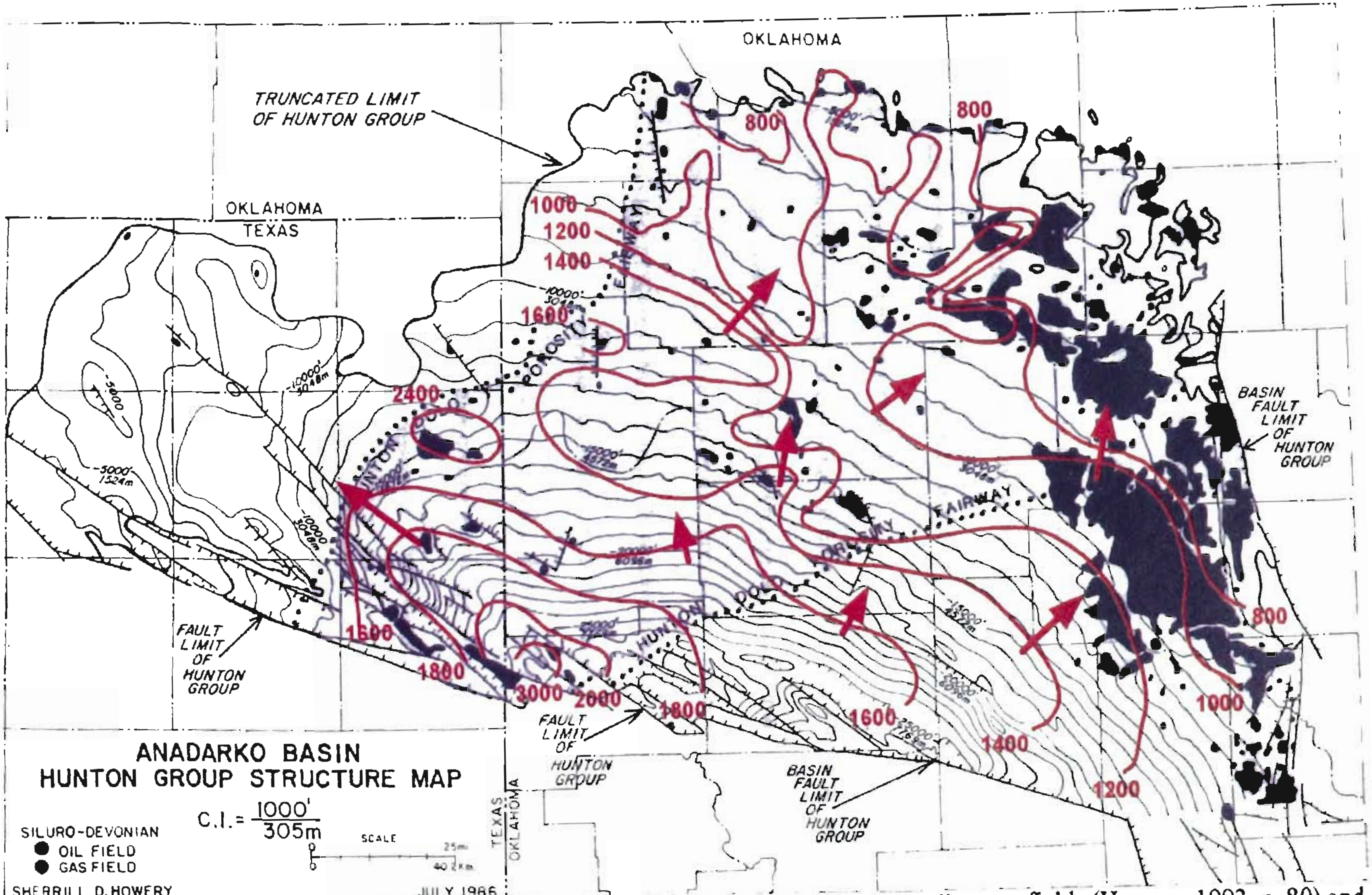


Figure 39. Hunton dolomite porosity fairway, structure on top of Hunton, and Hunton oil or gas fields (Howery, 1993, p. 80) and potentiometric map with arrows showing fluid migration north and east from the deep Anadarko basin.

potentiometric surfaces. Hitchon (1969a, 1969b) discussed the effect of topography and geology on the flow of fluids in a sedimentary basin.

The Hunton dolomite porosity fairway map (Howery, 1993, p. 80), overlain on the potentiometric map (Figure 39) shows the relationship between geology, fluid migration, and hydrocarbon accumulation. The average elevation of the Anadarko basin goes from near 3000 feet in the western basin (Texas Panhandle) to less than 1500 feet in the eastern basin. Migration of fluids in the northern shelf may be more influenced by topography than pressure. Flow is to the east in the direction of decreasing topographic elevation in the Hunton of the northern shelf.

The depletion of the upper shelf margin is characteristic of a hydrogeologic system in equilibrium with surface pressures. Overpressured compartments in the deeper basin, seen in structural traps, may reflect pressures corresponding to paleotopographic highs (Wichita Mountains). Petroleum accumulations in the deeper basin are more influenced by pressure or other variables. Likewise, Hutasoit (1992 p. 131-132) in a study of the Illinois basin, concluded that topography might control the shallow system whereas other variables control the deeper system. In addition, he reported that the deep system is underpressured. Understanding the pressure architecture within a basin is critical in a hydrodynamic analysis.

CHAPTER V

SUMMARY AND CONCLUSIONS

A hydrodynamic evaluation of the Hunton offers an explanation for petroleum accumulation, especially in areas of subtle stratigraphic traps. The geologic study of Cheyenne Valley Field (Menke, 1986) is an example. Hydrodynamics can be integrated with reservoir facies and porosities. Maps of supratidal, intertidal, and subtidal facies by Menke (1986) directly correlate to variations in hydraulic gradients in potentiometric maps and permeability variations calculated from drill stem tests (DSTs). Furthermore, by overlaying a potentiometric map on a permeability index map, hydrocarbon migration and entrapment may be predicted. On a potentiometric map and permeability index map, closely spaced contours indicate barriers to flow.

An example of using hydrodynamics on a regional scale is shown by combining the production map by Howery (1993) with the potentiometric map and the permeability index map. Results show that high permeabilities calculated from DSTs correspond to the Hunton dolomitic fairway (major producing trend). Production, however, is not necessarily from the more permeable zones within this trend. In fact, geochemical evidence shows that hydrocarbons migrated updip, from the deep basin (Rice et al., 1988, p. 52), and were trapped against the less permeable Hunton carbonates of the eastern shelf margin. Typically, production comes from zones of less than six-percent porosity and areas of low flow or hydrostatic conditions.

The following have been concluded based upon a hydrodynamic study using drill stem test (DST) pressures in the Hunton Group of the Anadarko basin:

1. Hydrodynamics is helpful in predicting hydrocarbon migration in the Hunton.
2. Flow of fluids in the Hunton Group is primarily north and east in the Anadarko.
3. Petroleum reservoirs tend to be associated with hydrostatic conditions.
4. Potentiometric maps help identify stratigraphic and structural traps, interpreted as closed or partially closed potentiometric contours and steep hydraulic gradients.
5. The ratio of highest flowing pressure to highest shut-in-pressure is a relative index that can be used successfully to represent actual rock permeability.
6. The permeability index map corresponds with permeabilities in the dolomite fairway and the index predicts the higher permeabilities associated with karstification in the northern shelf of the Anadarko basin.
7. Producing fields are on the flanks of Hunton paleotopographic highs.
8. Small changes in permeability have large effects on petroleum accumulations.
9. Topography on the shelf probably controls flow of formation fluids in the shelf, and paleotopography and pressure probably controls flow in the deeper basin.
10. The combination of Hunton thickness maps, permeability index maps, and potentiometric maps is useful for identifying facies boundaries.

Recommendations

For a robust understanding of hydrocarbon migration and occurrences, the function of hydrocarbon traps in connection with regional flow of formation fluids should be given more consideration. In hydrocarbon traps, water saturated rock helps remove water (like a wick), which facilitates the separation and isolation of oil and gas (Roberts, 1980, p. 217). This exchange requires subsurface flow of fluids. Hydrocarbon separation is caused by abrupt changes in pressure, temperature, and salinity related to the change in flow direction of water from lateral to upward. This study concentrated primarily on lateral movement of fluids in the Hunton Group, but another study on vertical movement of fluids may help explain more anomalies.

An exploration strategy using these ideas should help visualize the subsurface environment in four dimensions – both spatially and temporally. A three-dimensional mapping program developed by IHS Energy for the personal computer helps to view geologic formations and production data in a block diagram that can be rotated on the computer screen. Combining several time specific intervals of depletion pressures, for example, would help to understand the interaction of rocks and fluids. John Forster of IHS Energy is normalizing DST fluid recoveries so this data can be mapped; another example of how fluid data from DSTs is useful in formation evaluation. Visualizing fluids in the subsurface helps to test geologic models.

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APPENDICES

APPENDIX A

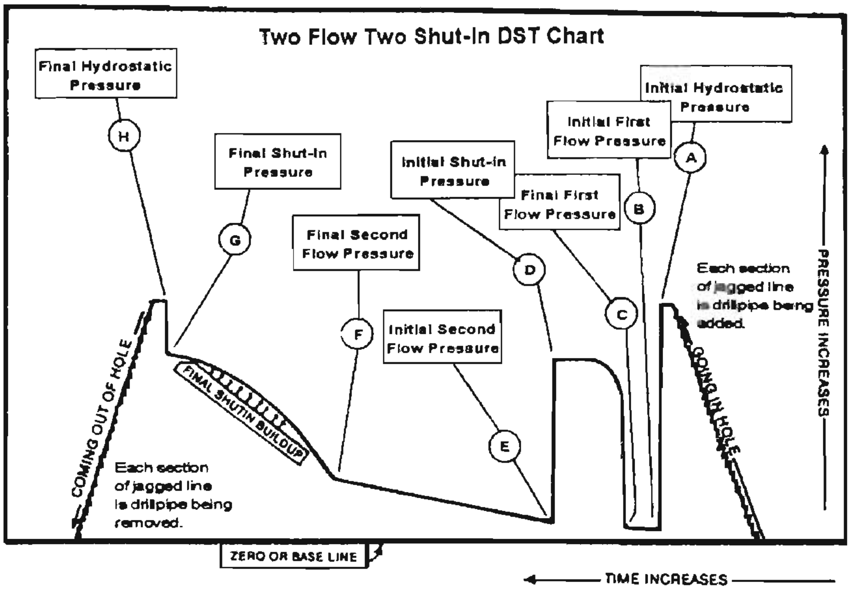
MECHANICS OF DRILL STEM TESTS

What is a Drill Stem Test?

A drill stem test (DST) is a temporary well completion designed to sample formation fluid and to establish the possibility of commercial production (Dolan, 1957, p. 318). The DST is completed in an open hole environment (uncased borehole filled with drilling mud). A well may have had several DSTs intervals or zones that were tested for commercial viability. A *normal* DST according to Johnston (1976 p. 1) obtains the following data:

1) Permeability: The calculated permeability is the average effective permeability of the formation to the *actual* fluid produced and a direct measurement of subsurface reservoir pressures (core analysis gives absolute, not effective permeability).
2) Well Bore Damage: Pressure fluctuations induced by a DST can help to determine well bore damage.
3) Reservoir Pressure: Static reservoir pressures are determined and used for other calculations.
4) Depletion: If a pressure depletion occurs during the relatively short duration of a DST, then it is likely the reservoir is too small for commercial development.
5) Radius of Investigation: The removal of fluid near the borehole in a DST provides information for volumetric calculations and well spacing decisions.
6) Barrier Indications: Barriers may be determined within the radius of investigation.

A graphical representation of the events during a typical DST is shown in the pressure – time chart (Figure A1). Inaccuracies in pressure measurements can be reduced or eliminated by examining the DST chart. Errors result from (1) reservoir characteristics that prevent measurement of true reservoir pressures, (2) mechanical



Drill Stem Test Chart Components

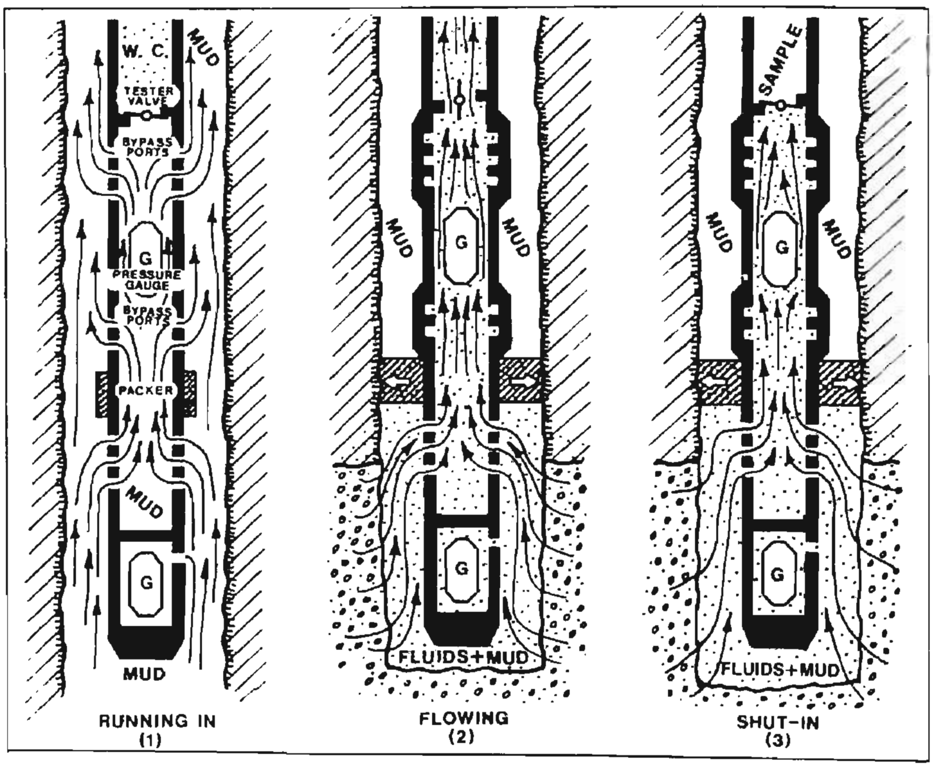
1. Base Line - The base line is a horizontal line scribed near the bottom of the chart. This base line is put on at the surface at atmospheric pressure. The procedure for scribing this base line is outlined in our Recorder Manuals.
2. Pressure Lines - The pressure line increases from the base line vertically up.
3. Time Line - The time line increases from right to left on all AK-1 recorders. This is a horizontal line.
4. Going-In-Hole-Line. This is a line that measures the hydrostatic pressure of the well bore fluid while going in hole. This hydrostatic pressure increases from atmospheric at the surface to the maximum hydrostatic pressure at bottom of the hole. This is marked point A. Initial Hydrostatic Fluid Pressure.
5. Initial First Flow Pressure - This is the point when the tool is first opened and the formation pressure is flowing the rat hole mud into the drill stem. Labeled point B.
6. Final First Flow - After tool has been opened for the first flow period. This is the last point of the first flow period. Labeled point C.
7. Initial Shut-in Pressure - This is the point at the end of the initial shut-in period. Labeled point D.
8. Initial Second Flow Pressure - After the tool has been opened for the final flow period this is the first point on this final flow and is Labeled point E.
9. Final Second Flow Pressure - After the tool has been opened for the final flow period this is the last point on this final flow and is Labeled point F.
10. Final Shut-in Pressure - This is the point at the end of the final shut-in pressure buildup curve labeled point G. This is the point at which the tool is pulled loose.
11. Final Hydrostatic Fluid Pressure - This is the point where the packer is pulled loose and the recorder is measuring the final hydrostatic pressure and is labeled point H. NOTE: There are occasions where the final hydrostatic pressure is less than the initial hydrostatic pressure. The reason for this is that the mud may have dropped in annulus during test. This mud will go into a low pressure zone somewhere above the packer.
12. Coming-Out-Of-Hole-Line - This is recording the hydrostatic fluid pressure from a maximum at bottom to atmospheric at the surface.

Figure A1: Example of DST chart with recorded events (Kopco Inc., DST Report).

failures of the DST, and (3) alteration of the reservoir conditions by the drilling fluid system (Puckette, 1996, p. 26). Pressure-time charts, however, are often unavailable.

The general stages in a DST are shown in Figure A2. The main stages of a DST include (1) the running in, (2) flowing period, and (3) shut-in period. Small variations in gauge pressures are recorded as jagged lines on the far left and right of the pressure-time chart (Figure A1). Each small segment of the jagged line represent a segment of drill pipe that is being added (running in) or taken out (running out). As pipe is added (running in) to the drill stem, the mud hydrostatic pressure increases and flows past the ports on the side of the tool. The tester valve, of Figure A2 part 1 is closed during the running in phase of the DST. Closing of the tester valve prevents the air or water (water cushion) within the drill stem test tool from mixing with the drilling fluids. Wells deeper than 8,000 feet use a water cushion to prevent the collapse of the drill stem from increased mud hydrostatic pressure, as the tool is lowered (Puckette, 1996, p. 28).

When the formation depth is reached, a flexible rubber packer expands against the side of the borehole and separates the hydrostatic mud column from the reservoir by forming a seal. The tester valve is opened causing a pressure drop in the tool compared to the formation pressure (Figure A2 part 2). The pressure differential causes formation fluid to flow (flowing period) into the DST tool and up the drill stem. During this flowing period fluid samples are collected and pressure gauges record formation pressures. In Figure A2 part 3 of the DST, the tester valve is closed, trapping the fluid in the chamber above it (shut-in period). The pressure within the closed tool builds up, eventually reaching equilibrium with the pore fluid pressure of the isolated formation (Dahlberg, 1995, p. 15). The flowing and shut-in periods may be repeated for



Stages in a drill stem test consist of three main parts:

part (1) is running in,
part (2) is flowing period, and
part (3) is shut-in period.

Figure A2: Mechanics of a typical DST (Dahlberg, 1995, p. 16).

verification. When the DST is concluded, the packer is collapsed and the tool pulled out (running out) with a sample of formation fluids.

In a typical DST there are three pressure regions: the pressure above the valve assembly within the drill pipe, the recharging reservoir pressure below the valve assembly during a close-in period, and the hydrostatic head of the mud in the annulus (*Halliburton Services Primer of DST Chart Interpretation*, Fulton, p. 10). Knowledge of these pressure regions helps to evaluate the pressure – time chart, a continuous record of the stages of a DST.

In a low permeability formation, the test may be terminated before reaching the true formation pressure (Dahlberg, 1994, p. 17). In this case, the logarithmic pressure buildup curve is used to predict the pressure if the well was shut-in indefinitely. Recognition of high and low permeability formations is possible by examining the shape of the pressure buildup curve (shut-in curve). Low permeability formations will approach equilibrium along a curved path, whereas higher permeability formations will have a more squared-off shut-in curve. Puckette (1996, p. 30-41) provided examples of these curves and associated fluid recoveries. According to Murphy (1970, p. 8) many buildup curves are unusable for extrapolation of static reservoir pressure because of insufficient closure resulting from very low permeabilities. Murphy (1970) provided many practical DST chart interpretation techniques.

Damaged Borehole and Permeability Indicators

According to *Basic Formation Evaluation* by Johnston (1976, p. 5) in the past, low fluid recovery meant poor production potential. Many wells were abandoned needlessly that may have been producers. Johnston (1976, p. 5) referencing van Everdingen (1953 p. 198, 171) and Hurst (1953, B-6) has shown that some of these abandoned wells were actually commercial producers requiring stimulation, such as an acid wash. Johnston (1976, p. 5) defined well bore damage (skin effect or skin damage) as a zone of reduced permeability immediately adjacent to the well bore; it is generally the result of the mechanical action of drilling a hole in the formation. The net effect is to reduce fluid entry into the borehole. The damage can be so extensive that it can even prevent formation fluid production completely (Johnston, 1976, p. 5).

Though some degree of damage may occur, the pressures still may be useful for evaluation of permeabilities. Bredehoeft (1965, p. 34) quoting van Everdingen (1953 p. 173) explained the skin damage affect on formation pressure measurements. "The volume of the fluids contained in a cylinder around the well-bore in which permeability is reduced by mud invasion is small compared to the volume of fluids within the drainage area of the well. It may therefore be concluded that any transient conditions set up in this cylinder are short duration and can be neglected in the analysis. Hence, the effect of a reduction in permeability in this cylinder can be taken into account as an additional pressure drop, proportional at all times to the rate of production from the formation."

Since the reduction in permeability, in the above analysis by van Everdingen (1953), is proportional to the rate of production from the formation, the ratio of the flowing pressure (FP) to the shut-in pressure (SIP) should be constant regardless of formation damage. Pressures are indicative of permeability changes near the borehole and adjacent reservoir.

Pressure Variability near the Borehole

Pressure variability near the borehole is easier to identify from DSTs with two shut-in periods and may result from borehole damage or mechanical failure of the DST. All factors being equal, the initial shut-in pressure (ISIP) and final shut-in pressure (FSIP) should be close in value with the ISIP slightly higher than the FSIP. An ISIP significantly less than the FSIP may be a result of formation damage. If the FSIP is greater to an extent that it closely approaches the mud hydrostatic pressure (HP), it is likely one of the packers has collapsed (Dahlberg, 1995, p. 23).

Low capacity formations are susceptible to mud-leakage effect that may cause abnormal pressures (Dolan, 1957, p. 319) or packer failure. If the hole is too irregular or large for the packers to seat (seal), the drilling fluid will flow past them and fill the drill pipe. An inadequate packer seal may be possible in fractured rocks. Test failures are reported as "test failed." Packer failures are recognized by large volumes of drilling mud and pressures near hydrostatic pressure (Puckette, 1996, p. 28, 30).

Marc Pearcy reservoir engineer with Schlumberger Well Services, said DSTs completed by Schlumberger showed the ISIP was usually closer to actual reservoir pressures than the FSIP (1998, personal communication). Pearcy stated this is a result of volumetrics or the storage capacity of a cylindrical volume of rock around the well bore to release fluids during a decline in hydraulic head. A pressure drop within the well bore induces this decline in hydraulic head and occurs after the packer is seated and the tool is opened to atmospheric pressure or the water cushion. Less time is required for pressure build-up during the initial shut-in time because the first flow period is relatively short and removes a relatively small volume of fluid around the well bore. The initial shut-in time, therefore, is more likely to reflect original reservoir pressures.

The FSIP *sees* deeper into the formation on the condition that adequate pressure build-up time is allowed for formation fluids to come out of reservoir storage and flow into the well bore. Adequate time is required to replenish formation fluids that were removed from storage in the first flow period, initial shut-in time and second flow period. In low permeability wells even after a few days pressures may not build-up to true formation pressures (Brad Thompson, Devon Energy, 1998, personal communication).

Pearcy (1998) of Schlumberger stated that supercharging of a reservoir, recognized by high ISIP compared to FSIP, is less important than volumetrics. Supercharging is believed to occur during drilling and completion operations when the hydrostatic head, plus pressure surges set up by pipe movement, induce a zone of abnormally high pressures in the formation around the well bore (Bateman, 1974, p. 2). The purpose of the first flow period is to remove *abnormally high pressures* caused by supercharging, stated Bateman. High pressures, previously attributed to supercharging, may in fact be characteristic of original reservoir pressures.

"Because experience has shown it difficult to obtain a stabilized mechanical reading during the final shut-in build-up period, it has now become general practice to take an initial shut-in build-up. The initial shut-in should be taken with a minimum of fluid flow from the formation. By so doing, there is a minimum amount of disturbance to the formation and pressure will build-up to a maximum and stabilize in a minimum length of time." (Johnston, 1976, p. 8). The pressure build-up in the radius of investigation around the well bore, says Johnston (1976, p. 9), is affected in three ways. 1) The higher the permeability and longer the time of flow is held, the larger the area of influence by the test. 2) The greater the porosity or storage capacity of the formation the smaller the area of influence. 3) The higher the fluid viscosity and/or compressibility, the smaller the area of influence will be in the formation.

Considerations for a *Quality* DST

Johnston (1976, p. 22) provided some statistics from several thousand DSTs regarding initial shut-in periods. ISIPs held for 30 minutes, only 50% reached a maximum static pressure (almost exclusively in high permeability, high pressure formations). ISIPs held for 45 minutes reached a maximum static pressure 75% of the time (in good permeability, good pressure formations). Those held for 60 minutes reached a maximum and static pressure 92%. Consequently, Johnston (1976, p.22) recommended as a rule of thumb a minimum of 60 minutes be given to the ISIP time.

The general purpose of the flow period according to Johnston (1976, p. 22) is to induce flow of formation fluid into the test tool in sufficient quantity to recover a representative sample. Johnston suggested that when the blow at the surface dies, it is generally indicative that fluid entry at the bottom of the well has ceased, and recommended shutting the tool in for pressure build-up. "One to two hours is suggested as being sufficient flow time to obtain an adequate sample of reservoir fluid in most instances" (Johnston, 1976, p. 23).

"As far as formation evaluation is concerned the final shut-in time is the most important portion of the DST." (Johnston, 1976, p. 23). The results of the flow periods are reflected in the FSIP and hence the final shut-in time should be based on the length of time of the flow period. Johnston recommended that for a good well (good blow and flow of formation fluid to the surface) that final shut-in time be one half the flow time and regardless of the surface or flow reaction the shut-in time should never be less than 30 minutes. On an average well (blow but no flow) final shut-in time should be at least the same as the flow period. If the DST showed poor flow characteristics indicated by the blow dying during the open flow period the final shut-in should be at least twice the open time. DSTs from scout tickets in Dewey County, for example, are in general agreement with these guidelines (first flow time = 15-30 minutes open time, initial shut-in time = 1 hour, second flow time = 1-2 hours, final shut-in time = 2-3 hours on average), an example is shown in Figure A3. A helpful summary of the abbreviations used in DST data is shown in Figure A4.

Assumptions for using Darcy's Law with Drill Stem Tests

Most equations in reservoir engineering describing fluid flow in porous media originated from Darcy's Law, an empirical equation developed by a Frenchman, Henry d'Arcy (Johnston, 1976, p. 2). Certain assumptions are intrinsic in Darcy's Law and apply to drill stem tests, explained by Johnson.

~~3-4-~~24 HP | MAP NO | SEC 17-16N-17W | WELL CLASS

STATE Oklahoma | COUNTY Dewey | LOC SE SW NE | D (INIT) | D (FIN)

OPER Sarkeys, Inc.

WELL 1-17 | FARM State | 330FSL-990FWL of NE/4

POOL PUTNAM | ELEV. 1940 GR 1959 DF 1961 KB

CONT Viersen-Cochran (RT) | GEOL.

API NO 35-043-20648 | PROVINCE

Petroleum Information CORPORATION

FR 12-15-75 | SPUD 12-14-75 | COMP 2-26-76

TD 14,685 | FORM Sylvan sh | PBTD

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COMPLETION RECORD

PROD INTERVAL TREATMENT

PRODUCING FM	FROM - TO	TREATMENT
	DRY & ABANDONED	

PROD FM IP

CASING RECORD

SIZE	DEPTH	SX	SIZE	DEPTH	SX
20"	110	10 yds			
10-3/4"	4082	950			

(1170 1st Nat'l Center, Okla City,OK 73102) PTD 14,800'Hunton

Sarkeys 1-17 State

LOG TOPS: (KB 1961)

Tonkawa Sd	7840	(- 5879)	Morrow Sd	10,960	(- [illegible]
Cottage Grove Sd	8470	(- 6509)	Chester Lm	11,580	(- 9619)
Hogshooter Lm	8690	(- 6729)	Miss Lm	13,018	(-11057)
Cleveland Sd	9100	(- 7139)	Woodford Sh	14,108	(-12147)
Oswego Lm	9600	(- 7639)	Hunton Lm	14,224	(-12263)
Red Fork Sd	9920	(- 7959)	Sylvan Sh	14,606	(-12645)
Morrow Sh	10,550	(- 8589)	TD	14,685	(-12724)

(1-7-76) SPUD w/ CT, 20" @ 110 w/ 10 yds
SPUD w/ RT 12-14-75, 10-3/4" @ 4082 w/ 950, Drlg 7963
(1-14) Drlg 9931 (1-21) Drlg 10,891 (1-28) Drlg 11,435
(2-4) Drlg 11,960 (2-11) Drlg 12,330 (2-8)
(2-8) @ 14,063 cond hole (2-25) @ 14,243 to DST
(3-3) DST #1 (Hunton lm) 14,235-243, pre op 15 mins, SI 90 mins, re op 70 mins, rec 4030' SGCWC, 6684' SGCSW, ISIP 4966/90 mins, IFP 3164-3943 FFP 3987-4881, FSIP 4966/120 mins, IHP 7463 FHP 7216, BHT 258°
No Cores; Drlg. Comp 2-24-76
TD 14,685 - DI, CORL, GRL & CALP Logs.
DST (Strd) #2 (Morrow sd) 11,275-360, pre op 30 mins, weak blow air, SI 60 mins, re op 60 mins, very slight blow air, no gas to surf, SI 120 mins,

3-4-24 HP

(Cont'd)

Figure A3: Example of Hunton scout ticket with DST, continued next page.

SHEET NO	2	SEC	17-16N-17W
Okla. COUNTY	Dewey	LOC	SE SW NE
OPERATOR	Sarkeys, Inc.		330 FT FR S LINE
WELL 1-17 FARM	State		330 FT FR W LINE

DST #2 (Cont'd)
Rec 3000' wtr cush, 100' SGCM, ISIP 3163/60 mins,
IFP 1308-1329, FFP 1329-1329, FSIP 3011/120 mins
IHP 5799, FHP 5756
COMPLETED 2-26-76
DRY & ABANDONED

PROPERTY OF OCGS
GEOLOGICAL LIBRARY

Completion Issued 3-23-76

Figure A3 (cont'd): Example of Hunton scout ticket with DST.

AOF - absolute open flow
bbl, bbls - barrel, barrels
BCPD/BCPH - barrels of condensate per day/hour
BF - barrels of fluid
BH - bottom hole
BHC - bottom hole choke
BHFP - bottom hole flowing pressure
BHP - bottom hole pressure
BHSIP - bottom hole shut in pressure
BHT - bottom hole temperature
BLOPD/BLOPH - barrels of load oil per day/hour
BO/BOPD/BOPH - barrels of oil/per day/hour
BPH - barrels per hour
BSWPD/BSWPH - barrels of salt water per day/hour
btm - bottom
BWPD/BWPH - barrels of water per day/hour
CAOF - calculated absolute open flow
CCM - condensate-cut mud (10% Conden.) + (90% Mud)
CFG - cubic feet of gas
chl - chloride
COF - calculated open flow
cush - cushion
DC - drill collar
DP - drill pipe
DPM - drill pipe measurement
DPU - drill pipe unloaded
DST - drillstem test
DST - (STRD) - drillstem test w/ straddle packers
DTD - driller's total depth
est - estimate, estimated
f/ - flow
FBH - flowing by heads
FHP - final hydrostatic pressure
fm - formation
FP - flow pressure
FSIP - final shut in pressure
FU - fill up
FW - fresh water
gal - gallon, gallons
GC - gas cut (10% Gas)
GCM - gas cut mud (10% Gas) + (90% Mud)
GCO - gas cut oil (10% Gas) + (90% Oil)
GCSW - gas cut salt water (10% Gas) + (90% Salt Water)
GCW - gas cut water (10% Gas) + (90% Water)
gas - gas in pipe (reported in vertical feet)
GIP - gas in pipe (reported in vertical feet)
G&MCO - gas & mud cut oil (* 80% Oil) +(20% Mud & Gas)
G&OCM - gas & oil cut mud (20% Gas & Oil) + (80% Mud)
GOR - gas-oil ratio
GSG - good show gas
GSO - good show of oil
GSO&G - good show of oil & gas
GTS - gas to surface
gty - gravity
HGCM - heavily (highly) gas cut mud (40% Gas) + (60% Mud)
HGCSW - heavily (highly) gas cut salt water (40% Gas) + (60% St. Wtr.)
HGCW - heavily (highly) gas cut water (40% Gas) + (60% Water)
HOCM - heavily (highly) oil cut mud (40% Oil) + (60% Mud)
HOCSW - heavily (highly) oil cut salt water (40% Oil) + (60% St. Wtr.)
HOCW - heavily (highly) oil cut water (40% Oil) + (60% Water)
HO&GCM - heavily (highly) oil & gas cut mud (40% Oil & Gas) +(60% Mud)
HP - hydrostatic pressure
hr - hour(s)
H_2S - hydrogen sulfide
hvy - heavy, heavily
HWCM - heavily (highly) water cut mud (40% Wtr.) + (60% Mud)
IFP - initial flow pressure
IHP - initial hydrostatic pressure
immed - immediate(ly)
incr - increase(d) (ing)
int - interval
IPF initial potential flow
ISIP - initial shut in pressure
lost circ - lost circulation
MC - mud cut (10% Mud)
MCF - thousand cubic feet
MCFGPD - thousand cubic feet of gas per day
MCO - mud cut oil (10% Mud) + (90% Oil)
MCSW - mud cut salt water (10% Mud) + (90% S. Wtr.)
MCW - mud cut water (10% Mud) * (90% Wtr.)
md - millidarcies
mdy - muddy
min - minute(s) or minimum
mud wt - mud weight
MSW - muddy salt water (10% Mud) + (90% S. Wtr.)
MTS - mud to surface
MW - muddy water (10% Mud) + (90% Wtr.)
NA - not available
NGTS - no gas to surface
NOB - not on bottom
NS - now show(s)
OB - off bottom
OC - oil cut (10% Oil)
OCM - oil cut mud (10% Oil) + (90% Mud)
OCSW - oil cut salt water (10% Oil) + (90% S. Wtr.)
OCW - oil cut water (10% Oil) + (90% Wtr.)
OFP - open flow potential
O&G - oil & gas
O&GCM - oil & gas cut mud (20% Oil & Gas) + (80% Mud)
O&GCSW - oil & gas cut salt water (20% Oil & Gas) + (80% S. Wtr.)
O&GCW - oil & gas cut water (20% Oil & Gas) + (80% Wtr.)
OH - open hole
op - open
orif - orifice
ostn - oil stain (1% Oil)
O&SW - oil & salt water (50% Oil & 50% Salt Water)
OTS - oil to surface
O&W - oil & water (50% Oil & 50% Water)
oz - ounce
PD - per day
perm - permeable, permeability
pkr - packer
ppm - parts per million
pr - poor
press - pressure
PSA - packer set at
RBSO - rainbow show of oil (1% Oil)
res - resistivity
rev - reverse(ed) (ing)
rev out - reverse out
rng - running
SCF - standard cubic feet
SFP - standard flow pressure
SG - show gas (10% Gas)
SG&C - show gas & condensate (10% Gas & Cond.)
SG&O - show gas & oil (10% Gas & Oil)
SG&W - show gas & water (10% Gas & Water)
SGCM - slightly gas cut mud (5% Gas) + (95% Mud)
SGCO - slightly gas cut oil (5% Gas) + (95% Oil)
SGCSW - slightly gas cut salt water (5% Gas) + (95% S. Wtr.)
SGCW - slightly gas cut water (5% Gas) + (95% Water)
SGCWB - slightly gas cut water blanket (5% Gas) + (95% Wtr.)
SGCWC - slightly gas cut water cushion (5% Gas) + (95% Wtr.)
SI - shut in
SIBHP - shut in bottom hole pressure
SIP - shut in pressure
sli - slight, slightly
sm - small
S&O - stain & odor
SO - show of oil (10% Oil)
SO&G - show of oil & gas (10% O & G)
SO&GCM - slightly oil & gas cut mud (5% O & G) + (95% Mud)
SOCM - slightly oil cut mud (5% Oil) + (95% Mud)
SOCSW - slightly oil cut salt water (5% Oil) + (95% S. Wtr.)
SOCW - slightly oil cut water (5% Oil) + (95% Water)
SOCWB - slightly oil cut water blanket (5% Oil) + (95% Wtr.)
SOCWC - slightly oil cut water cushion (5% Oil) + (95% Wtr.)
spl - sample
spl cham - sample chamber
SSG - slight show gas (-5% Gas)
SSG&O - slight show gas & oil (5% G & O)
SSO - slight show oil (-5% Oil)
SSO&G - slight show oil & gas(-5% Gas & Oil)
stds - stands
stdy - steady
strg - strong
surf - surface
SW/SWTR - salt water
SWCM - salt water cut mud
SWTS - salt water to surface
tite - tight
tstd, tstg - tested, testing
TSTM - to small to measure
VHGCM - very heavily (highly) gas cut mud (50% Gas) + (50% Mud)
VHGCSW - very heavily (highly) gas cut salt water (50% Gas) + (50% S. Wtr.)
VHGCW - very heavily (highly) gas cut water (50% Gas) + (50% Wtr.)
VHO&GCM - very heavily (highly) oil & gas cut salt water
(50% O & G) + (50% Salt Water)
VHOCM - very heavily (highly) oil cut mud (50% Oil) + (50% Mud)
VHOCSW - very heavily (highly) oil cut salt water (50% S. Wtr.) + (50% Oil)
VHOCW - very heavily (highly) oil cut water (50% Oil) + (50% Water)
visc. - viscosity
vol - volume
v-sli - very slight, slightly (2% or less)
VSGCM - very slightly gas cut mud (2% Gas) + (98% Mud)
VSGSW - very slightly gas cut salt water (2% Gas) + (98% S. Wtr.)
VSGCW - very slightly gas cut water (2% Gas) + (98% Water)
VSO&GCM - very slightly oil & gas cut mud (2% Oil & Gas) + (98% Mud)
VSO&GSCW - very slightly oil & gas cut salt water (2% Oil & Gas) + (98% S. Wtr.)
VSOCM - very slightly oil cut mud (2% Oil) + (98% Mud)
VSOCSW - very slightly oil cut salt water (2% Oil) + (98% S. Wtr.)
VSOCW - very slightly oil cut water (2% Oil) + (98% Water)
VSSG - very slight show gas (- 2% Gas)
VSSO - very slight show oil (- 2% Oil)
WAB - weak air blow
WC - water cushion
WCM - water cut mud
WCO - water cut oil
WCTS - water cushion to surface
wk - weak
WLT - wireline test
wtr - water
WTS - water to surface
" - inch, inches

Figure A4: Abbreviations pertaining to DST data from an actual DST report.

1) Radial Flow – fluid is flowing equally into the well bore from all directions, this assumption is true for most sandstones but not fractured limestones (the effect of fractures on empirical equations is negligible).

2) Homogeneous Formation – assumes horizontal formation and constant thickness and length of zone being tested. Calculated formation characteristics are averages.

3) Steady State Conditions – during the pressure build-up curve formation and fluid characteristics approach equilibrium and during flow the rate and pressure drop causing flow are constant (deviation in formation tests is common).

4) Infinite Reservoir – amount of fluid removed during test is negligible compared to the total amount of fluid in the reservoir.

5) Single Phase Flow – only one type of formation fluid is flowing into the well bore. If gas is produced in a test in an oil-bearing formation, it is assumed gas came out of solution in the well bore; conversely, if oil is produced in a gas formation then it is assumed to be gas condensate. Another assumption is that water is produced from another horizon.

The DST is the only evaluation tool that obtains reservoir parameters under dynamic, rather than static, conditions early enough to make a decision regarding well completion (Johnston, 1976, p. i).

APPENDIX B

DST DATA FOR THE HUNTON GROUP IN THE ANADARKO BASIN

WITH EXPLANATION OF DST WELL HEADERS

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35007000610000	-100.53068	36.65169	UNION OIL OF CAL	PARKER-B	1	UNNAMED	BEAVER	N002	E023	12	2669	DF	19551130	7797	D&A-G	
35007000610000	-100.53068	36.65169	UNION OIL OF CAL	PARKER-B	1	UNNAMED	BEAVER	N002	E023	12	2669	DF	19551130	7797	D&A-G	
35007004970002	-100.70908	36.60721	HUBER J M	SAGER	1	BALKO S	BEAVER	N002	E022	29	2821	KB	19680115	9980	GAS-W	354CSTR
35009201080000	-99.96896	35.32434	CONTINENTA	GORDON UNI	1	MAYFIELD W	BECKHAM	N010	W026	20	2104	DF	19720925	19969	GAS	000GRWS
35009201700000	-99.95132	35.31702	HELMERICH	ADKERSON	1	MAYFIELD W	BECKHAM	N010	W026	28	2128	DF	19761105	18700	GAS	169ABCK
35009201870000	-99.92456	35.31709	HELMERICH & PAY	CUPP 'D' UNIT	1	MAYFIELD W	BECKHAM	N010	W026	26	2204	KB	19761223	15393	GAS	202VIOL
35009201870000	-99.92456	35.31709	HELMERICH & PAY	CUPP 'D' UNIT	1	MAYFIELD W	BECKHAM	N010	W026	26	2204	KB	19761223	15393	GAS	202VIOL
35009202220000	-99.9398	35.30007	HELMERICH	CUPP A	2	MAYFIELD W	BECKHAM	N010	W026	34	2030	DF	19771208	16030	GAS	269HNTN
35011000010000	-98.36917	36.13112	COYLE JOHN	DOUGHERTY	1	WILDCAT	BLAINE	N019	W011	10	1250	DF	19560822	8902	D&A-G	
35011000490000	-98.34546	36.15393	PAN AMERIC	WORLEY UNI	1	OKEENE NW	BLAINE	N019	W011	2	1219	DF	19610308	8735	GAS	404CHRK
35011000490000	-98.34546	36.15393	PAN AMERIC	WORLEY UNI	1	OKEENE NW	BLAINE	N019	W011	2	1219	DF	19610308	8735	GAS	404CHRK
35011200170000	-98.25016	36.13418	SHELL OIL	MURDOCK	1-10	STAR	BLAINE	N019	W010	10	1208	KB	19660609	8533	D&A	
35011201210000	-98.2413	36.14678	LONE STAR	VELMA & FE	1	STAR	BLAINE	N019	W010	2	1187	DF	19680328	8496	GAS	269HNTN
35011201230000	-98.32781	36.11034	GETTY OIL	LUETKEMEYE	1	OKEENE NW	BLAINE	N019	W011	24	1234	DF	19671222	9251	D&A-O	
35011201400000	-98.21634	36.10309	NATIONAL C	EMBRY	1	STAR	BLAINE	N019	W010	24	1160	KB	19680426	8594	D&A	
35011201460000	-98.33024	36.14854	JONES & PELLOW	DUGGINS UNIT	1	OKEENE NW	BLAINE	N019	W011	1	1259	DF	19680913	8718	GAS	404RDFK
35011201680000	-98.26027	36.13323	CLEARY PET	DILL	1-10	STAR	BLAINE	N019	W010	10	1223	DF	19690331	9386	D&A-G	
35011201710000	-98.30495	36.10501	CLEARY PET	PAKAREK	1-19	WILDCAT	BLAINE	N019	W010	19	1212	DF	19690425	8890	D&A-G	
35011201860000	-98.22572	36.13956	OKLAHOMA N	EMMONS	1	STAR	BLAINE	N019	W010	12	1186	KB	19690626	8837	D&A-G	
35011201860000	-98.22572	36.13956	OKLAHOMA N	EMMONS	1	STAR	BLAINE	N019	W010	12	1186	KB	19690626	8837	D&A-G	
35011202330000	-98.26928	36.15493	ANADARKO P	NAYLOR	A1-4	STAR	BLAINE	N019	W010	4	1208	KB	19710128	8900	D&A-O	
35011202970000	-98.25889	35.98204	UNIVERSAL	S D A	1-3	SOONER TREN	BLAINE	N017	W010	3	1240	KB	19720322	9484	GAS	354CSTR
35011203080000	-98.27037	36.13862	FARMERS RO	WELDON LEI	1	WILDCAT	BLAINE	N019	W010	9	1233	KB	19720525	8940	D&A-G	
35011203470000	-98.4013	36.03926	ARKLA EXPL	WEBER	1-17	SOUTHARD SE	BLAINE	N018	W011	17	1301	DF	19730423	9940	GAS	402MRRW
35011203570000	-98.23985	35.84642	SHENANDOAH	BUTLER	1	WILDCAT	BLAINE	N016	W010	23	1254	KB	19730916	10772	D&A-O	
35011204140000	-98.48349	36.13874	FERGUSON O	GRABOW	1	OKEENE NW	BLAINE	N019	W012	9	1413	KB	19740315	9724	OIL	404RDFK
35011204920000	-98.33014	36.13401	TEXAS O&G	MCCULLOUGH	1	OKEENE NW	BLAINE	N019	W011	12	1229	GR	19740813	9000	GAS	354CSTR
35011205050000	-98.30363	36.14063	DYCO PET	FRECHEK	1	OKEENE NW	BLAINE	N019	W010	7	1213	GR	19740921	9030	GAS	354CSTR
35011205140000	-98.48879	36.07605	ARKLA EXPL	M V FROST	1-33	CARLETON NE	BLAINE	N019	W012	33	1680	KB	19741230	9871	D&A-O	
35011209470000	-98.29243	36.13587	HAMON JAKE	KRAUSE	1	SOONER TREN	BLAINE	N019	W010	8	1216	DF	19781101	8990	D&A	
35011300070000	-98.25154	36.12351	SHELL OIL	DILL	1-15	STAR	BLAINE	N019	W010	15	1213	KB	19650506	8960	D&A-O	
35011301310000	-98.239	36.13236	LAMMERTS R	DIHL UNIT	1	STAR	BLAINE	N019	W010	11	1196	DF	19660927	8515	GAS	319MSRH
35011302710000	-98.23344	36.12235	CLEARY PET	JANZEN	1	STAR	BLAINE	N019	W010	14	1181	DF	19660418	8568	GAS	319MSRH
35015000040000	-98.45101	34.9657	BRITISH AM	PAU-TAN-PY	1	APACHE	CADDO	N006	W012	27	1351	DF	19581014	7661	D&A-G	
35015000090001	-98.47228	35.28259	ELLISON KE	MILLER-LON	1	COGAR	CADDO	N009	W012	4	1547	DF	19611226	21021	GAS-W	405HXBR
35015000330000	-98.45645	34.95754	SHELL OIL	HOLCOMB	1	APACHE	CADDO	N006	W012	27	1341	ES	19580202	5318	D&A-O	
35015000330000	-98.45645	34.95754	SHELL OIL	HOLCOMB	1	APACHE	CADDO	N006	W012	27	1341	ES	19580202	5318	D&A-O	
35015000460000	-98.56545	35.03435	SHELL OIL	ROGER TOFP	1	WILDCAT	CADDO	N007	W013	34	1405	KB	19550818	10364	D&A-G	
35015000700000	-98.58423	35.04798	MAGNOLIA P	KE-AH-BONE	1	CARNEGIE SW	CADDO	N007	W013	28	1414	KB	19540928	11636	D&A-O	
35015000770000	-98.44307	34.89956	AN-SON CORP	ANAGOOM	1	WILDCAT	CADDO	N005	W012	14	1357	DF	19541026	3085	D&A	
35015001270000	-98.55645	34.99807	GOFFER-LEE	GILES	1	WILDCAT	CADDO	N006	W013	15	1412	DF	19600916	6015	D&A	
35015001410000	-98.51645	35.0158	SINCLAIR O	SUSIE	2	ALDEN NE	CADDO	N006	W013	1	1412	DF	19571120	8984	OIL	202BRMD2
35015002430000	-98.41445	34.92491	GOSE PET/W	BLACKBEAR	1	WILDCAT	CADDO	N005	W012	12	1303	DF	19661114	5540	D&A	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35007000610000	301HRGN	3133	3160		700	700	1014	0.22		150	150	0.214	tight	multi-zn		h			
35007000610000	301HRGN	3062	3092		600	600	867	0.19					tight	multi-zn		l			
35007004970002	269HNTN	9365	9429	1195	1810	1810	-2716	0.19	959	959	959	0.530							
35009201080000	269HNTN	16824	16930	8193	8247	8247	2909	0.49	1911	2106	2106	0.255	tight				YF	FmR	OK
35009201700000	251CMNL	16100	16139	7763	7720	7763	2684	0.48	3648	2375	3648	0.470					YF	FmR	OK
35009201870000	269HNTN	14646	14695	5983	4625	5983	376	0.41	2590	1354	2590	0.433		multi-zn	H	l	YD	FmR	OK
35009201870000	251CMNL	14713	14806	5934	6244	6244	826	0.42	1859	1947	1947	0.312		multi-zn	L	h			
35009202220000	251CMNL	15830	16021	7943	7158	7943	3091	0.50	3216	2440	3216	0.405							
35011000010000	301BDRC	8833	8842		3800	3800	580	0.43	1300	3750	3750	0.987					Y	FmR	No ISIP
35011000490000	269HNTN	8583	8596	475	448	475	-6355	0.06	17	17	17	0.036	tight	multi-zn	L	l			
35011000490000	269HNTN	8585	8620	1095	906	1095	-5046	0.13	44	44	44	0.040	tight	multi-zn	H	h			
35011200170000	269HNTN	8460	8533	154		154	-6994	0.02	12	26	26	0.169	tight						
35011201210000	269HNTN	8384	8422	2663	2071	2663	-1508	0.32	45	35	45	0.017	tight						
35011201230000	269HNTN	8831	8854	3799	3794	3799	550	0.43	930	3709	3709	0.976					Y	FmR	OK
35011201400000	269HNTN	8504	8594	3408	3408	3408	-105	0.40	3104		3104	0.911						FmR	OK
35011201460000	269HNTN	8549	8570	1531	1506	1531	-4019	0.18	946	946	946	0.618					YD	FmR	OK
35011201680000	269HNTN	8504	8520	1436	1436	1436	-4209	0.17	703	703	703	0.490							
35011201710000	269HNTN	8758	8790	3746	3746	3746	478	0.43	3682	3746	3746	1.000						FmR	OK
35011201860000	269HNTN	8375	8410	3195	1938	3195	-353	0.38	120	30	120	0.038	tight	multi-zn	L	h			
35011201860000	269HNTN	8310	8837	382	639	639	-6277	0.07	86	86	86	0.135	tight	multi-zn	H	l			
35011202330000	269HNTN	8427	8469	3544	3544	3544	361	0.42	329	400	400	0.113	tight				YD	FmR	OK
35011202970000	269HNTN	9428	9442	4127	2704	4127	673	0.44	1217	2704	2704	0.655							
35011203080000	269HNTN	8520	8580	1375	510	1375	-4390	0.16	153	153	153	0.111	tight						
35011203470000	269HNTN	9395	9413	4027	4152	4152	817	0.44	3977	4002	4002	0.964					Y	FmR	OK
35011203570000	269HNTN	10357	10405	1675	1620	1675	-5549	0.16	1343	1343	1343	0.802							
35011204140000	269HNTN	9184	9208	3983	3983	3983	771	0.43	3897	3983	3983	1.000					Y	FmR	OK
35011204920000	269HNTN	8699	9000	3447	3186	3447	-358	0.38	2092	2092	2092	0.607					YD	FmR	OK
35011205050000	269HNTN	8576	8590	1505	1288	1505	-4140	0.18	932	932	932	0.619							
35011205140000	269HNTN	9813	9844	4153	4179	4179	823	0.42	3902	4204	4204	1.006					Y	FmR	OK
35011209470000	269HNTN	8578	8630	305	800	800	-5694	0.09	282	188	282	0.353							
35011300070000	269HNTN	8533	8577	3728	3728	3728	653	0.43	1229	3339	3339	0.896						FmR	OK
35011301310000	269HNTN	8459	8460	3950	3925	3950	1231	0.47					tight				Y	FmR	OK
35011302710000	269HNTN	8486	8568	22	67	67	-7243	0.01	8	8	8	0.119	tight						
35015000040000	269HNTN	3995	4150		100	100	-2584	0.02		90	90	0.900	suspect						
35015000090001	301BDRC	19498	19675		8430	8430	1	0.43	1510	1630	1630	0.193	tight				Y	FmR	No ISIP
35015000330000	269HNTN	2889	2901		25	25	-1506	0.01					tight	multi-zn					
35015000330000	269HNTN	3479	3529		200	200	-1758	0.06					tight	multi-zn					
35015000460000	269HNTN	6340	6418		700	700	-3508	0.11	250	325	325	0.464							
35015000700000	269HNTN	7850	7918		40	40	-6418	0.01					tight						
35015000770000	269HNTN	1620	1685		10	10	-306	0.01					tight						
35015001270000	269HNTN	4513	4587	155	50	155	-2842	0.03					tight						
35015001410000	269HNTN	7571	7616		1185	1185	-3656	0.16	60	85	85	0.072	tight						
35015002430000	269HNTN	2995	3180	264	298	298	-1236	0.09	93	93	93	0.312	suspect						

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35015200480000	-98.45645	34.99108	SUN OIL	DIRK GOEKE	1	BROXTON W	CADDO	N006	W012	15	1407	KB	19680605	8101	OIL	202VIOL
35015200480000	-98.45645	34.99108	SUN OIL	DIRK GOEKE	1	BROXTON W	CADDO	N006	W012	15	1407	KB	19680605	8101	OIL	202VIOL
35015200700000	-98.52692	35.0335	JONES & PE	HALL	1	ALDEN NE	CADDO	N007	W013	36	1381	DF	19690306	8533	OIL	319WDFD
35015200860000	-98.53466	35.03441	JONES & PE	HARRISON	1	ALDEN NE	CADDO	N007	W013	35	1380	DF	19700114	9420	OIL	319WDFD
35015203170000	-98.58248	35.03466	WESTHEIMER	LONE BEAR	1	WILDCAT	CADDO	N007	W013	33	1431	DF	19720717	7380	D&A-O	
35015203170000	-98.58248	35.03466	WESTHEIMER	LONE BEAR	1	WILDCAT	CADDO	N007	W013	33	1431	DF	19720717	7380	D&A-O	
35015203420000	-98.51249	35.0245	JONES & PE	HALL /D/	1	ALDEN NE	CADDO	N006	W012	6	1385	KB	19731030	9592	D&A-O	
35015212870000	-98.48424	34.97748	BASS ENTER	CECIL KIEF	1	WILDCAT	CADDO	N006	W012	20	1432	KB	19820423	9832	D&A-O	
35015366180000	-98.45422	34.95018	HUBER J M	KIEFER	1	APACHE	CADDO	N006	W012	34	1347	DF	19600511	4050	D&A-G	
35017000010000	-97.73103	35.50602	STANOLIND	SMITH	1	MUSTANG N	CANADIAN	N012	W005	21	1341	DF	19560516	8293	OIL	301BDRC
35017000040000	-97.73468	35.45152	DUNCAN WAL	BORELLI	1	WILDCAT	CANADIAN	N011	W005	4	1294	KB	19560314	8556	D&A-G	
35017000080000	-97.69009	35.47694	KINGWOOD O	RUTTY	1	MUSTANG N	CANADIAN	N012	W005	35	1247	KB	19571010	7970	D&A-O	
35017000090000	-97.70801	35.58818	PAN AMERIC	KAY BEE IN	1	WILDCAT	CANADIAN	N013	W005	23	1218	DF	19570822	7721	D&A-G	
35017000150000	-97.76973	35.43069	AMERADA HE	LAWSON	1	WILDCAT	CANADIAN	N011	W005	18	1362	DF	19450227	9541	D&A-O	
35017000170000	-97.80498	35.62897	PHILLIPS P	PIEDMONT	1	WILDCAT	CANADIAN	N013	W006	2	1307	DF	19481103	9197	D&A-O	
35017000190000	-97.90462	35.5142	SINCLAIR O	COMM EMMA	1	EL RENO	CANADIAN	N012	W007	14	1357	DF	19521007	11700	GAS	202WLCX2
35017000330000	-97.79149	35.66909	SINCLAIR O	WALTER TRE	1	WILDCAT	CANADIAN	N014	W006	24	1289	DF	19610627	8791	D&A-O	
35017000670000	-97.69881	35.52496	PAN AMERIC	CORFF	1	UNNAMED	CANADIAN	N012	W005	11	1260	DF	19570329	8610	D&A-O	
35017000670000	-97.69881	35.52496	PAN AMERIC	CORFF	1	UNNAMED	CANADIAN	N012	W005	11	1260	DF	19570329	8610	D&A-O	
35017000930000	-97.73825	35.68734	JULIAN OIL	SIMPSON	1	PIEDMONT N	CANADIAN	N014	W005	16	1204	KB	19560328	8326	D&A-O	404BRVL
35017000930000	-97.73825	35.68734	JULIAN OIL	SIMPSON	1	PIEDMONT N	CANADIAN	N014	W005	16	1204	KB	19560328	8326	D&A-O	404BRVL
35017000940000	-97.71597	35.67286	JONES SHEL	PRUETT	1	WILDCAT	CANADIAN	N014	W005	22	1182	KB	19581015	7449	D&A-G	405PRRY
35017000940000	-97.71597	35.67286	JONES SHEL	PRUETT	1	WILDCAT	CANADIAN	N014	W005	22	1182	KB	19581015	7449	D&A-G	405PRRY
35017001110000	-97.83268	35.40068	PAN AMERIC	PATZACK	1	WILDCAT	CANADIAN	N011	W006	28	0		19680717	10016	D&A-O	
35017200520000	-97.9633	35.67844	APACHE COR	ROTHER UNI	1	WILDCAT	CANADIAN	N014	W007	20	1220	DF	19671001	9676	D&A-G	
35017200540000	-97.7515	35.69812	MIDWEST OI	EVERY	1	REEDING S	CANADIAN	N014	W005	8	1199	KB	19670914	7942	D&A	
35017200540000	-97.7515	35.69812	MIDWEST OI	EVERY	1	REEDING S	CANADIAN	N014	W005	8	1199	KB	19670914	7942	D&A	
35017200670000	-97.91244	35.45536	PAN AMERIC	ED COOKSEY	1	WILDCAT	CANADIAN	N011	W007	2	1410	KB	19680205	10540	D&A-O	
35017200710000	-97.7652	35.70166	OKLAHOMA N	MCGRANAHAN	1	REEDING S	CANADIAN	N014	W005	7	1197	DF	19680419	8101	D&A-O	
35017200790000	-97.74263	35.66548	WARREN O F	MONAR	1	WILDCAT	CANADIAN	N014	W005	28	1211	KB	19680508	8093	D&A	
35017200930000	-97.77108	35.45166	FERGUSON O	WEDMAN	1	WILDCAT	CANADIAN	N011	W005	6	1374	KB	19680918	9068	D&A-G	
35017201170000	-98.19581	35.57459	CONTINENTA	HADLOCK UN	1	CALUMET	CANADIAN	N013	W009	30	1611	DF	19691229	14300	GAS	202VIOL
35017201290000	-97.7176	35.3971	APACHE EXP	CURTIS	1	MUSTANG N	CANADIAN	N011	W005	27	1324	KB	19700405	8560	OIL	269HNTN
35017201480000	-97.73537	35.39713	CAPITOL WE	KERR-MCGEE	1	MUSTANG N	CANADIAN	N011	W005	28	1328	DF	19710602	8690	D&A-O	
35017201480000	-97.73537	35.39713	CAPITOL WE	KERR-MCGEE	1	MUSTANG N	CANADIAN	N011	W005	28	1328	DF	19710602	8690	D&A-O	
35017201480000	-97.73537	35.39713	CAPITOL WE	KERR-MCGEE	1	MUSTANG N	CANADIAN	N011	W005	28	1328	DF	19710602	8690	D&A-O	
35017201500000	-97.91207	35.56023	MAGNESS PE	DICK JENSE	35-1	WILDCAT	CANADIAN	N013	W007	35	1332	KB	19710219	11556	D&A-O	
35017201530000	-97.83732	35.46985	SOUTHLAND	HUSMANN	1	WILDCAT	CANADIAN	N012	W006	33	1337	KB	19710119	9626	D&A-O	
35017201720000	-97.67325	35.4043	CAPITOL WE	KRIVANEK	1	UNNAMED	CANADIAN	N011	W005	25	1331	KB	19711130	9766	OIL	202VIOL
35017201990000	-97.87706	35.43718	RAMSEY ENG	KIRKEGARD	1	WILDCAT	CANADIAN	N011	W006	7	1360	KB	19720501	10635	D&A-O	
35017202010000	-97.68597	35.35031	WILSHIRE O	SUZANNE WE	1-12	MUSTANG N	CANADIAN	N010	W005	12	1322	KB	19720530	8619	D&A-O	
35017202120000	-97.79981	35.35896	CLEARY PET	HUNT	1-11	MUSTANG SW	CANADIAN	N010	W006	11	1295	KB	19720905	9700	GAS	451HART
35017202370000	-98.27309	35.58385	CONTINENTA	LECK UNIT	1	CALUMET	CANADIAN	N013	W010	21	1557	KB	19730223	14146	2 GAS	401SPRG1

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35015200480000	251CMNL	6156	6216	525	498	525	-3680	0.08	16	21	21	0.040	tight	multi-zn	L	h			
35015200480000	269HNTN	5790	5826	217	237	237	-3909	0.04	8	44	44	0.186	tight	multi-zn	H	l			
35015200700000	269HNTN	6255	6339	116	143	143	-4650	0.02	61	35	61	0.427	suspect						
35015200860000	269HNTN	6865	6915	890	195	890	-3621	0.13	80	110	110	0.124	tight						
35015203170000	269HNTN	5032	5126	2390	2390	2390	1445	0.47	2149	2377	2377	0.995		multi-zn	H	h	Y	FmR	OK
35015203170000	269HNTN	5810	6014	1383	999	1383	-1609	0.23	140	165	165	0.119	tight	multi-zn	L	l			
35015203420000	269HNTN	6576	6636		306	306	-4593	0.05	77	77	77	0.252	tight						
35015212870000	251CMNL	7880	8006	92	126	126	-6303	0.02	99	96	99	0.786	suspect						
35015366180000	269HNTN	2110	2240	890	890	890	1021	0.40	40	80	80	0.090	tight						
35017000010000	301BDRC	8180	8228		135	135	-6597	0.02		80	80	0.593	suspect						
35017000040000	269HNTN	8380	8556		3925	3925	1179	0.46	3830	3100	3830	0.976							
35017000080000	269HNTN	7875	7965		540	540	-5557	0.07	50	80	80	0.148	tight						
35017000090000	301BDRC	7528	7575		70	70	-6206	0.01		70	70	1.000	suspect						
35017000150000	269HNTN	8491	8515		3700	3700	804	0.43					tight				Y	FmR	No ISIP
35017000170000	301HRGN	8225	8319		3600	3600	730	0.43		1700	1700	0.472							
35017000190000	251CMNL	9690	9735		4440	4440	1170	0.46		900	900	0.203	tight				Y	FmR	No ISIP
35017000330000	269HNTN	8036	8136	90	45	90	-6653	0.01	45	45	45	0.500	suspect						
35017000670000	269HNTN	7753	7805		2840	2840	-437	0.36	380	1120	1120	0.394		multi-zn	H	h			
35017000670000	269HNTN	7700	7757		2740	2740	-605	0.35		360	360	0.131	tight	multi-zn	L	l			
35017000930000	269HNTN	7542	7566		1400	1400	-3351	0.19		100	100	0.071	tight	multi-zn	H	h			
35017000930000	269HNTN	7566	7588		1400	1400	-3373	0.18					tight	multi-zn		l			
35017000940000	269HNTN	7347	7375		970	970	-4107	0.13	60	625	625	0.644		multi-zn	H	h			
35017000940000	269HNTN	7352	7449		970	970	-4181	0.13	95	200	200	0.206	tight	multi-zn	L	l			
35017001110000	269HNTN	9110	9495	884	1156	1156	-7009	0.12					tight						
35017200520000	269HNTN	9382	9676	2306	2210	2306	-3497	0.24	643	662	662	0.287	tight						
35017200540000	269HNTN	7697	7940	904	260	904	-4797	0.11	13	27	27	0.030	tight	multi-zn	L	l			
35017200540000	269HNTN	7602	7670	468	951	951	-4426	0.12		42	42	0.044	tight	multi-zn	H	h			
35017200670000	269HNTN	10089	10191	2261	2445	2445	-3523	0.24	102	140	140	0.057	tight						
35017200710000	269HNTN	7708	8101	441		441	-5956	0.05					tight						
35017200790000	269HNTN	7657	7663	212	352	352	-5695	0.05	88	106	106	0.301	suspect						
35017200930000	269HNTN	8744	8777		2930	2930	-1102	0.33	662	706	706	0.241	tight						
35017201170000	269HNTN	12768	12878	6734	6781	6781	3316	0.53	665	665	665	0.098	tight						
35017201290000	269HNTN	8461	8560	3483	3483	3483	254	0.41	176	220	220	0.063	tight						
35017201480000	269HNTN	8598	8690	3339	3148	3339	-181	0.38	201	223	223	0.067	tight	multi-zn	M	h	YD	FmR	OK
35017201480000	269HNTN	8638	8690	198	208	208	-6915	0.02	44	88	88	0.423	suspect	multi-zn	H	l			
35017201480000	269HNTN	8590	8600	3215	3269	3269	-242	0.38		22	22	0.007	tight	multi-zn	L	m			
35017201500000	269HNTNL	9808	9873	3580		3580	-842	0.36	196	71	196	0.055	tight						
35017201530000	269HNTN	9208	9255	898	806	898	-5987	0.10	522	522	522	0.581							
35017201720000	269HNTN	7997	8051	339	368	368	-5929	0.05	43	43	43	0.117	tight						
35017201990000	269HNTN	9633	9680	4361	4312	4361	1058	0.45	1539	1887	1887	0.433					Y	FmR	OK
35017202010000	269HNTN	8735	8800	4089	4089	4089	1316	0.46	222	259	259	0.063	tight				Y	FmR	OK
35017202120000	269HNTN	9524	9550	3896	3826	3896	123	0.41	106	248	248	0.064	tight					FmR	OK
35017202370000	269HNTN	13341	13518	2232	1782	2232	-7161	0.17	1055	1191	1191	0.534							

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35017202420000	-97.81374	35.71271	BIG CHIEF	MOFFAT	1	WILDCAT	CANADIAN	N014	W006	2	1255	KB	19721031	8390	D&A-G	
35017202590000	-97.78391	35.4847	CONTINENTA	TILLIE SMR	1	WILDCAT	CANADIAN	N012	W006	25	1357	KB	19730128	9240	D&A-O	
35017203230000	-97.86259	35.70188	APEXCO	HEINEN	1	WILDCAT	CANADIAN	N014	W006	8	1273	KB	19740119	8975	D&A	
35017203370000	-97.80465	35.62485	LAMMERTS R	MCLAIN-SAV	1	RICHLAND N	CANADIAN	N013	W006	2	1317	DF	19740313	8550	OIL	269HNTN
35017203380000	-97.89421	35.58566	MACK OIL	WILDS	1	WILDCAT	CANADIAN	N013	W007	24	1317	DF	19740426	10350	D&A	
35017203690000	-97.6978	35.55282	AMOCO PROD	GOODMAN	1	WILDCAT	CANADIAN	N013	W005	35	1299	KB	19740627	8020	D&A-G	
35017204230000	-97.8017	35.39708	JONES & PE	BALES	261	WILDCAT	CANADIAN	N011	W006	26	1357	DF	19750219	9506	D&A-O	
35017204260000	-97.72512	35.36174	JONES & PE	ROBBERSON	9-1	MUSTANG N	CANADIAN	N010	W005	9	1276	DF	19750721	8869	D&A-O	
35017204540000	-97.81722	35.43878	APEXCO	STEJSKAL	1	WILDCAT	CANADIAN	N011	W006	10	1351	GR	19750821	10090	D&A	
35017206330000	-97.87685	35.50428	JONES & PE	PORTA	19-1	EL RENO E	CANADIAN	N012	W006	19	1343	KB	19770810	9853	D&A-O	
35017207810000	-98.02049	35.47536	JONES & PE	MEYER	35-1	FORT RENO S	CANADIAN	N012	W008	35	1447	DF	19771207	11225	GAS	269HNTN
35017208020000	-97.73763	35.42777	MUSTANG PR	SMITH	16-A	MUSTANG NW	CANADIAN	N011	W005	16	1328	KB	19780322	8650	GAS	359MPLM
35017208400000	-97.79314	35.70541	CALVERT DR	REHERMAN	1	PIEDMONT NW	CANADIAN	N014	W006	12	1203	DF	19780222	8230	OIL	359MSSP
35017209060000	-97.78841	35.40426	WILSHIRE O	EDWARD BEJ	1	MUSTANG W	CANADIAN	N011	W006	25	1341	DF	19781013	9403	D&A-O	
35017300000000	-97.77509	35.40787	SINCLAIR O	FRANK HORL	1	WILDCAT	CANADIAN	N011	W005	19	1376	GR	19650204	9792	D&A-G	
35039000090000	-99.05066	35.778	HUNT OIL	RENE GRAFT	1	ANTHON NW	CUSTER	N015	W017	18	1757	DF	19620402	15580	GAS	402MRRW
35039000090000	-99.05066	35.778	HUNT OIL	RENE GRAFT	1	ANTHON NW	CUSTER	N015	W017	18	1757	DF	19620402	15580	GAS	402MRRW
35039000100000	-98.76722	35.77774	MOBIL OIL	MATTIE HOR	1	CRANE W	CUSTER	N015	W015	14	1783	DF	19610328	14869	2 GAS	353MRMC
35039200120000	-98.8418	35.74206	PARKER ROB	BELL	1	UNNAMED	CUSTER	N015	W015	30	1798	DF	19680102	14700	2 GAS	402MRRWU
35039200140000	-99.13915	35.79401	SINCLAIR O	STATE OF O	1	ALEDO	CUSTER	N015	W018	8	1876	DF	19680115	16108	D&A-G	
35039200140000	-99.13915	35.79401	SINCLAIR O	STATE OF O	1	ALEDO	CUSTER	N015	W018	8	1876	DF	19680115	16108	D&A-G	
35039200140000	-99.13915	35.79401	SINCLAIR O	STATE OF O	1	ALEDO	CUSTER	N015	W018	8	1876	DF	19680115	16108	D&A-G	
35039200190000	-98.85538	35.74912	PARKER ROB	CORNELIUS	1	CUSTER CITY	CUSTER	N015	W016	25	1784	DF	19680511	14725	GAS	269HNTN
35039200230000	-98.96379	35.80152	RODEN OIL	WILMOTH JO	1	WILDCAT	CUSTER	N015	W017	1	1955	KB	19680803	15536	D&A-G	
35039200290000	-98.88648	35.80709	SUNRAY DX	FRANS	1	WILDCAT	CUSTER	N015	W016	3	1846	KB	19681216	14950	D&A-G	
35039200290000	-98.88648	35.80709	SUNRAY DX	FRANS	1	WILDCAT	CUSTER	N015	W016	3	1846	KB	19681216	14950	D&A-G	
35039200330000	-98.83583	35.72245	APACHE EXP	CAMPBELL U	1	CUSTER CITY	CUSTER	N014	W015	6	1770	KB	19690423	14820	GAS	269HNTN
35039200400000	-99.01095	35.75997	WHITE SHIE	KINCAID	1	ANTHON NW	CUSTER	N015	W017	21	1826	DF	19691202	15600	D&A-G	
35039200440000	-99.19231	35.73098	MCCULLOCH	HANEY ETAL	1-35	WILDCAT	CUSTER	N015	W019	35	1721	DF	19700407	18410	D&A-O	
35039200450000	-98.86892	35.56115	RODEN OIL	HENRY E NI	35-1	UNNAMED	CUSTER	N013	W016	35	1702	DF	19701216	21054	GAS	401SPRG
35039200460000	-98.98174	35.6498	HUBER J M	ARAPAHO	1	WILDCAT	CUSTER	N014	W017	35	1738	KB	19700823	18049	D&A-O	
35039200490000	-98.92836	35.71384	MCCULLOCH	SCHIMMER	1-5	WILDCAT	CUSTER	N014	W016	5	1810	DF	19710426	16290	D&A-O	
35039200530000	-99.21332	35.7755	MCCULLOCH	TOUCHSTONE	1-15	ALEDO SW	CUSTER	N015	W019	15	1845	KB	19720515	17805	GAS	404RDFK
35039200550000	-98.66616	35.48216	KENNEDY HE	WILBUR HAY	1-27	WEATHERFOR	CUSTER	N012	W014	27	1807	GR	19721001	19474	GAS	403ATOK
35039200560000	-99.00877	35.72079	ARKLA EXPL	WRIGHT	1-4	ANTHON	CUSTER	N014	W017	4	1795	KB	19720512	16700	GAS	353MRMC
35039200580000	-99.12355	35.80875	HICKERSON	FINE	1	ALEDO	CUSTER	N015	W018	4	1896	KB	19720818	15985	GAS	402MRRW
35039200580000	-99.12355	35.80875	HICKERSON	FINE	1	ALEDO	CUSTER	N015	W018	4	1896	KB	19720818	15985	GAS	402MRRW
35039200740000	-98.88659	35.79249	SOUTHERN U	JONES DROK	1	CUSTER CITY	CUSTER	N015	W016	10	1804	KB	19750327	15097	OIL	404RDFK
35039200780000	-98.88845	35.75093	WESSELY EN	MILLER UNI	1	CUSTER CITY	CUSTER	N015	W016	27	1840	KB	19750114	14642	GAS	354CSTR
35039200780000	-98.88845	35.75093	WESSELY EN	MILLER UNI	1	CUSTER CITY	CUSTER	N015	W016	27	1840	KB	19750114	14642	GAS	354CSTR
35039202030000	-99.08261	35.76266	WOODS PET	CROM	23-1	ALEDO SE	CUSTER	N015	W018	23	1830	KB	19780731	16140	D&A-G	
35039300120000	-98.91992	35.76471	MOBIL OIL	DIEHL ESTATE U	1	CUSTER CITY	CUSTER	N015	W016	20	1849	DF	19650304	15177	GAS	269HNTN
35039300120000	-98.91992	35.76471	MOBIL OIL	DIEHL ESTATE U	1	CUSTER CITY	CUSTER	N015	W016	20	1849	DF	19650304	15177	GAS	269HNTN

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35017202420000	269HNTN	8200	8390	3533	3533	3533	463	0.42	319	254	319	0.090	tight						
35017202590000	269HNTN	8654	8920	4076	3594	4076	1203	0.46	666	1021	1021	0.250	tight						
35017203230000	269HNTN	8540	8625	29	29	29	-7290	0.00	29	29	29	1.000	suspect						
35017203370000	269HNTN	8207	8270	2713	2850	2850	-824	0.34	26	38	38	0.013	tight				YD	FmR	OK
35017203380000	269HNTN	9455	9540	883	813	883	-6324	0.09	531	566	566	0.641							
35017203690000	269HNTN	7630	7796	600	306	600	-5207	0.08	77	77	77	0.128	tight						
35017204230000	269HNTN	9042	9188	3080	3042	3080	-1207	0.34	957	1028	1028	0.334					YD	FmR	OK
35017204260000	269HNTN	8821	8854	3150	3510	3510	-30	0.40	819	890	890	0.254	tight						
35017204540000	269HNTN	9129	9185	3127	3127	3127	-1109	0.34	143	270	270	0.086	tight						
35017206330000	269HNTN	9749	9853	4800	1404	4800	1813	0.49	684	684	684	0.143	tight						
35017207810000	269HNTN	10823	10924	960	1200	1200	-6896	0.11	665	663	665	0.554							
35017208020000	269HNTN	8519	8650	3658	3658	3658	545	0.42	2278	3575	3575	0.977					YD	FmR	OK
35017208400000	269HNTN	8138	8163	2818	1867	2818	-900	0.35	176	159	176	0.062	tight						
35017209060000	269HNTN	8907	8951	3600	3600	3600	132	0.40	123	123	123	0.034	tight						
35017300000000	269HNTN	8765	8839		3289	3289	-390	0.37	449	524	524	0.159	tight						
35039000090000	269HNTN	15147	15195	6765	6140	6765	1110	0.45	1350	2675	2675	0.395		multi-zn	H	h	Y	FmR	OK
35039000090000	269HNTN	15438	15580	4840	540	4840	-3414	0.31					tight	multi-zn		l			
35039000100000	269HNTN	14258	14370		2625	2625	-6942	0.18		1820	1820	0.693							
35039200120000	251CMNL	14336	14700	8456	7895	8456	5283	0.58	4454	4924	4924	0.582							
35039200140000	269HNTN	15735	15775		7260	7260	1714	0.46	5754	6466	6466	0.891		multi-zn	H	l	Y	FmR	No ISIP
35039200140000	269HNTN	15645	15680	7350	7350	7350	2002	0.47	4067	4067	4067	0.553		multi-zn	M	m			
35039200140000	269HNTN	15685	15730		7619	7619	2531	0.48	3766	3866	3866	0.507		multi-zn	L	h			
35039200190000	269HNTN	14516	14530	7539	7379	7539	3467	0.52	2975	3016	3016	0.400					YF	FmR	OK
35039200230000	269HNTN	15400	15536	3947	371	3947	-5093	0.25	3233	218	3233	0.819							
35039200290000	269HNTN	14514	14681	6140	5715	6140	369	0.42	2342	2447	2447	0.399		multi-zn	L	l	YD	FmR	OK
35039200290000	269HNTN	14514	14721	6217	5654	6217	495	0.42	2385	2542	2542	0.409		multi-zn	H	h		FmR	OK
35039200330000	269HNTN	14248	14367	5265	6668	6668	1743	0.46	1774	1774	1774	0.266	tight				YF	FmR	damaged
35039200400000	269HNTN	15150	15250	2747	7042	7042	1720	0.46	2747	2747	2747	0.390							
35039200440000	269HNTN	17902	17932	7940	7940	7940	864	0.44	4320	7071	7071	0.891					Y	FmR	OK
35039200450000	269HNTN	18212	18707	1288	1648	1648	-13461	0.09					tight						
35039200460000	269HNTN	17508	17558	7332	7292	7332	-52	0.42	2632	3490	3490	0.476						FmR	OK
35039200490000	269HNTN	15764	15860	6656	6656	6656	264	0.42	5425	6529	6529	0.981					Y	FmR	OK
35039200530000	269HNTN	17534	17805	8376	8857	8857	3087	0.50	2603	4207	4207	0.475						FmR	OK
35039200550000	269HNTN	18544	18700		13355	13355	11827	0.71	7830	8466	8466	0.634					Y	FmR	No ISIP
35039200560000	269HNTN	15970	16015	7289	7289	7289	1455	0.46	1696	4177	4177	0.573					Y	FmR	OK
35039200580000	269HNTN	15835	15985		7302	7302	1614	0.46	3030	3038	3038	0.416		multi-zn	L	h		FmR	No ISIP
35039200580000	269HNTN	15603	15985	7166		7166	1322	0.45	3081	3140	3140	0.438		multi-zn	H	l	YD	FmR	No FSIP
35039200740000	269HNTN	14598	14736	3468	3496	3496	-5414	0.24	3191	3191	3191	0.913							
35039200780000	269HNTN	13446	13642	740	1289	1289	-9030	0.09	370	463	463	0.359		multi-zn	H	l			
35039200780000	269HNTN	14350	14642	741	1519	1519	-9535	0.10	222	262	262	0.172	tight	multi-zn	L	h			
35039202030000	269HNTN	15450	15675	6722	2722	6722	611	0.43		2118	2118	0.315					YD	FmR	OK
35039300120000	269HNTN	15030	15047	3913	3978	3978	-4643	0.26	31	700	700	0.176	tight	multi-zn	M	m			
35039300120000	269HNTN	15062	15074	7121	4130	7121	2089	0.47	911	1006	1006	0.141	tight	multi-zn	L	h			

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35039300120000	-98.91992	35.76471	MOBIL OIL	DIEHL ESTATE U	1	CUSTER CITY I	CUSTER	N015	W016	20	1849	DF	19650304	15177	GAS	269HNTN
35039300580001	-99.00938	35.80017	HUNT H L	RENE GRAFT	2	UNNAMED	CUSTER	N015	W017	4	1860	DF	19630118	14895	GAS-W	402MRRW
35039350320000	-98.87333	35.76348	SOCONY MOB	TED WEBB U	1	CUSTER CITY I	CUSTER	N015	W016	23	1746	DF	19600622	14887	GAS	269HNTN
35039350330000	-98.8911	35.77804	MOBIL OIL	LOUISE R C	1	CUSTER CITY I	CUSTER	N015	W016	15	1802	DF	19600203	15165	GAS	269HNTN
35039500150000	-98.8025	35.79258	MOBIL OIL	C S DOBBIN	1	UNNAMED	CUSTER	N015	W015	9	1837	DF	19610529	14405	OIL	404OSWG
35039500150000	-98.8025	35.79258	MOBIL OIL	C S DOBBIN	1	UNNAMED	CUSTER	N015	W015	9	1837	DF	19610529	14405	OIL	404OSWG
35043000030000	-99.086	35.96564	SINCLAIR O	KUNC	1	PUTNAM	DEWEY	N017	W018	11	1931	KB	19570103	14467	OIL	404OSWG
35043000100000	-98.89091	35.85045	MOBIL OIL	M W HERRIN	1	WILDCAT	DEWEY	N016	W016	22	1925	DF	19591202	14608	D&A-O	
35043000100000	-98.89091	35.85045	MOBIL OIL	M W HERRIN	1	WILDCAT	DEWEY	N016	W016	22	1925	DF	19591202	14608	D&A-O	
35043000500001	-99.29944	36.13562	MCCULLOCH	CAIN	1-11	VICI	DEWEY	N019	W020	11	2243	DF	19710303	13355	GAS-W	359MSSP
35043200970000	-99.16889	35.8183	BARNES J C	WALKER /A/	1	ALEDO	DEWEY	N016	W019	36	1932	KB	19690108	15715	1O&1G	269HNTN
35043201120000	-99.03529	35.85929	WESSELY PE	SARKEYS-WA	1	PUTNAM	DEWEY	N016	W017	17	1980	KB	19680313	14685	D&A-G	
35043201280000	-99.1696	35.83305	BARNES J C	EARNEST MA	1	ALEDO	DEWEY	N016	W019	25	1924	KB	19681015	16560	OIL	404SKNR
35043201280000	-99.1696	35.83305	BARNES J C	EARNEST MA	1	ALEDO	DEWEY	N016	W019	25	1924	KB	19681015	16560	OIL	404SKNR
35043201280000	-99.1696	35.83305	BARNES J C	EARNEST MA	1	ALEDO	DEWEY	N016	W019	25	1924	KB	19681015	16560	OIL	404SKNR
35043201340000	-99.33477	35.87463	HUMBLE OIL	BOSWELL	1-9	WILDCAT	DEWEY	N016	W020	9	2058	KB	19690314	17004	D&A-O	
35043201340000	-99.33477	35.87463	HUMBLE OIL	BOSWELL	1-9	WILDCAT	DEWEY	N016	W020	9	2058	KB	19690314	17004	D&A-O	
35043201470000	-99.23472	36.13361	NATIONAL C	CINNAMON	1	WILDCAT	DEWEY	N019	W019	9	2071	KB	19680916	12903	D&A-G	
35043201500000	-99.10384	35.98002	FAIN-PORTE	SEAL	1-A	PUTNAM	DEWEY	N017	W018	3	1952	KB	19681021	13870	D&A-G	
35043201500000	-99.10384	35.98002	FAIN-PORTE	SEAL	1-A	PUTNAM	DEWEY	N017	W018	3	1952	KB	19681021	13870	D&A-G	
35043201500000	-99.10384	35.98002	FAIN-PORTE	SEAL	1-A	PUTNAM	DEWEY	N017	W018	3	1952	KB	19681021	13870	D&A-G	
35043201550000	-98.87331	35.89008	HENDRICK D	DAVIS	1	UNNAMED	DEWEY	N016	W016	2	1891	DF	19681218	13848	OIL	405CGGV
35043201810000	-99.1222	35.9195	ROYAL RESO	A F MEYER	1	WILDCAT	DEWEY	N017	W018	28	2024	KB	19690801	14948	OIL	404RDFK
35043201860001	-99.01525	35.83591	APACHE COR	CHRISTOPHE	1	PUTNAM SW	DEWEY	N016	W017	28	1894	DF	19760615	14569	GAS-W	269HNTN
35043201990000	-99.3157	35.87541	MCCULLOCH	HENRY HARR	1-10	UNNAMED	DEWEY	N016	W020	10	2043	KB	19700428	16892	GAS	269HNTN
35043201990000	-99.3157	35.87541	MCCULLOCH	HENRY HARR	1-10	UNNAMED	DEWEY	N016	W020	10	2043	KB	19700428	16892	GAS	269HNTN
35043201990000	-99.3157	35.87541	MCCULLOCH	HENRY HARR	1-10	UNNAMED	DEWEY	N016	W020	10	2043	KB	19700428	16892	GAS	269HNTN
35043201990000	-99.3157	35.87541	MCCULLOCH	HENRY HARR	1-10	UNNAMED	DEWEY	N016	W020	10	2043	KB	19700428	16892	GAS	269HNTN
35043202000000	-98.93151	36.12086	MC CULLOCH	GADEN	1-17	WILDCAT	DEWEY	N019	W016	17	1816	DF	19691016	11868	D&A-O	
35043202000000	-98.93151	36.12086	MC CULLOCH	GADEN	1-17	WILDCAT	DEWEY	N019	W016	17	1816	DF	19691016	11868	D&A-O	
35043202000000	-98.93151	36.12086	MC CULLOCH	GADEN	1-17	WILDCAT	DEWEY	N019	W016	17	1816	DF	19691016	11868	D&A-O	
35043202000000	-98.93151	36.12086	MC CULLOCH	GADEN	1-17	WILDCAT	DEWEY	N019	W016	17	1816	DF	19691016	11868	D&A-O	
35043202010000	-99.01751	35.84495	WESSELY PE	POWERS	1	PUTNAM SW	DEWEY	N016	W017	21	1844	KB	19700313	14436	GAS	269HNTN
35043202020000	-99.03293	35.87567	WESSELY PE	CLARK UNIT	1-8	PUTNAM	DEWEY	N016	W017	8	1930	KB	19700117	14493	GAS	269HNTN
35043202080000	-99.33885	36.0232	CITIES SER	THOMSEN A	1	CAMARGO W	DEWEY	N018	W020	21	1890	KB	19700216	14438	D&A-G	
35043202080000	-99.33885	36.0232	CITIES SER	THOMSEN A	1	CAMARGO W	DEWEY	N018	W020	21	1890	KB	19700216	14438	D&A-G	
35043202080000	-99.33885	36.0232	CITIES SER	THOMSEN A	1	CAMARGO W	DEWEY	N018	W020	21	1890	KB	19700216	14438	D&A-G	
35043202250000	-98.79358	36.08479	MC CULLOCH	J A PETERM	1	UNNAMED	DEWEY	N019	W015	34	1957	DF	19700425	11580	OIL	402MRRW
35043202250000	-98.79358	36.08479	MC CULLOCH	J A PETERM	1	UNNAMED	DEWEY	N019	W015	34	1957	DF	19700425	11580	OIL	402MRRW
35043202250000	-98.79358	36.08479	MC CULLOCH	J A PETERM	1	UNNAMED	DEWEY	N019	W015	34	1957	DF	19700425	11580	OIL	402MRRW
35043202250000	-98.79358	36.08479	MC CULLOCH	J A PETERM	1	UNNAMED	DEWEY	N019	W015	34	1957	DF	19700425	11580	OIL	402MRRW
35043202300000	-99.0267	35.83405	APACHE COR	SULLIVAN U	1	PUTNAM SW	DEWEY	N016	W017	29	1882	KB	19700724	14656	GAS	269HNTN
35043202300000	-99.0267	35.83405	APACHE COR	SULLIVAN U	1	PUTNAM SW	DEWEY	N016	W017	29	1882	KB	19700724	14656	GAS	269HNTN

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35039300120000	269HNTN	14800	15074	2958	2416	2958	-6864	0.20	787	437	787	0.266	tight	multi-zn	H	l			
35039300580001	269HNTN	14502	14522		3496	3496	-5144	0.24	1952	1952	1952	0.558							
35039350320000	269HNTN	14194	14337		5320	5320	-1150	0.37	1650	1220	1650	0.310					YD	FmR	No ISIP
35039350330000	301BDRC	14697	14751		6445	6445	911	0.44	1825	1860	1860	0.289	tight						
35039500150000	269HNTN	14312	14378		5075	5075	-1627	0.35	1830	1830	1830	0.361		multi-zn	H	h			
35039500150000	269HNTN	14300	14388		4605	4605	-2648	0.32	1345	1370	1370	0.298	tight	multi-zn	L	l			
35043000030000	269HNTN	13875	13920		4800	4800	-1666	0.34	870	4500	4500	0.938							
35043000100000	269HNTN	14200	14255		5560	5560	-373	0.39		1795	1795	0.323		multi-zn	L	l		FmR	No ISIP
35043000100000	269HNTN	14474	14604		5695	5695	-432	0.39	1900	2205	2205	0.387		multi-zn	H	h	Y	FmR	No ISIP
35043000500001	269HNTN	13050	13126	5421	5421	5421	775	0.41	2626	3944	3944	0.728							
35043200970000	269HNTN	15580	15674	7049	7049	7049	1417	0.45	2922	2832	2922	0.415					Y	FmR	OK
35043201120000	269HNTN	14252	14270		6336	6336	1336	0.44	1627	2832	2832	0.447					Y	FmR	No ISIP
35043201280000	269HNTN	16175	16289	6803	6562	6803	265	0.42	2427	3675	3675	0.540		multi-zn	H	l		FmR	OK
35043201280000	269HNTN	16162	16189	6763	2266	6763	279	0.42	2266	2268	2266	0.335		multi-zn	M	m			
35043201280000	269HNTN	16110	16160	7124	7084	7124	1084	0.44	2105	2186	2186	0.307		multi-zn	L	h			
35043201340000	269HNTN	16510	16604	7964	7848	7964	2581	0.48	2266	2282	2282	0.287	tight	multi-zn	H	h			
35043201340000	269HNTN	16622	16750	2235	2685	2685	-8918	0.16					tight	multi-zn		l			
35043201470000	269HNTN	12586	12631	5231	5253	5253	737	0.42	1663	1686	1686	0.321							
35043201500000	269HNTN	13825	13870	6057	6043	6057	1108	0.44	1645	1944	1944	0.321		multi-zn	L	h	Y	FmR	OK
35043201500000	269HNTN	13550	13639	5944	5944	5944	1096	0.44	3698	5921	5921	0.996		multi-zn	H	m		FmR	OK
35043201500000	269HNTN	13440	13552	2165	1961	2165	-6944	0.16	1434	1411	1434	0.662		multi-zn	M	l			
35043201550000	269HNTN	13765	13765	5995	5870	5995	1018	0.44	1825	1875	1875	0.313					Y	FmR	OK
35043201810000	269HNTN	14516	14590	6038	3758	6038	419	0.41	2439	2439	2439	0.404							
35043201860001	269HNTN	14128	14180	6148	6107	6148	936	0.43	4345	5108	5108	0.831						FmR	OK
35043201990000	269HNTN	16472	16716	7352	7228	7352	1138	0.44	2075	1372	2075	0.282	tight	multi-zn	M	h	Y	FmR	OK
35043201990000	269HNTN	16718	16841	7382	7302	7382	1077	0.44	1899	2100	2100	0.284	tight	multi-zn	M	m		FmR	OK
35043201990000	269HNTN	16468	16512		5608	5608	-2409	0.34	1785	1785	1785	0.318		multi-zn	H	l			
35043201990000	269HNTN	16470	16616	6430	5332	6430	-745	0.39	1762	1787	1787	0.278	tight	multi-zn	L	m			
35043202000000	269HNTN	11510	11610	5027	5027	5027	1017	0.43	91	274	274	0.055	tight	multi-zn	H	h	Y	FmR	OK
35043202000000	269HNTN	11410	11510	2278	186	2278	-4795	0.20	70	70	70	0.031	tight	multi-zn	M	m			
35043202000000	269HNTN	11310	11410	2741	1851	2741	-3699	0.24	91	91	91	0.033	tight	multi-zn	M	m			
35043202000000	269HNTN	11250	11310	1897	1439	1897	-5414	0.17	45	45	45	0.024	tight	multi-zn	L	l			
35043202010000	269HNTN	14168	14209	6262	6305	6305	1194	0.44	2192	2300	2300	0.365					YD	FmR	OK
35043202020000	269HNTN	13950	14150	6893		6893	2604	0.49	2435	2547	2547	0.370					YF	FmR	No FSIP
35043202080000	269HNTN	14298	14348	5303		5303	-1054	0.37	1837	2207	2207	0.416		multi-zn	H	l		FmR	No FSIP
35043202080000	269HNTN	14161	14236	5877		5877	293	0.41	1798	1856	1856	0.316		multi-zn	M	m			
35043202080000	269HNTN	14135	14161	6018	6016	6018	671	0.42	1808	1808	1808	0.300		multi-zn	L	h			
35043202250000	269HNTN	11077	11130	4671	4671	4671	872	0.42	3315	4413	4413	0.945		multi-zn	H	h	Y	FmR	OK
35043202250000	269HNTN	11045	11070	4529	4436	4529	627	0.41	1108	1108	1108	0.245	tight	multi-zn	M	m			
35043202250000	269HNTN	11014	11045	3896	3681	3896	-710	0.35	1134	1155	1155	0.296	tight	multi-zn	M	l			
35043202250000	269HNTN	11320	11356	4700	4488	4700	709	0.41	1141	1141	1141	0.243	tight	multi-zn	L	m			
35043202300000	269HNTN	14220	14260	5770	5770	5770	31	0.40	2394	2798	2798	0.485		multi-zn	L	m		FmR	OK
35043202300000	269HNTN	14183	14220		6129	6129	843	0.43	3170	3381	3381	0.552		multi-zn	H	m	YD	FmR	No ISIP

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35043202330000	-98.88651	35.86492	WESSELY PETR	LOVE UNIT	1	UNNAMED	DEWEY	N016	W016	15	1953	KB	19700826	14518	OIL	405CGGV
35043202330000	-98.88651	35.86492	WESSELY PETR	LOVE UNIT	1	UNNAMED	DEWEY	N016	W016	15	1953	KB	19700826	14518	OIL	405CGGV
35043202340000	-99.32218	36.1051	MIDWEST OI	ROY TURNER	1	WILDCAT	DEWEY	N019	W020	22	2202	KB	19700609	13560	D&A-O	
35043202340000	-99.32218	36.1051	MIDWEST OI	ROY TURNER	1	WILDCAT	DEWEY	N019	W020	22	2202	KB	19700609	13560	D&A-O	
35043202380000	-99.03523	35.88642	WESSELY PE	ATLANTIC-S	1	PUTNAM	DEWEY	N016	W017	5	1891	KB	19701014	14290	GAS	269HNTN
35043202380000	-99.03523	35.88642	WESSELY PE	ATLANTIC-S	1	PUTNAM	DEWEY	N016	W017	5	1891	KB	19701014	14290	GAS	269HNTN
35043202380000	-99.03523	35.88642	WESSELY PE	ATLANTIC-S	1	PUTNAM	DEWEY	N016	W017	5	1891	KB	19701014	14290	GAS	269HNTN
35043202510000	-99.2028	35.84469	CHAMPLIN E	F E FERREL	1	WILDCAT	DEWEY	N016	W019	22	1967	KB	19710312	16766	D&A	
35043202510000	-99.2028	35.84469	CHAMPLIN E	F E FERREL	1	WILDCAT	DEWEY	N016	W019	22	1967	KB	19710312	16766	D&A	
35043202640000	-99.12571	35.90442	MCCULLOCH	KNOX ETAL	1-33	PUTNAM	DEWEY	N017	W018	33	2000	KB	19710505	15323	GAS	359MSSP
35043202750000	-98.67863	36.15751	BEARD OIL	USA	3-2	WILDCAT	DEWEY	N019	W014	3	1678	KB	19710415	10326	D&A-G	
35043202940000	-99.31502	36.14102	MCCULLOCH	HOYT ETAL	1-10	VICI TOWNSITI	DEWEY	N019	W020	10	2208	KB	19711108	13559	GAS	359MSSP
35043203000000	-98.94082	35.89123	MCCULLOCH	HENDRIX	1-6	PUTNAM N	DEWEY	N016	W016	6	1845	KB	19720104	14420	GAS	353MRMC
35043203020000	-99.22917	36.06588	MCCULLOCH	PIPER ETAL	1-4	WILDCAT	DEWEY	N018	W019	4	2000	KB	19720104	13837	D&A-O	
35043203110000	-99.32185	36.15371	MCCULLOCH	STATEX-TUR	1-3	VICI TOWNSITI	DEWEY	N019	W020	3	2286	KB	19720201	12750	GAS	359MSSP
35043203630000	-99.35918	36.09056	MONSANTO C	JEFFREY	1	VICI SW	DEWEY	N019	W020	29	2051	DF	19720925	13675	GAS	402MRRW
35043203830000	-99.36817	35.83202	SAMEDAN OI	WALTON	1	WILDCAT	DEWEY	N016	W020	30	1999	KB	19730606	18188	D&A-G	
35043204060000	-99.32917	35.88083	MCCULLOCH	SOUTH UNIT	1-9	LEEDEY	DEWEY	N016	W020	9	2035	KB	19731207	16910	D&A-O	
35043204060000	-99.32917	35.88083	MCCULLOCH	SOUTH UNIT	1-9	LEEDEY	DEWEY	N016	W020	9	2035	KB	19731207	16910	D&A-O	
35043204490000	-99.33652	36.09413	MONSANTO C	BASKETT	1	VICI SW	DEWEY	N019	W020	28	2173	KB	19731217	13516	GAS	402MRRW
35043204720000	-99.10177	36.1407	COQUINA OI	WARD	1	WILDCAT	DEWEY	N019	W018	10	1875	ES	19740228	12300	D&A-G	
35043205510000	-98.96753	36.04333	HELMERICH	TALOGA TOW	1-13	PUTNAM	DEWEY	N018	W017	13	1718	KB	19750701	12557	GAS	402MRRW
35043205640000	-98.76466	36.11207	HOOVER & B	WALTERS	1-23	UNNAMED	DEWEY	N019	W015	23	1861	KB	19750505	11115	OIL	404RDFK
35043206480000	-99.02745	35.86386	SARKEYS	STATE	1-17	PUTNAM	DEWEY	N016	W017	17	1961	KB	19760226	14685	D&A-G	
35043206490000	-99.31112	35.86638	UNION OIL	GAMBLE	1-15	LEEDEY	DEWEY	N016	W020	15	2027	KB	19760528	16603	GAS	269HNTN
35043206490000	-99.31112	35.86638	UNION OIL	GAMBLE	1-15	LEEDEY	DEWEY	N016	W020	15	2027	KB	19760528	16603	GAS	269HNTN
35043207150000	-99.03935	35.93752	SARKEYS	MILLIE	1-20	PUTNAM	DEWEY	N017	W017	20	1724	KB	19770405	13720	GAS	269HNTN
35043207600000	-99.30023	35.86639	HOOVER & B	GAMBLE	1-14	LEEDEY	DEWEY	N016	W020	14	2008	DF	19770505	16835	GAS	405CLVD
35043207610000	-99.32259	35.90966	DYCO PET	MOORE	1	TRAIL S	DEWEY	N017	W020	34	2011	GR	19770721	16726	GAS	404CHRK
35043207610000	-99.32259	35.90966	DYCO PET	MOORE	1	TRAIL S	DEWEY	N017	W020	34	2011	GR	19770721	16726	GAS	404CHRK
35043207630000	-99.12354	35.81694	MARLIN OIL	ROUNDS	1	ALEDO	DEWEY	N016	W018	33	1931	KB	19780602	15677	GAS	402MRRW
35043207740000	-99.01512	36.10806	TEXAS O&G	JONES H	1	CESTOS SE	DEWEY	N019	W017	21	1878	GR	19770510	13100	GAS	354CSTR
35043207740000	-99.01512	36.10806	TEXAS O&G	JONES H	1	CESTOS SE	DEWEY	N019	W017	21	1878	GR	19770510	13100	GAS	354CSTR
35043208410000	-98.93542	36.0453	COX EDWIN	PANNELL	1	PUTNAM	DEWEY	N018	W016	8	1657	DF	19771130	12355	GAS	402MRRWU
35043209780000	-99.06603	35.90996	HELMERICH	GORE	1-36	PUTNAM	DEWEY	N017	W018	36	1740	KB	19790919	14050	2 GAS	404OSWG
35043210020000	-99.03132	35.97548	CHAMPLIN E	THOMPSEN /	1	PUTNAM	DEWEY	N017	W017	5	1729	KB	19800605	13470	GAS	269HNTN
35043210180000	-99.05237	35.86334	MONSANTO C	WILLIAMS	1-18	PUTNAM	DEWEY	N016	W017	18	1917	KB	19800415	14644	GAS	404RDFK
35043210180000	-99.05237	35.86334	MONSANTO C	WILLIAMS	1-18	PUTNAM	DEWEY	N016	W017	18	1917	KB	19800415	14644	GAS	404RDFK
35043210860000	-99.19243	36.08311	HILLIARD O	KENNEDY	1	CESTOS SW	DEWEY	N019	W019	35	2064	KB	19800914	13350	GAS	402MRRW
35043212120000	-99.1016	35.99649	DYCO PET	GORE	1-34	PUTNAM	DEWEY	N018	W018	34	1984	GR	19810510	13880	D&A-G	
35043212880000	-99.07485	36.01826	ARCO O&G	THOMSEN UN	2	PUTNAM	DEWEY	N018	W018	24	1858	KB	19811018	13370	D&A	
35043218270000	-98.8004	36.06322	STONE PET	PARMENTER	1-4	HUCMAC NW	DEWEY	N018	W015	4	1929	KB	19831209	11685	OIL	354CSTRL
35043219770000	-98.65415	35.86688	HELMERICH	BOYD	1-14	EAGLE CITY S	DEWEY	N016	W014	14	1824	KB	19841123	12490	D&A-G	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35043202330000	269HNTN	13915	14000	6113	5954	6113	1099	0.44	2076	2121	2121	0.347		multi-zn	L	l			
35043202330000	269HNTN	13910	14443	6307	6083	6307	1073	0.44	2656	3250	3250	0.515		multi-zn	H	h			
35043202340000	269HNTN	13250	13352	5818	5762	5818	1362	0.44	1898	2488	2488	0.428		multi-zn	L	h			
35043202340000	269HNTN	13208	13250	3427	2328	3427	-3678	0.26	1594	1594	1594	0.465		multi-zn	H	l			
35043202380000	269HNTN	13906	14065	5900	5900	5900	514	0.42	2826	2868	2868	0.486		multi-zn	M	m		FmR	OK
35043202380000	269HNTN	13910	13970	5689	5642	5689	155	0.41	2467	1763	2467	0.434		multi-zn	L	l		FmR	OK
35043202380000	269HNTN	13980	14070	6121	6122	6122	987	0.44	2710	3445	3445	0.563		multi-zn	H	h		FmR	OK
35043202510000	269HNTN	16335	16485	5510	6039	6039	-1531	0.37	2701	2701	2701	0.447		multi-zn	H	l			
35043202510000	269HNTN	16545	16756	7598	6024	7598	1551	0.45					tight	multi-zn		h			
35043202640000	269HNTN	14890	14978	6567	6567	6567	1145	0.44		4144	4144	0.631					Y	FmR	OK
35043202750000	269HNTN	9759	9808	4225	4225	4225	956	0.43	1930	4225	4225	1.000					Y	FmR	OK
35043202940000	269HNTN	12736	12810	2432	5385	5385	979	0.42	3894	5159	5159	0.958					Y	FmR	damaged
35043203000000	269HNTN	13745	13906	6043	5928	6043	935	0.43	1928	4034	4034	0.668					Y	FmR	OK
35043203020000	269HNTN	13416	13549	2547	2409	2547	-6072	0.19	1953	2087	2087	0.819							
35043203110000	269HNTN	12706	12730	5537	6158	6158	2799	0.48	1241	1280	1280	0.208	tight						
35043203630000	269HNTN	13470	13673	6095		6095	1486	0.45	2214	3028	3028	0.497					Y	FmR	No FSIP
35043203830000	269HNTN	17707	17839	8007	8007	8007	1379	0.45	3896	8007	8007	1.000					Y	FmR	OK
35043204060000	269HNTN	16375	16545	6752	6795	6795	103	0.41	2665	2665	2665	0.392		multi-zn	L	h			
35043204060000	269HNTN	16375	16615	6666	6282	6666	-245	0.40	2708	2708	2708	0.406		multi-zn	H	l			
35043204490000	269HNTN	13193	13430	5556	5411	5556	691	0.41	2068	2104	2104	0.379						FmR	OK
35043204720000	269HNTN	11950	11994	4895	4895	4895	408	0.41	1493	1668	1668	0.341					Y	FmR	OK
35043205510000	269HNTN	12200	12281	5364	5391	5391	1031	0.44	1628	2137	2137	0.396					Y	FmR	OK
35043205640000	269HNTN	10553	10589	4482		4482	911	0.42	2045	2431	2431	0.542					Y	FmR	No FSIP
35043206480000	269HNTN	14235	14243	4968	4966	4966	-1602	0.35	3943	4881	4881	0.983						FmR	OK
35043206490000	269HNTN	16535	16585	6494	6856	6856	186	0.41	1581	1137	1581	0.231	tight	multi-zn	L	h		FmR	OK
35043206490000	269HNTN	16535	16603	6294	6779	6779	2	0.41	1642	1381	1642	0.242	tight	multi-zn	H	l	YD	FmR	OK
35043207150000	269HNTN	13360	13442	5042	504	5042	-875	0.38	3929	4563	4563	0.905						FmR	OK
35043207600000	269HNTN	16567	16719	4751	3979	4751	-4494	0.28	3034	3034	3034	0.639							
35043207610000	269HNTN	16227	16345	5343	4084	5343	-2844	0.33	2132	2217	2217	0.415		multi-zn	L	l			
35043207610000	269HNTN	16227	16282	5802	5715	5802	-1794	0.36	3304	3308	3308	0.570		multi-zn	H	h			
35043207630000	269HNTN	15282	15677	6719	6877	6877	1043	0.44	117	1915	1915	0.278	tight				YD	FmR	OK
35043207740000	269HNTN	11924	12080	5833	5668	5833	2342	0.48	1801	1864	1864	0.320		multi-zn	L	h			
35043207740000	269HNTN	12338	12400	3952	3924	3952	-2023	0.32	2141	2141	2141	0.542		multi-zn	H	l			
35043208410000	269HNTN	11865	12039	5163	4336	5163	721	0.43	1616	1729	1729	0.335							
35043209780000	269HNTN	13612	13670	5030		5030	-1113	0.37	53		53	0.011	tight						
35043210020000	269HNTN	13070	13470	5780	5865	5865	872	0.44	1406	1594	1594	0.272	tight						
35043210180000	269HNTN	14175	14260	6904	6849	6904	2504	0.48	4011	2220	4011	0.581		multi-zn	L	h			
35043210180000	269HNTN	14112	14160	4718		4718	-2097	0.33	4662	4662	4662	0.988		multi-zn	H	l			
35043210860000	269HNTN	12978	13350	6010	5983	6010	1639	0.45	2887	5983	5983	0.996					Y	FmR	OK
35043212120000	269HNTN	13550	13650	3787	5787	5787	779	0.42	4592	5787	5787	1.000					Y	FmR	damaged
35043212880000	269HNTN	12980	13370	5393	5697	5697	740	0.43	1800	1800	1800	0.316							
35043218270000	269HNTN	11230	11361	4813	4791	4813	919	0.42	4746	4791	4791	0.995					Y	FmR	OK
35043219770000	269HNTN	11936	12036	4866	5314	5314	1216	0.44	886	850	886	0.167	tight						

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35043219780000	-99.33853	35.88626	BRACKEN EX	STOUT BENJ	2-4	LEEDEY	DEWEY	N016	W020	4	2106	KB	19850420	18588	GAS	269HNTN
35045000840001	-99.67407	36.16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000840001	-99.67407	36.16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000840001	-99.67407	36.16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000840001	-99.67407	36.16817	PAN AMERIC	BOYD UNIT	1	ARNETT NE	ELLIS	N020	W023	32	2470	DF	19650621	15000	GAS-W	269HNTN
35045000910001	-99.38793	36.04858	BROWN TOM	CREE ESTAT	1-12	WILDCAT	ELLIS	N018	W021	12	2030	DF	19710211	15074	D&AWG	
35045000910001	-99.38793	36.04858	BROWN TOM	CREE ESTAT	1-12	WILDCAT	ELLIS	N018	W021	12	2030	DF	19710211	15074	D&AWG	
35045200500000	-99.70211	36.48419	PAN AMERIC	HAINES UNI	1	UNNAMED	ELLIS	N023	W023	7	2293	DF	19660901	10830	GAS	402MRRW
35045200870000	-99.85688	36.18198	WOODS PET	OBLANDER	1	WILDCAT	ELLIS	N020	W025	27	2495	KB	19670801	14422	D&A-G	
35045201000000	-99.66293	36.17013	CLEARY PET	STATE	1-33	ARNETT E	ELLIS	N020	W023	33	2504	KB	19670924	13563	D&A-G	
35045201020000	-99.77284	36.41503	GETTY OIL	COFFMAN-B	1	GAGE N	ELLIS	N022	W024	4	2324	DF	19671115	11586	D&A-G	
35045201030000	-99.67888	36.19352	SAMEDAN-WO	SOBER	1	ARNETT E	ELLIS	N020	W023	20	2428	KB	19671208	13580	D&A-G	
35045201240000	-99.9427	36.19235	SHELL OIL	TAYLOR	1-23	GOODWIN S	ELLIS	N020	W026	23	2460	KB	19680612	14385	D&A-G	
35045201260000	-99.69873	36.06799	PAN AMERIC	BERRYMAN U	1	GRAND NE	ELLIS	N018	W023	6	2490	KB	19680807	15692	GAS	269HNTN
35045201370000	-99.70686	36.06785	PAN AMERIC	BERRYMAN U	1	GRAND NE	ELLIS	N018	W024	1	2475	KB	19681117	15300	D&A-G	
35045201370000	-99.70686	36.06785	PAN AMERIC	BERRYMAN U	1	GRAND NE	ELLIS	N018	W024	1	2475	KB	19681117	15300	D&A-G	
35045201370000	-99.70686	36.06785	PAN AMERIC	BERRYMAN U	1	GRAND NE	ELLIS	N018	W024	1	2475	KB	19681117	15300	D&A-G	
35045201490000	-99.66177	36.193	CLOVER HEF	THOMPSON	1-21	ARNETT E	ELLIS	N020	W023	21	2454	KB	19690310	13658	D&A-G	
35045201490000	-99.66177	36.193	CLOVER HEF	THOMPSON	1-21	ARNETT E	ELLIS	N020	W023	21	2454	KB	19690310	13658	D&A-G	
35045201500000	-99.68739	36.52825	RAMSEY ENGINEE	FRISBY	1	WILDCAT	ELLIS	N024	W023	29	2151	DF	19690617	10430	D&A-G	
35045201500000	-99.68739	36.52825	RAMSEY ENGINEE	FRISBY	1	WILDCAT	ELLIS	N024	W023	29	2151	DF	19690617	10430	D&A-G	
35045201870000	-99.82667	36.25519	APACHE OIL	L F BRANDE	1	WILDCAT	ELLIS	N021	W025	36	2248	KB	19700527	13102	D&A-O	
35045201870000	-99.82667	36.25519	APACHE OIL	L F BRANDE	1	WILDCAT	ELLIS	N021	W025	36	2248	KB	19700527	13102	D&A-O	
35045202010000	-99.44886	36.14856	MIDWEST OI	W C CLEM	1	UNNAMED	ELLIS	N019	W021	4	2369	KB	19701121	13740	GAS	269HNTN
35045202010000	-99.44886	36.14856	MIDWEST OI	W C CLEM	1	UNNAMED	ELLIS	N019	W021	4	2369	KB	19701121	13740	GAS	269HNTN
35045202040001	-99.53973	36.08847	WESTERN ST	PENZOIL-BA	1	WILDCAT	ELLIS	N019	W022	27	2308	KB	19720225	14912	D&AWG	
35045202070000	-99.87466	36.13565	MCCULLOCH	IMKE	1-9	WILDCAT	ELLIS	N019	W025	9	2463	KB	19710209	15978	D&A-G	
35045202080000	-99.75238	35.98673	MC CULLOCH	JACKSON	1-34	WILDCAT	ELLIS	N018	W024	34	2395	KB	19710315	17500	D&A-G	
35045202080000	-99.75238	35.98673	MC CULLOCH	JACKSON	1-34	WILDCAT	ELLIS	N018	W024	34	2395	KB	19710315	17500	D&A-G	
35045202120000	-99.72798	36.52777	RIMROCK EX	ALLEY	1	LUTHER HILL E	ELLIS	N024	W024	25	2263	DF	19710421	10372	GAS	402MRRW
35045202160000	-99.62492	36.08099	MCCULLOCH	G A BERRYM	1-35	WILDCAT	ELLIS	N019	W023	35	2335	KB	19710307	15187	D&A-G	
35045202160000	-99.62492	36.08099	MCCULLOCH	G A BERRYM	1-35	WILDCAT	ELLIS	N019	W023	35	2335	KB	19710307	15187	D&A-G	
35045202270000	-99.65591	36.06652	MCCULLOCH	A C BERRYM	1-4	GRAND NE	ELLIS	N018	W023	4	2364	KB	19720515	15510	GAS	402MRRW
35045202270000	-99.65591	36.06652	MCCULLOCH	A C BERRYM	1-4	GRAND NE	ELLIS	N018	W023	4	2364	KB	19720515	15510	GAS	402MRRW
35045202370000	-99.86987	36.09493	MCCULLOCH	IDS-STATEX	1-28	WILDCAT	ELLIS	N019	W025	28	2389	KB	19720608	15395	D&A-G	
35045202580000	-99.7701	36.09715	MCCULLOCH OIL	IDS-STATEX-HAI	1-28	ARNETT S	ELLIS	N019	W024	28	2386	KB	19721024	15253	D&A-G	
35045202610000	-99.71453	35.93766	LONE STAR	BERRYMAN U	1-24	PEEK S	ELLIS	N017	W024	24	2353	KB	19731016	17068	GAS	402MRRW
35045202650000	-99.42721	36.14015	NATOL PETR	LIZZIE CAM	1	VICI W	ELLIS	N019	W021	10	2332	KB	19730315	13735	GAS	402MRRW1
35045202850000	-99.45884	36.12431	CITIES SER	SNIDER A	1	WILDCAT	ELLIS	N019	W021	17	2280	KB	19730513	13970	D&A-G	
35045202920000	-99.69012	36.51154	TEXAS O&G	WITTENBERG	1	GAGE NE	ELLIS	N024	W023	32	2178	KB	19730724	10755	GAS	402MRRW
35045202940000	-99.44816	36.16278	ODESSA NAT	MILSTEAD	1	VICI W	ELLIS	N020	W021	33	2365	KB	19731015	13700	GAS	402MRRW
35045202940000	-99.44816	36.16278	ODESSA NAT	MILSTEAD	1	VICI W	ELLIS	N020	W021	33	2365	KB	19731015	13700	GAS	402MRRW
35045203280000	-99.84736	36.01204	WESSELY EN	RICHARDS U	1	WILDCAT	ELLIS	N018	W025	27	2117	KB	19740113	16294	D&A-G	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35043219780000	269HNTN	16700	16832	7208		7208	775	0.43	3042	3417	3417	0.474							
35045000840001	269HNTN	13425	13476	5763		5763	1388	0.43	3287	3623	3623	0.629		multi-zn	L	m		FmR	No FSIP
35045000840001	269HNTN	13370	13425	5848	5836	5848	1621	0.44	4712	4284	4712	0.806		multi-zn	H	h	Y	FmR	OK
35045000840001	269HNTN	13498	13499	500	5610	5610	1036	0.42					tight	multi-zn		l			
35045000840001	269HNTN	13431	13432	5700	5600	5700	1296	0.42					tight	multi-zn		m			
35045000910001	269HNTN	14345	14467	6394	6117	6394	1314	0.44	1687	2075	2075	0.325		multi-zn	H	l	Y	FmR	OK
35045000910001	269HNTN	14350	14450	6505	6007	6505	1569	0.45	1687	1770	1770	0.272	tight	multi-zn	L	h			
35045200500000	269HNTN	10520	10560	4400	4186	4400	1195	0.42	4072	4110	4110	0.934					Y	FmR	OK
35045200870000	269HNTN	14039	14063	5633	5693	5693	675	0.40	2832	2832	2832	0.497							
35045201000000	269HNTN	13423	13518	3847	4693	4693	-922	0.35	1875	1912	1912	0.407							
35045201020000	269HNTN	11160	11251	67	13	67	-8783	0.01	13	13	13	0.194	tight						
35045201030000	269HNTN	13213	13319	4338	5058	5058	-14	0.38	2165	2181	2181	0.431							
35045201240000	269HNTN	13740	13868	6012	5615	6012	1521	0.43	2268	2750	2750	0.457							
35045201260000	269HNTN	14966	15001	6343	6150	6343	1130	0.42	2973	3991	3991	0.629						FmR	OK
35045201370000	269HNTN	15130	15300	6438	6438	6438	1020	0.42	3575	6138	6138	0.953		multi-zn	M	m		FmR	OK
35045201370000	269HNTN	15105	15158	6446	6424	6446	1179	0.43	5338	6317	6317	0.980		multi-zn	H	h	Y	FmR	OK
35045201370000	269HNTN	14854	15060	4396	4116	4396	-3131	0.29	2460	2468	2468	0.561		multi-zn	L	l			
35045201490000	269HNTN	13330	13658	4870	4757	4870	-731	0.36	1435	1870	1870	0.384		multi-zn	H	l	YD	FmR	OK
35045201490000	269HNTN	13330	13446	5053	5259	5259	318	0.39	1590	1630	1630	0.310		multi-zn	L	h			
35045201500000	269HNTN	10192	10210	4166		4166	900	0.41					tight	multi-zn		l	Y	FmR	No FSIP
35045201500000	269HNTN	10192	10210	4658	4615	4658	1958	0.46	1983	2089	2089	0.448		multi-zn		h			
35045201870000	269HNTN	12909	12980	2242	2272	2272	-5846	0.18	1143	1169	1169	0.515		multi-zn	H	l			
35045201870000	269HNTN	12980	13092	4174	4103	4174	-1868	0.32	1166	1126	1166	0.279	tight	multi-zn	L	h			
35045202010000	269HNTN	13447	13500	5849	5849	5849	1447	0.43	2686	3805	3805	0.651		multi-zn	H	h	Y	FmR	OK
35045202010000	269HNTN	13410	13447	5625	5569	5625	1019	0.42	2126	2154	2154	0.383		multi-zn	L	l			
35045202040001	269HNTN	14674	14912	6210	6279	6279	899	0.42	2913	5341	5341	0.851					Y	FmR	OK
35045202070000	269HNTN	14750	14793	4954	3625	4954	-1676	0.33	2407	2518	2518	0.508							
35045202080000	269HNTN	16017	16085	3939	3325	3939	-5219	0.24	2787	2787	2787	0.708		multi-zn	L	h			
35045202080000	269HNTN	16085	16185	3513	3692	3692	-5850	0.23	2708	2708	2708	0.733		multi-zn	H	l			
35045202120000	269HNTN	10192	10372	3950	3821	3950	386	0.38	954	954	954	0.242	tight						
35045202160000	269HNTN	15070	15187	6611	6671	6671	1494	0.44	61	6611	6611	0.991		multi-zn	H	h	Y	FmR	OK
35045202160000	269HNTN	14880	14928	6351	6230	6351	1065	0.43	1197	1197	1197	0.188	tight	multi-zn	L	l			
35045202270000	269HNTN	15086	15180	6548	5940	6548	1266	0.43	1350	1447	1447	0.221	tight	multi-zn	L	l			
35045202270000	269HNTN	15086	15366	6855	6626	6855	1740	0.45	1488	1553	1553	0.227	tight	multi-zn	H	h			
35045202370000	269HNTN	15045	15395	7276	6861	7276	2641	0.47	1710	1770	1770	0.243	tight						
35045202580000	269HNTN	14912	15240	6385	6363	6385	877	0.42	2572	2705	2705	0.424					Y	FmR	OK
35045202610000	269HNTN	16720	17068	7301	7258	7301	986	0.43	3858	4461	4461	0.611					Y	FmR	OK
35045202650000	269HNTN	13606	13735	5538	5501	5538	507	0.40	2248	2501	2501	0.452					YD	FmR	OK
35045202850000	269HNTN	13795	13890	3861	3295	3861	-3307	0.28	2198	2198	2198	0.569							
35045202920000	269HNTN	10472	10755	4257	4375	4375	832	0.41	1641	1785	1785	0.408					Y	FmR	OK
35045202940000	269HNTN	13437	13487	5320	4060	5320	319	0.39	2052	2013	2052	0.386		multi-zn	L	h			
35045202940000	269HNTN	13397	13441	2492	2474	2492	-5717	0.19	2090	2090	2090	0.839		multi-zn	H	l			
35045203280000	269HNTN	15968	16110	6845	6579	6845	727	0.42	3397	4771	4771	0.697					Y	FmR	OK

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35045203580000	-99.96849	36.13142	WESSELY EN	STEINLE UN	1	WILDCAT	ELLIS	N019	W026	10	2589	KB	19740417	14735	D&A-O	
35045204380000	-99.76037	36.00245	HOOVER & B	JACKS	1-28	UNNAMED	ELLIS	N018	W024	28	2392	DF	19750905	16200	GAS	402MRRW
35045206000000	-99.61762	36.19172	BRAUN C F	LOWERY	1	UNNAMED	ELLIS	N020	W023	23	2485	KB	19770823	13735	GAS	402MRRW
35051000250000	-97.68984	34.92966	SUPERIOR O	STATE	1	BRADLEY NE	GRADY	N005	W005	2	1157	KB	19550504	14124	2 OIL	202TPCK
35051000350000	-97.68667	34.9868	SUPERIOR O	MOWDY	1	WILDCAT	GRADY	N006	W005	13	1112	KB	19550504	14166	D&A-G	
35051001160000	-97.67216	34.92246	GULF OIL E	MAINKA-RIN	1	BRADLEY NE	GRADY	N005	W005	12	1160	DF	19510605	13651	OIL	251CMNL
35051201030000	-97.67272	35.2964	FERGUSON O	STATTON	1	WILDCAT	GRADY	N010	W005	36	1274	KB	19691229	10865	D&A-G	
35051201300001	-97.71172	35.10703	CLARCAN PE	LUDLOW	1	MIDDLEBURG S	GRADY	N007	W005	3	1314	KB	19740126	11852	GAS-W	269HNTN
35051201300001	-97.71172	35.10703	CLARCAN PE	LUDLOW	1	MIDDLEBURG S	GRADY	N007	W005	3	1314	KB	19740126	11852	GAS-W	269HNTN
35051201300001	-97.71172	35.10703	CLARCAN PE	LUDLOW	1	MIDDLEBURG S	GRADY	N007	W005	3	1314	KB	19740126	11852	GAS-W	269HNTN
35051204350000	-97.68935	35.3264	DUNCAN WAL	DARROW	1	TUTTLE E	GRADY	N010	W005	23	1195	KB	19750103	8918	OIL	269HNTN
35051207870000	-98.07383	35.33791	HELMERICH	CURTIS	1-17	WATONGA TRI	GRADY	N010	W008	17	1367	KB	19790507	13908	GAS	269HNTN
35051210730000	-97.86945	35.21451	SUNRISE EX	CULBERTSON	1	AMBER N	GRADY	N009	W006	31	1219	DF	19810413	12095	GAS	404OSBR
35051354930001	-97.67689	34.8787	CITIES SERVICE	BROWN J	1	BRADLEY	GRADY	N005	W005	25	1016	GR	19601120	13037	OIL-WO	251CMNL
35051354940000	-97.6725	34.87524	CITIES SER	SELZER	1	BRADLEY DIST	GRADY	N005	W005	25	1016	GR	19560411	12380	OIL	251CMNL
35051354950000	-97.68021	34.89674	GULF OIL	BRANCH UNI	1	BRADLEY N	GRADY	N005	W005	24	1054	DF	19550601	12523	OIL	202BRMD1
35051354960000	-97.67688	34.88601	SINCLAIR O	G A BROWN	1	GOLDEN TREN	GRADY	N005	W005	24	1017	ES	19551207	12204	OIL	404HART
35051355070000	-97.68995	34.91109	SINCLAIR O	CLARA CUDD	1	BRADLEY DIST	GRADY	N005	W005	14	1090	GR	19571023	12424	D&A-O	
35051355070000	-97.68995	34.91109	SINCLAIR O	CLARA CUDD	1	BRADLEY DIST	GRADY	N005	W005	14	1090	GR	19571023	12424	D&A-O	
35051355210000	-97.69335	34.93302	SUPERIOR O	TOKLAN ROY	1	BRADLEY NE	GRADY	N005	W005	2	1119	GR	19550831	13330	OIL	202BRMD1
35051355210000	-97.69335	34.93302	SUPERIOR O	TOKLAN ROY	1	BRADLEY NE	GRADY	N005	W005	2	1119	GR	19550831	13330	OIL	202BRMD1
35051355240000	-97.68559	34.93325	GULF OIL	MAINKA DOU	1	BRADLEY NE	GRADY	N005	W005	1	1144	GR	19560711	13528	OIL	202VIOL
35051355250000	-97.6804	34.92938	GULF OIL E	MAINKA-RIN	2	BRADLEY NE	GRADY	N005	W005	1	1141	GR	19520520	13445	OIL	202BRMD1
35051359610000	-97.74522	35.17108	CLEARY PET	HILLTOP UN	2	BLANCHARD N	GRADY	N008	W005	17	1340	DF	19610421	11909	GAS	202BRMD
35059000900001	-99.5591	36.76251	NATIONAL C	SCHUYLER	1	WILDCAT	HARPER	N026	W022	3	1886	KB	19740327	8285	D&AWG	
35059200540000	-99.4683	36.76346	COX EDWIN	MCCORMICK	1	SELMAN	HARPER	N026	W021	4	1783	DF	19670217	7478	1O&1G	406TNKW
35059200540000	-99.4683	36.76346	COX EDWIN	MCCORMICK	1	SELMAN	HARPER	N026	W021	4	1783	DF	19670217	7478	1O&1G	406TNKW
35059200700000	-99.4815	36.76334	COX EDWIN	JOHNSON	1	LOVEDALE	HARPER	N026	W021	5	1801	KB	19670626	7500	GAS	406TNKW
35059200930000	-99.48197	36.63182	CLEARY PET	KINNEY	1-20	FORT SUPPLY	HARPER	N025	W021	20	2139	DF	19671111	8996	D&A	
35059201230001	-99.355	36.83222	ANDERSON R	CLARK UNIT	1	WILDCAT	HARPER	N027	W020	9	1783	DF	19680409	7350	D&AW	
35059201350000	-99.56072	36.8296	MESA PET	HUCKABY	1-10	WILDCAT	HARPER	N027	W022	10	1770	KB	19680720	7744	D&A-G	
35059201470000	-99.42835	36.64331	SUN OIL	J B RUBLE	1	WILDCAT	HARPER	N025	W021	14	2000	KB	19681014	8750	D&A	
35059201570000	-99.46307	36.76691	COX EDWIN	CAMERON	1	LOVEDALE	HARPER	N026	W021	4	1752	DF	19681209	7400	D&A	
35059201610000	-99.48678	36.62456	CHAMPLIN P	LUCY KINNE	1	FORT SUPPLY	HARPER	N025	W021	20	2116	DF	19681222	9265	D&A-G	
35059201760000	-99.39261	36.83056	KIRPATRICK	WOOLFOLK	1	SELMAN E	HARPER	N027	W020	7	1831	DF	19690807	7355	D&A-O	
35059201810000	-99.39818	36.80862	KIRKPATRIC	ART HEPNER	1	SELMAN E	HARPER	N027	W020	19	1858	KB	19700313	7550	D&A-O	
35059202240000	-99.57423	36.69089	TEXAS PACI	MOBERLY RA	1-33	WILDCAT	HARPER	N026	W022	33	1877	KB	19700904	8800	D&A-G	
35059202300000	-99.36882	36.73784	PAYNE W C	HAYES	1	LOVEDALE	HARPER	N026	W020	17	1782	KB	19701129	7704	D&A-O	
35059202860000	-99.42957	36.78725	PUBLISHERS	JOSEPHINE	1	LOVEDALE	HARPER	N027	W021	26	1784	KB	19720721	7545	GAS	402MRRW
35059203910000	-99.4795	36.80142	COTTON PET	WEAVER	1	LOVEDALE	HARPER	N027	W021	20	1741	KB	19740112	7450	D&A-O	
35059203910000	-99.4795	36.80142	COTTON PET	WEAVER	1	LOVEDALE	HARPER	N027	W021	20	1741	KB	19740112	7450	D&A-O	
35059204350000	-99.29956	36.67806	WOODS PET	SCHAEFER	1	LOVEDALE SE	HARPER	N025	W020	1	1877	KB	19741004	8390	D&A-G	
35059205450000	-99.54122	36.83211	NATIONAL C	SCHALLNER	1	BUFFALO SE	HARPER	N027	W022	11	1729	KB	19761129	7660	D&A-O	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35045203580000	269HNTN	14624	14652	2775	2498	2775	-6095	0.19	2221	2221	2221	0.800							
35045204380000	269HNTN	15870	16200	5954	5542	5954	-1004	0.37	3435	3444	3444	0.578							
35045206000000	269HNTN	13482	13513	4722	2985	4722	-873	0.35	1972	2080	2080	0.440							
35051000250000	251CMNL	12038	12073		4550	4550	-1131	0.38		1525	1525	0.335							
35051000350000	251CMNL	12300	12371		1350	1350	-8356	0.11		1155	1155	0.856							
35051001160000	251CMNL	13085	13136		5650	5650	175	0.43					tight				Y	FmR	No ISIP
35051201030000	301BDRC	8950	9045	334	3453	3453	-345	0.38	296	345	345	0.100	tight						
35051201300001	269HNTN	11779	11852	1415	1345	1415	-7495	0.12	945	945	945	0.668		multi-zn	H	l			
35051201300001	269HNTN	11135	11175	2561	3176	3176	-3031	0.28	602	600	602	0.190	tight	multi-zn	M	m			
35051201300001	269HNTN	11172	11175	4404	4120	4404	-390	0.39	615	630	630	0.143	tight	multi-zn	L	h			
35051204350000	269HNTN	8820	8842	4104	4104	4104	1179	0.46	71	118	118	0.029	tight				Y	FmR	OK
35051207870000	269HNTN	13184	13280	220	261	261	-11352	0.02	70	70	70	0.268	tight						
35051210730000	269HNTN	11912	12095	4841	4867	4867	-409	0.40	1018	1032	1032	0.212	tight				YD	FmR	OK
35051354930001	251CMNL	11005	11006		2965	2965	-3614	0.27	1195	2240	2240	0.755					YD	FmR	No ISIP
35051354940000	269HRGH	10764	11037		875	875	-8139	0.08	125	150	150	0.171	tight						
35051354950000	269HNTN	10144	10233	1100	1410	1410	-6147	0.14					tight						
35051354960000	269HNTN	10999	11044		2300	2300	-5081	0.21	800	950	950	0.413							
35051355070000	269HNTN	10884	10909		2445	2445	-4561	0.22		950	950	0.389		multi-zn	H	h			
35051355070000	269HNTN	11350	11395		1135	1135	-7864	0.10					tight	multi-zn		l			
35051355210000	251CMNL	12215	12289		1700	1700	-7514	0.14	525	575	575	0.338		multi-zn	H	l			
35051355210000	269HNTN	11920	11946		4415	4415	-1332	0.37	540	605	605	0.137	tight	multi-zn	L	h			
35051355240000	269HNTN	12326	12384		2600	2600	-5649	0.21		1580	1580	0.608							
35051355250000	269HNTN	11926	11981		4300	4300	-1593	0.36					tight				YD	FmR	No ISIP
35051359610000	269HNTN	10801	10868	4665	4225	4665	504	0.43	295	1285	1285	0.275	tight						
35059000900001	269HNTN	8146	8285	1087	762	1087	-4061	0.13	610	675	675	0.621							
35059200540000	269HNTN	7286	7400	2735	2712	2735	265	0.37	837	1045	1045	0.382		multi-zn	H	h	YD	FmR	OK
35059200540000	269HNTN	7244	7286	607	1718	1718	-1808	0.24	46	46	46	0.027	tight	multi-zn	L	l			
35059200700000	269HNTN	7297	7390	116	92	116	-5340	0.02	69	59	69	0.595	suspect						
35059200930000	269HNTN	8726	8760	3502	3516	3516	940	0.40	3160	3488	3488	0.992					Y	FmR	OK
35059201230001	269HNTN	7215	7350	483	992	992	-3434	0.13	127	165	165	0.166	tight						
35059201350000	269HNTN	7543	7610	3228	3159	3228	1102	0.42	23	47	47	0.015	tight						
35059201470000	269HNTN	8690	8750		2960	2960	-384	0.34	2911	2944	2944	0.995					YD	FmR	No ISIP
35059201570000	269HNTN	7250	7400	267	242	267	-5074	0.04	191	216	216	0.809	suspect						
35059201610000	269HNTN	8695	8760	108	88	108	-6412	0.01	76	88	88	0.815	suspect						
35059201760000	269HNTN	7195	7300	2047	2888	2888	742	0.40	94	490	490	0.170	tight						
35059201810000	269HNTN	7340	7550	1202	2004	2004	-1382	0.27	84	106	106	0.053	tight						
35059202240000	269HNTN	8630	8651	175	84	175	-6398	0.02	20	46	46	0.263	tight						
35059202300000	269HNTN	7600	7704	2431	808	2431	-694	0.32	1695	655	1695	0.697					YD	FmR	OK
35059202860000	269HNTN	7371	7393	121	109	121	-5349	0.02					tight						
35059203910000	269HNTN	7258	7304	2925	2527	2925	727	0.40	62	208	208	0.071	tight	multi-zn	L	h	Y	FmR	OK
35059203910000	269HNTN	7258	7304	2541	2222	2541	-98	0.35	101	233	233	0.092	tight	multi-zn	H	l		FmR	OK
35059204350000	269HNTN	8150	8390	3459	3484	3484	979	0.42	2982	3421	3421	0.982					Y	FmR	OK
35059205450000	269HNTN	7510	7660	3083	3008	3083	699	0.40	258	456	458	0.148	tight				Y	FmR	OK

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35059205750000	-99.70103	36.70647	FITKIN PET	PALMER	1-29	STOCKHOLM S	HARPER	N026	W023	29	2228	DF	19770130	9090	D&A-G	
35059206540000	-99.4539	36.6773	AMERADA HE	BRIZZOLARA	1	WILDCAT	HARPER	N025	W021	3	1961	KB	19780420	8485	D&A-O	
35059209530000	-99.42501	36.80853	KENNEDY &	JOSEPHINE	31-1	LOVEDALE NW	HARPER	N027	W021	23	1854	KB	19801021	7701	GAS	402MRRW
35059209610000	-99.48101	36.83788	PREMIER RE	MILLER	A027	LOVEDALE NW	HARPER	N027	W021	9	1781	KB	19800629	7600	D&A-G	
35059300060001	-99.54163	36.74439	RAMSEY ENG	BARNETT	1	WILDCAT	HARPER	N026	W022	11	1870	KB	19700513	8362	D&AWG	
35059352300001	-99.57045	36.8083	CAYMAN COR	CARMICHAEL	1	WILDCAT	HARPER	N027	W022	21	1794	DF	19691027	8363	D&AWG	
35073000200000	-98.14971	36.06267	UTAH SOUTH	HILL	1	LACEY SW	KINGFISH	N018	W009	3	1121	KB	19571023	9330	GAS	404INOL
35073000210000	-97.91403	35.93293	CALVERT DR	PERDUE	1	DUNLAP NE	KINGFISH	N017	W007	23	1086	KB	19590527	8035	OIL	404BGLO
35073000290000	-97.9008	35.95109	CALVERT DR	CORR	1	DOVER SW	KINGFISH	N017	W007	13	1022	DF	19591028	7850	OIL	405CLVD
35073000350001	-98.13212	36.0889	CALVERT EXPL	CLINE	1	LACEY SW	KINGFISH	N019	W009	26	1119	DF	19631118	8661	1O&1GW	404RDFK
35073000350001	-98.13212	36.0889	CALVERT EXPL	CLINE	1	LACEY SW	KINGFISH	N019	W009	26	1119	DF	19631118	8661	1O&1GW	404RDFK
35073000470000	-97.94423	35.94295	SUPERIOR O	LONG	1	DOVER SW	KINGFISH	N017	W007	16	1128	KB	19481214	9026	2 GAS	269HNTN
35073000550000	-97.96201	35.94297	CARTER ED	PECK	1	DOVER SW	KINGFISH	N017	W007	17	1137	DF	19530915	8175	D&A-G	
35073000570000	-97.72953	35.82924	PHILLIPS &	HASLEY	1	PLEASANT RID	KINGFISH	N016	W005	28	1010	DF	19450508	7867	OIL	202WLCX2
35073000570000	-97.72953	35.82924	PHILLIPS &	HASLEY	1	PLEASANT RID	KINGFISH	N016	W005	28	1010	DF	19450508	7867	OIL	202WLCX2
35073000640000	-97.81827	35.8692	NATIONAL A	J STEPHENS	1	WILDCAT	KINGFISH	N016	W006	15	1098	DF	19501114	7908	D&A-G	
35073000740001	-98.07791	35.97617	CLEARY PET	GLAZIER	1-5	WILDCAT	KINGFISH	N017	W008	5	1117	DF	19660916	9110	D&AW	
35073000740001	-98.07791	35.97617	CLEARY PET	GLAZIER	1-5	WILDCAT	KINGFISH	N017	W008	5	1117	DF	19660916	9110	D&AW	
35073000750000	-97.89622	35.93656	CALVERT PE	SEEFELDT	1	WILDCAT	KINGFISH	N017	W007	24	1030	DF	19601115	7856	D&A	
35073000780001	-97.99048	36.06772	HALL-JONES	THROCKMORT	1	DOVER-HENNE	KINGFISH	N018	W007	6	1168	DF	19630214	8320	OIL-W	269HNTN
35073000850000	-97.95029	36.05342	JONES & PE	STINSON	1	DOVER-HENNE	KINGFISH	N018	W007	9	1111	DF	19600810	8040	2 OIL	404OSWG
35073001810000	-98.0527	36.13974	JONES & PE	COLE	1	LACEY NE	KINGFISH	N019	W008	9	1218	DF	19630516	8285	2 OIL	352OSGE
35073001850000	-98.07519	36.13956	JONES & PE	DITMARS CH	1	LYONS SE	KINGFISH	N019	W008	8	1219	DF	19630302	8288	2 OIL	353MRMC
35073001890000	-98.00324	36.06388	HALL-JONES	CHOATE	1	DOVER-HENNE	KINGFISH	N018	W008	1	1165	DF	19630509	8240	OIL	353MRMC
35073001920001	-98.03837	35.92192	NATIONAL C	BARNARD	1	WILDCAT	KINGFISH	N017	W008	27	1193	KB	19650727	9173	D&AWO	
35073001920001	-98.03837	35.92192	NATIONAL C	BARNARD	1	WILDCAT	KINGFISH	N017	W008	27	1193	KB	19650727	9173	D&AWO	
35073002070000	-98.13207	36.07417	CALVERT EX	NELSON	1	LACEY SW	KINGFISH	N019	W009	35	1102	DF	19620802	9190	1O&2G	353MRMCB
35073002220000	-98.18448	36.12036	GULF OIL	A O MAY	1	STAR	KINGFISH	N019	W009	17	1131	DF	19621101	8749	OIL	353MRMC
35073002270000	-98.13663	36.11023	TOMMY WARD	NELSON	1	WILDCAT	KINGFISH	N019	W009	23	1119	DF	19620625	8592	D&A-O	
35073002310000	-97.86841	35.87924	LYNCH G J	GASAWAY	1	WILDCAT	KINGFISH	N016	W006	8	1099	DF	19500531	7819	D&A-O	
35073002420000	-97.92979	35.81842	PAN AMERIC	POST UNIT	1	OKARCHE W	KINGFISH	N016	W007	34	1086	DF	19640103	9274	D&A-O	
35073200860000	-97.89412	35.83304	BROOKWOOD	HELT	1	WILDCAT	KINGFISH	N016	W007	25	1150	DF	19660914	8397	D&A-O	
35073200860000	-97.89412	35.83304	BROOKWOOD	HELT	1	WILDCAT	KINGFISH	N016	W007	25	1150	DF	19660914	8397	D&A-O	
35073200860000	-97.89412	35.83304	BROOKWOOD	HELT	1	WILDCAT	KINGFISH	N016	W007	25	1150	DF	19660914	8397	D&A-O	
35073200900000	-98.17317	36.10827	KING RESOU	CIMARRON R	1-21	STAR	KINGFISH	N019	W009	21	1097	KB	19660930	8476	D&A	
35073201620000	-97.70519	35.78192	PICKENS W	CRONKITE	1	EDMOND W	KINGFISH	N015	W005	14	1102	KB	19670224	7146	D&A-O	
35073201840000	-98.03253	35.89407	GRAHAM-MIC	THOMPSON	1-3	KINGFISHER W	KINGFISH	N016	W008	3	1183	KB	19670526	9018	OIL	269HNTN
35073201840000	-98.03253	35.89407	GRAHAM-MIC	THOMPSON	1-3	KINGFISHER W	KINGFISH	N016	W008	3	1183	KB	19670526	9018	OIL	269HNTN
35073201860000	-98.02351	35.87962	SINCLAIR O	MARIE SVOB	1	KINGFISHER W	KINGFISH	N016	W008	11	1141	GR	19670609	9009	OIL	269HNTN
35073202120000	-98.01764	35.9598	PAN AMERIC	KUNTZ UNIT	1	WILDCAT	KINGFISH	N017	W008	11	1072	DF	19670717	8840	D&A-O	
35073202120000	-98.01764	35.9598	PAN AMERIC	KUNTZ UNIT	1	WILDCAT	KINGFISH	N017	W008	11	1072	DF	19670717	8840	D&A-O	
35073202170000	-98.07041	35.98764	NATOL PET	PARADIS	1	WILDCAT	KINGFISH	N018	W008	32	1131	KB	19670714	9060	D&A	
35073202190000	-97.84249	35.93618	CLEARY PET	GILBERT	1-21	UNNAMED	KINGFISH	N017	W006	21	1012	DF	19670908	7873	2 OIL	404BGLM

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35059205750000	269HNTN	8950	9020	774	621	774	-5127	0.09	136	162	162	0.209	tight						
35059206540000	269HNTN	8318	8380	1721	1582	1721	-2718	0.21	1104	1456	1456	0.846							
35059209530000	269HNTN	7308	7450	2891	2891	2891	621	0.39	1765	2740	2740	0.948					YD	FmR	OK
35059209610000	269HNTN	7221	7600	2943	2891	2943	510	0.39	179	204	204	0.069	tight						
35059300060001	269HNTN	8244	8350	3030	2678	3030	36	0.36	141	235	235	0.078	tight				Y	FmR	OK
35059352300001	269HNTN	7798	7942	454	259	454	-5172	0.06	65	65	65	0.143	tight						
35073000200000	269HNTN	8464	8469		810	810	-5606	0.10		60	60	0.074	tight						
35073000210000	269HNTN	7979	7996	3470	3325	3470	552	0.43	1090	1650	1650	0.476						FmR	OK
35073000290000	269HNTN	7805	7850	440	335	440	-5882	0.06	145	170	170	0.386	suspect						
35073000350001	269HNTN	8480	8660	864	1518	1518	-4276	0.18	115	510	510	0.336		multi-zn	H	l			
35073000350001	269HNTN	8480	8660	4075	4281	4281	1665	0.49	835		835	0.195	tight	multi-zn	L	h			
35073000470000	251CMNL	8210	8230		3275	3275	-59	0.40					tight						
35073000550000	269HNTN	8147	8175		3565	3565	629	0.44		1505	1505	0.422					Y	FmR	No ISIP
35073000570000	269HNTN	7090	7102		3050	3050	467	0.43					tight	multi-zn		h	Y	FmR	No ISIP
35073000570000	269HNTN	7223	7360		2900	2900	-113	0.39					tight	multi-zn		l		FmR	No ISIP
35073000640000	269HNTN	7604	7614		2975	2975	-118	0.39	700	750	750	0.252	tight						
35073000740001	269HNTN	8700	8709		3917	3917	832	0.45	691	2429	2429	0.620		multi-zn	H	h	Y	FmR	No ISIP
35073000740001	269HNTN	8898	9110	419	669	669	-6554	0.07	167	167	167	0.250	tight	multi-zn	L	l			
35073000750000	269HNTN	7834	7856	3480	3500	3500	701	0.45	275	980	980	0.280	tight					FmR	OK
35073000780001	269HNTN	7992	8043	3190	3110	3190	-15	0.40	230	270	270	0.085	tight						
35073000850000	269HNTN	7833	7850	370	35	370	-5943	0.05		20	20	0.054	tight						
35073001810000	269HNTN	8034	8148		567	567	-5711	0.07	517	517	517	0.912							
35073001850000	269HNTN	8185	8285		720	720	-5518	0.09	610	610	610	0.847							
35073001890000	269HNTN	8042	8144		1045	1045	-4732	0.13	820	825	825	0.789							
35073001920001	269HNTN	8821	8833	1088	1088	1088	-5300	0.12	435	435	435	0.400		multi-zn	H	l			
35073001920001	269HNTN	8989	9018	3386	3516	3516	-264	0.39	475	498	498	0.142	tight	multi-zn	L	h			
35073002070000	269HNTN	8383	8430	3635		3635	489	0.43	1409	1407	1409	0.388							
35073002220000	269HNTN	8604	8609	690	460	690	-5994	0.08	15	15	15	0.022	tight						
35073002270000	269HNTN	8264	8271	15	260	260	-6593	0.03	85	225	225	0.865	suspect						
35073002310000	269HNTN	7793	7818		3200	3200	163	0.41		700	700	0.219	tight					FmR	No ISIP
35073002420000	269HNTN	8257	8327	655	393	655	-5832	0.08	240	240	240	0.366							
35073200860000	269HNTN	8092	8150	3377	3606	3606	755	0.44	95	703	703	0.195	tight	multi-zn	H	m	Y	FmR	OK
35073200860000	269HNTN	8250	8252	3525	3525	3525	479	0.43					tight	multi-zn		l		FmR	OK
35073200860000	269HNTN	U 8113	8115	3900	3775	3900	1422	0.48					tight	multi-zn		h			
35073200900000	269HNTN	8305	8353	794	794	794	-5548	0.10	514	514	514	0.647							
35073201620000	269HNTN	7105	7136	2995	2958	2995	407	0.42	82	297	297	0.099	tight				Y	FmR	OK
35073201840000	269HNTN	8804	8840	3540	3566	3566	12	0.40	1572	1674	1674	0.469		multi-zn	H	h		FmR	OK
35073201840000	269HNTN	8992	9008	3189	2819	3189	-967	0.35	446	446	446	0.140	tight	multi-zn	L	l			
35073201860000	269HNTN	8765	8820	3734	3667	3734	351	0.42	2301	2719	2719	0.728						FmR	OK
35073202120000	269HNTN	8600	8840	3645	3508	3645	71	0.41	657	1452	1452	0.398		multi-zn	H	l		FmR	OK
35073202120000	269HNTN	8618	8619	3700	3700	3700	410	0.43					tight	multi-zn		h	YD	FmR	OK
35073202170000	269HNTN	8621	8630	3932	3932	3932	957	0.46	95	1570	1570	0.399					Y	FmR	OK
35073202190000	269HNTN	7548	7873	3426	3426	3426	507	0.44	2164	3414	3414	0.996						FmR	OK

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35073202330000	-97.69393	35.79998	KIRKPATRIC	PRITCHETT-	1	SOONER TREN	KINGFISH	N015	W005	2	1133	KB	19671207	7135	OIL	359MSSP
35073202600000	-98.1145	36.08129	CITIES SER	MC MEEKAN-	1	LACEY SW	KINGFISH	N019	W009	36	1123	KB	19671224	8662	OIL	359MSSP
35073202610000	-98.00556	35.86521	APACHE COR	SARAH LOVE	1	KINGFISHER W	KINGFISH	N016	W008	13	1124	KB	19680201	8860	OIL	359MSSP
35073202630000	-97.82023	35.95071	CALVERT FU	MUSICK	1	SOONER TREN	KINGFISH	N017	W006	15	1021	KB	19671228	7671	2 OIL	404BGLM
35073202630000	-97.82023	35.95071	CALVERT FU	MUSICK	1	SOONER TREN	KINGFISH	N017	W006	15	1021	KB	19671228	7671	2 OIL	404BGLM
35073202910000	-97.80248	35.77471	FEDERAL PE	CERNY	1	SOONER TREN	KINGFISH	N015	W006	14	1202	KB	19680318	8180	OIL	269HNTN
35073203290000	-97.9865	35.86268	APACHE COR	HILL UNIT	1	OKARCHE N	KINGFISH	N016	W007	18	1071	KB	19680417	8950	D&A	
35073203480000	-98.10955	35.92197	PAYNE W C	MAJOR	1	WILDCAT	KINGFISH	N017	W009	25	1165	KB	19680517	9431	D&A-G	
35073203630000	-98.03419	35.96558	APACHE COR	ENGLEKING	1	WILDCAT	KINGFISH	N017	W008	10	1076	DF	19680717	8930	D&A-O	
35073203630000	-98.03419	35.96558	APACHE COR	ENGLEKING	1	WILDCAT	KINGFISH	N017	W008	10	1076	DF	19680717	8930	D&A-O	
35073203720000	-97.99878	36.07472	MAGNESS PE	STATE	36-1	SOONER TREN	KINGFISH	N019	W008	36	1163	DF	19680722	8390	2 OIL	359MSSP
35073204190000	-97.8851	35.85115	PICKENS W	EVERY	1	WILDCAT	KINGFISH	N016	W006	19	1141	KB	19681023	8150	D&A-O	
35073204190000	-97.8851	35.85115	PICKENS W	EVERY	1	WILDCAT	KINGFISH	N016	W006	19	1141	KB	19681023	8150	D&A-O	
35073204490000	-97.8271	35.8111	RANCHO OIL	VAIL	1	SOONER TREN	KINGFISH	N015	W006	3	1175	KB	19690104	7866	1O&1G	404PRUE
35073204680000	-97.93299	35.93571	CALVERT FU	GERBER	1	SOONER TREN	KINGFISH	N017	W007	22	1151	KB	19690106	8459	D&A-G	
35073204770000	-97.85146	35.94339	BORELLI GE	WILLIAMS	1	SOONER TREN	KINGFISH	N017	W006	16	1015	KB	19690613	7856	OIL	359MSSP
35073204810000	-98.02807	35.88685	BLAIK OIL	HILL	1	OKARCHE N	KINGFISH	N016	W008	2	1172	KB	19690217	8888	OIL	269HNTN
35073204820001	-97.72954	35.80736	TURLEY OIL	WELLER	1	WILDCAT	KINGFISH	N015	W005	4	1070	DF	19690502	7515	D&AW	
35073205310000	-98.03669	35.88347	CLINTON OI	BENGS	1-V	OKARCHE N	KINGFISH	N016	W008	10	1177	KB	19690801	9200	D&A-O	
35073205590000	-97.87165	35.85474	PICKENS CO	EVERY	2	WILDCAT	KINGFISH	N016	W006	19	1158	KB	19690604	8196	D&A	
35073205880000	-98.02543	35.9912	CALVERT EX	TURNER	35-1	UNNAMED	KINGFISH	N018	W008	35	1122	DF	19690909	8762	D&A	
35073205900000	-98.07218	35.79253	SUN OIL	A H BREDEL	1	WILDCAT	KINGFISH	N015	W008	8	1183	KB	19690922	9921	D&A-G	
35073206840000	-98.02342	35.86874	BROWN JAME	MC CULLY	1	OKARCHE N	KINGFISH	N016	W008	14	1130	KB	19691021	9197	OIL	354MNNGZ
35073207580000	-97.95646	35.76045	AN-SON COR	REHERMAN	1	OKARCHE N	KINGFISH	N015	W007	21	1179	KB	19700319	9140	OIL	269HNTN
35073208540000	-97.95475	35.89579	EL PASO NA	STRUCK	1	OKARCHE N	KINGFISH	N016	W007	4	1120	KB	19700621	8428	OIL	354MSSPU
35073208580000	-97.98067	36.01297	KING RESOURCES	ROMERMAN	1-30	SOONER TREN	KINGFISH	N018	W007	30	1099	DF	19700523	8450	D&A-G	
35073208840000	-97.82716	35.88466	EARLSBORO	CLARA HONE	1	UNNAMED	KINGFISH	N016	W006	10	1129	DF	19700807	7982	GAS	269HNTN
35073209420000	-98.03441	36.0091	MAGNESS PE	HILDA	27-1	SOONER TREN	KINGFISH	N018	W008	27	1130	DF	19701117	8526	D&A-G	
35073209470000	-97.70742	35.81095	EASON OIL	FLORINE JI	1	SOONER TREN	KINGFISH	N015	W005	2	1104	KB	19701125	7433	OIL	269HNTN
35073209550000	-97.86103	36.01709	FLAG-REDFE	BAILEY	1	SOONER TREN	KINGFISH	N018	W006	20	1125	KB	19701217	7972	D&A-G	
35073210110000	-98.01904	35.87965	BLAIK OIL	HARRY THOM	1	OKARCHE N	KINGFISH	N016	W008	11	1159	KB	19710708	8845	GAS	404CHRK
35073210310000	-98.04785	36.00182	BOOKER OIL	GRABOW	1	SOONER TREN	KINGFISH	N018	W008	27	1138	DF	19710914	8900	D&A-G	
35073210520000	-97.95416	35.98416	BEARD OIL	EVERETT	1	WILDCAT	KINGFISH	N017	W007	4	1055	KB	19710721	8345	D&A	
35073210560000	-98.01011	35.88152	BLAIK OIL	HOLSTINE	1	OKARCHE N	KINGFISH	N016	W008	12	1150	KB	19720508	8800	OIL	269HNTN
35073210980000	-97.94963	35.99545	MAGNESS PE	VINCENT	33-1	SOONER TREN	KINGFISH	N018	W007	33	1062	DF	19711104	8290	D&A-G	
35073211020000	-97.94631	36.0644	FERGUSON O	STRIBAL	1	SOONER TREN	KINGFISH	N018	W007	4	1111	KB	19711204	8185	OIL	269HNTN
35073211520000	-98.03447	36.04901	AN-SON COR	HUFFMAN	1	SOONER TREN	KINGFISH	N018	W008	10	1134	KB	19720503	8587	OIL	269HNTNU
35073211650000	-98.20529	35.9747	VIERSEN &	WINTERS	1-6	COOPER E	KINGFISH	N017	W009	6	1185	DF	19720926	9184	OIL	354CSTR
35073211750000	-97.87171	35.86561	FLAG-REDFE	KARRENBROC	1	WILDCAT	KINGFISH	N016	W006	18	1147	KB	19720610	8230	D&A-O	
35073211750000	-97.87171	35.86561	FLAG-REDFE	KARRENBROC	1	WILDCAT	KINGFISH	N016	W006	18	1147	KB	19720610	8230	D&A-O	
35073211870000	-98.12355	36.14989	EASON OIL	MEWHERTER	1	SOONER TREN	KINGFISH	N019	W009	2	1187	GR	19720811	8870	D&A-G	
35073212100000	-97.952	35.76411	WESSELY EN	WOJAHN	1	OKARCHE N	KINGFISH	N015	W007	21	1164	DF	19721212	9007	D&A-G	
35073212840000	-98.05511	35.93009	DUNCAN WAL	BARNARD G	1	DUNLAP W	KINGFISH	N017	W008	21	1117	KB	19730613	8907	D&A-G	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35073202330000	269HNTN	7078	7088	581	581	581	-4706	0.08	18	18	18	0.031	tight						
35073202600000	251CMNL	8556	8638	282	512	512	-6414	0.06	19	19	19	0.037	tight						
35073202610000	269HNTN	8756	8765	3741	3741	3741	404	0.43	40	312	312	0.083	tight				Y	FmR	OK
35073202630000	269HNTN	7390	7490	2581	280	2581	-918	0.34	21	21	21	0.008	tight	multi-zn	L	h			
35073202630000	269HNTN	7500	7671	2137	1041	2137	-2054	0.28	13	41	41	0.019	tight	multi-zn	H	l			
35073202910000	269HNTNL	7945	8177	397	353	397	-6121	0.05					tight						
35073203290000	269HNTN	8590	8608	3714	3721	3721	465	0.43	3714	3671	3714	0.998					YD	FmR	OK
35073203480000	269HNTN	9005	9050	4029	4064	4064	855	0.45	3049	4012	4012	0.987					Y	FmR	OK
35073203630000	269HNTN	8494	8519	98	540	540	-6282	0.06	124	276	276	0.511		multi-zn	H	l			
35073203630000	269HNTN	8463	8513	3050	2090	3050	-878	0.38	330	456	456	0.150	tight	multi-zn	L	h			
35073203720000	269HNTN	8083	8090	1563	707	1563	-3566	0.19	515	431	515	0.329							
35073204190000	269HNTN	8008	8100	3491	3491	3491	549	0.43	869	1098	1098	0.315		multi-zn	L	l		FmR	OK
35073204190000	269HNTN	7932	8010	3452	3325	3452	555	0.43	1289	3071	3071	0.890		multi-zn	H	h		FmR	OK
35073204490000	269HNTN	7831	7866	3435	3388	3435	696	0.44	64	640	640	0.186	tight				Y	FmR	OK
35073204680000	269HNTN	8287	8315	1254	2047	2047	-2762	0.25	45	68	68	0.033	tight						
35073204770000	269HNTN	7525	7540	3320		3320	615	0.44	220	660	660	0.199	tight				Y	FmR	No FSIP
35073204810000	269HNTN	8800	8838	3317	3298	3317	-533	0.38	720	730	730	0.220	tight					FmR	OK
35073204820001	269HNTN	7188	7218	2798	2712	2798	-131	0.39		132	132	0.047	tight				YD	FmR	OK
35073205310000	269HNTN	9048	9058	3264	3240	3264	-862	0.36	516	609	609	0.187	tight						
35073205590000	269HNTN	7882	7905	3418	3390	3418	604	0.43	919	1155	1155	0.338						FmR	OK
35073205880000	269HNTN	8360	8762	306	372	372	-6840	0.04	20	20	20	0.054	tight						
35073205900000	269HNTN	9583	9640	2568	2686	2686	-2681	0.28	568	568	568	0.211	tight						
35073206840000	269HNTN	9134	9197	97	97	97	-7858	0.01	65	81	81	0.835	suspect						
35073207580000	269HNTN	8770	8833	4084	3904	4084	1129	0.46	776	803	803	0.197	tight				Y	FmR	OK
35073208540000	269HNTN	8350	8428	3540	3540	3540	305	0.42	536	469	536	0.151	tight					FmR	OK
35073208580000	269HNTN	8074	8111	2720	1977	2720	-1163	0.34	139	189	189	0.069	tight						
35073208840000	269HNTN	7830	7982	3674	3393	3674	1048	0.46	117	117	117	0.032	tight				Y	FmR	OK
35073209420000	269HNTN	8375	8526	208	195	208	-6949	0.02	90	105	105	0.505	suspect						
35073209470000	269HNTN	7055	7132	2065	2128	2128	-1452	0.30	164	227	227	0.107	tight						
35073209550000	269HNTN	7580	7755	2420	1692	2420	-1426	0.31					tight						
35073210110000	269HNTN	8770	8795	3611	3576	3611	130	0.41	531	1307	1307	0.362						FmR	OK
35073210310000	269HNTN	8400	8500	76	76	76	-7199	0.01		56	56	0.737	suspect						
35073210520000	269HNTN	7900	8029	3286	3221	3286	93	0.41	737	1389	1389	0.423						FmR	OK
35073210560000	269HNTN	8685	8745	3628	3659	3659	274	0.42	964	2708	2708	0.740					YD	FmR	OK
35073210980000	269HNTN	8030	8290	3887	3710	3887	1131	0.47	1203	3087	3087	0.794					Y	FmR	OK
35073211020000	269HNTN	7760	7887	410	637	637	-5406	0.08	91	118	118	0.185	tight						
35073211520000	269HNTNU	8228	8260	2581	2286	2581	-1575	0.31	296	333	333	0.129	tight						
35073211650000	269HNTN	9159	9184	3979	4052	4052	715	0.44	2950	4419	4419	1.091					Y	FmR	OK
35073211750000	269HNTN	7810	7886	3408	342	3408	590	0.43	700	970	970	0.285	tight	multi-zn	H	h	YD	FmR	OK
35073211750000	269HNTN	8018	8050	3254	3331	3331	260	0.41	467	493	493	0.148	tight	multi-zn	L	l			
35073211870000	269HNTN	8260	8328	222	233	233	-6640	0.03	34	31	34	0.146	tight						
35073212100000	269HNTN	8654	8739	474	1806	1806	-3691	0.21	86	107	107	0.059	tight						
35073212840000	269HNTN	8804	8907	3546	3245	3546	-164	0.40	93	167	167	0.047	tight						

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35073212900000	-97.92107	35.84404	MARLIN OIL	ZALABAK	1	OKARCHE N	KINGFISH	N016	W007	23	1049	GR	19730608	8750	D&A-G	
35073213070000	-97.90316	35.86949	MARLIN OIL	WHITE	1	OKARCHE N	KINGFISH	N016	W007	13	1100	GR	19730717	8450	D&A	
35073213100000	-97.93632	35.98029	WITHROW OI	EVERETT SM	3-1	SOONER TREN	KINGFISH	N017	W007	3	1043	KB	19730806	8263	OIL	269HNTN
35073213500000	-98.05515	35.93735	DUNCAN WAL	PECK	1	DUNLAP W	KINGFISH	N017	W008	21	1119	KB	19730920	9140	D&A	
35073213710000	-97.94123	35.97675	WITHROW OI	BOBBY STIT	3-1	SOONER TREN	KINGFISH	N017	W007	3	1047	KB	19731023	8270	D&A-O	
35073213780000	-97.7029	35.77468	CALVERT EX	WATKINS	1	EDMOND W	KINGFISH	N015	W005	14	1112	KB	19740116	7210	GAS	404SKNR
35073213780000	-97.7029	35.77468	CALVERT EX	WATKINS	1	EDMOND W	KINGFISH	N015	W005	14	1112	KB	19740116	7210	GAS	404SKNR
35073213970000	-97.95422	35.96943	EASON OIL	HOBBS	1	SOONER TREN	KINGFISH	N017	W007	9	1040	KB	19740201	8386	D&A	
35073216820000	-97.82383	35.88102	NCZ PETRO	SCHROEDER	1	SOONER TREN	KINGFISH	N016	W006	10	1130	KB	19760203	7966	OIL	404OSWG
35073216930000	-97.8226	35.82197	COTTON PET	JECH	1	SOONER TREN	KINGFISH	N016	W006	34	1184	KB	19751201	8130	OIL	359MSSP
35073217100000	-97.83441	35.89899	COTTON PET	LANKARD	1	LINCOLN SW	KINGFISH	N017	W006	34	1074	KB	19751213	7950	OIL	269HNTN
35073217290000	-97.85269	35.89722	DALCO EXPL	WILLMS	3	LINCOLN SW	KINGFISH	N016	W006	5	1068	KB	19760308	8034	OIL	404OSWG
35073217290000	-97.85269	35.89722	DALCO EXPL	WILLMS	3	LINCOLN SW	KINGFISH	N016	W006	5	1068	KB	19760308	8034	OIL	404OSWG
35073218450000	-97.96322	35.96214	MACKELLAR	WELLS	1	SOONER TREN	KINGFISH	N017	W007	8	1078	DF	19761109	8535	D&A	
35073219130000	-97.80033	35.76019	RESOURCES	COREY	1	SOONER TREN	KINGFISH	N015	W006	23	1233	GR	19770618	8131	D&A-O	
35073219240000	-98.12266	35.88851	FERGUSON O	BETTY LOU	1	ALTONA	KINGFISH	N016	W009	2	1232	KB	19770703	9730	D&A-G	
35073237080000	-97.99043	35.98772	PETROLEUM	WADE S HOB	1	SOONER TREN	KINGFISH	N018	W007	31	1051	KB	19821007	8500	OIL	269HNTN
35073300010000	-98.037	35.89045	SINCLAIR O	HILL-BONNE	1	OKARCHE N	KINGFISH	N016	W008	3	1179	DF	19670329	9702	OIL	269HNTN
35073300010000	-98.037	35.89045	SINCLAIR O	HILL-BONNE	1	OKARCHE N	KINGFISH	N016	W008	3	1179	DF	19670329	9702	OIL	269HNTN
35073300380000	-98.02991	36.00187	CALVERT PE	GARMS	1	SOONER TREN	KINGFISH	N018	W008	26	1112	DF	19651126	8645	D&A-G	
35073300470000	-97.77402	35.85802	MACKELLAR DRILL	KADAVY	1	DOVER-HENNE	KINGFISH	N016	W005	18	1061	DF	19650421	7389	OIL	359MSSP
35073300520000	-98.04155	35.89407	SINCLAIR O	HARIET SPE	1	OKARCHE N	KINGFISH	N016	W008	3	1176	GR	19651001	9208	D&A-G	
35073301050000	-98.19036	36.11763	JOHNSON E	MAY	1	STAR	KINGFISH	N019	W009	17	1130	KB	19650609	8410	D&A	
35073302580000	-97.72971	35.78904	RICHARD CH	WINANS	1	UNNAMED	KINGFISH	N015	W005	9	1144	KB	19660404	7345	1O&1G	404OSWG
35073302600000	-98.04008	35.88639	SINCLAIR O	MEL-KEN HI	1	OKARCHE N	KINGFISH	N016	W008	3	1172	GR	19660331	9110	OIL	269HNTN
35073303920000	-98.07477	36.02341	BOOKER OIL	WEHRENBERG	1	WILDCAT	KINGFISH	N018	W008	20	1177	DF	19660829	9011	D&A	
35073356560000	-97.93756	35.94477	ARMER L H	EMIL BOECH	1	DOVER SW	KINGFISH	N017	W007	15	1129	GR	19550309	8132	GAS	269HNTN
35073356580000	-97.95312	35.94667	TRIGG DRLG	KREMKE	1	DOVER SW	KINGFISH	N017	W007	16	1112	GR	19530804	8829	D&A-O	
35073356640000	-97.94641	35.93751	TRIGG DRLG	J R PORTER	3	DOVER SW	KINGFISH	N017	W007	21	1127	GR	19541215	8095	OIL	269HNTN
35073357630000	-97.71628	35.84016	REASOR G L	J N RAY	1	CASHION NW	KINGFISH	N016	W005	27	1058	GR	19530414	7135	OIL	301BDRC
35073357630000	-97.71628	35.84016	REASOR G L	J N RAY	1	CASHION NW	KINGFISH	N016	W005	27	1058	GR	19530414	7135	OIL	301BDRC
35073357650000	-97.70744	35.8366	REASOR G L	V J JIRIK	1	CASHION NW	KINGFISH	N016	W005	26	1077	GR	19520611	7130	OIL	269HNTN
35073358110001	-97.9517	35.77459	MAGNESS PE	STATE UNIT	1	OKARCHE N	KINGFISH	N015	W007	16	1163	KB	19700820	9510	D&AW	
35073359680001	-97.91376	36.0971	SUPERIOR O	BRITTAIN	1	SOONER TREN	KINGFISH	N019	W007	26	1089	DF	19741220	7734	D&AW	
35073362020000	-98.08626	35.91196	AMERADA HE	NELLIE GAL	1	DOVER SW	KINGFISH	N017	W008	31	1148	GR	19581119	9990	D&A-O	
35073501000000	-97.90534	36.10417	COASTAL ST	HENNESSEY	1	DOVER-HENNE	KINGFISH	N019	W007	24	1147	DF	19630809	7589	1O&1G	354MNNGZ
35073503170000	-97.98581	36.04603	KING-STEVE	DIXON	1	DOVER-HENNE	KINGFISH	N018	W007	7	1132	KB	19630314	8092	D&A	
35073503340000	-98.13213	36.06688	CALVERT EX	BLODGETT	1	LACEY SW	KINGFISH	N018	W009	2	1104	DF	19630118	8765	2 OIL	353MRMC
35073503350000	-98.13657	36.06385	CALVERT EX	BLODGETT U	1	LACEY SW	KINGFISH	N018	W009	2	1098	DF	19631014	8851	2 OIL	353MRMC
35073503360000	-98.1277	36.06325	CALVERT EX	BOETTLER	1	LACEY SW	KINGFISH	N018	W009	2	1092	DF	19621214	8800	3 OIL	251CMYHH
35073503990000	-98.02129	36.10734	ASHLAND OI	ANNIE TUTT	1	LACEY SE	KINGFISH	N019	W008	23	1197	DF	19621119	8080	2 GAS	353MRMC
35073504080000	-98.00766	36.07835	UNION OF C	STATE OF O	2-36	DOVER-HENNE	KINGFISH	N019	W008	36	1151	DF	19641030	8030	OIL	353MRMC
35073504120000	-98.18118	36.08512	CALVERT EXPL	DROKE UNIT	1	STAR	KINGFISH	N019	W009	32	1165	DF	19630517	8523	OIL	353MRMC

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35073212900000	269HNTN	8158	8200	3491	3491	3491	357	0.43	1542	2755	2755	0.789					YD	FmR	OK
35073213070000	269HNTN	8175	8450	3469	3469	3469	110	0.41	3505	3469	3505	1.010						FmR	OK
35073213100000	269HNTN	7810	7925	284	573	573	-5650	0.07	92	130	130	0.227	tight						
35073213500000	269HNTN	8770	8806	21	53	53	-7573	0.01	17	17	17	0.321	suspect						
35073213710000	269HNTN	7825	7841	3498	3489	3498	729	0.45	1172	2657	2657	0.769					Y	FmR	OK
35073213780000	269HNTN	7096	7108	2857	2834	2857	148	0.40	871	1549	1549	0.542		multi-zn	H	l		FmR	OK
35073213780000	269HNTN	7110	7210	2929	2911	2929	201	0.41	372	814	814	0.278	tight	multi-zn	L	h		FmR	OK
35073213970000	269HNTN	8100	8386	3373	2987	3373	-92	0.40	1124	1124	1124	0.333							
35073216820000	301BDRC	7640	7650	3392	3345	3392	775	0.44	318	706	706	0.208	tight					FmR	OK
35073216930000	269HNTN	7798	7830	3358	3358	3358	576	0.43	294	855	855	0.255	tight					FmR	OK
35073217100000	269HNTN	7617	7627	992	1460	1460	-3413	0.19	67	1100	1100	0.753							
35073217290000	269HNTN	7679	7693	3243	3248	3248	360	0.42	122	270	270	0.083	tight	multi-zn	L	h			
35073217290000	269HNTN	7858	8034	243	358	358	-6196	0.04	51	66	66	0.184	tight	multi-zn	H	l			
35073218450000	269HNTNU	8034	8144	3357	2756	3357	153	0.41	813	1555	1555	0.463						FmR	OK
35073219130000	269HNTN	8010	8131	235	251	251	-6358	0.03	116	140	140	0.558	suspect						
35073219240000	269HNTN	9357	9366	3717	3777	3777	-11	0.40	488	638	638	0.169	tight				YD	FmR	OK
35073237080000	269HNTN	8135	8156	3070		3070	-503	0.38	2063	2238	2238	0.729					YD	FmR	No FSIP
35073300010000	269HNTN	8793	8833	3628	3519	3628	148	0.41	1001	1341	1341	0.370		multi-zn	H	h		FmR	OK
35073300010000	269HNTN	8994	9089	3274	3070	3274	-869	0.36	524	524	524	0.160	tight	multi-zn	L	l		FmR	OK
35073300380000	269HNTN	8492	8494		250	250	-6844	0.03					tight						
35073300470000	269HNTN	7353	7388	3229	3229	3229	617	0.44	76	479	479	0.148	tight				Y	FmR	OK
35073300520000	269HNTN	8818	8863	1509	880	1509	-4442	0.17	666	639	666	0.441							
35073301050000	269HNTN	8324	8410	488	342	488	-6231	0.06	254	81	254	0.520	suspect						
35073302580000	269HNTN	7299	7345		348	348	-5453	0.05	99	132	132	0.379	suspect						
35073302600000	269HNTN	8842	8858		3671	3671	209	0.41	1131	2165	2165	0.590						FmR	No ISIP
35073303920000	269HNTN	8516	8596	66	66	66	-7277	0.01	33	50	50	0.758	suspect						
35073356560000	269HNTN	8070	8077		3410	3410	385	0.42	45	90	90	0.026	tight				YD	FmR	No ISIP
35073356580000	269HNTN	8075	8100		2500	2500	-1612	0.31					tight						
35073356640000	269HNTN	8080	8095		3450	3450	451	0.43	1700	2600	2600	0.754						FmR	No ISIP
35073357630000	301BDRC	7080	7093		2000	2000	-1734	0.28					tight	multi-zn		h			
35073357630000	301BDRC	7108	7135		2000	2000	-1776	0.28					tight	multi-zn		l			
35073357650000	269HNTN	7098	7113		1300	1300	-3240	0.18		300	300	0.231	tight						
35073358110001	269HNTN	8806	8940	553	645	645	-6390	0.07	138	230	230	0.357							
35073359680001	269HNTN	7459	7734	504	488	504	-5561	0.07	260	260	260	0.516							
35073362020000	269HNTN	8938	9034		3985	3985	684	0.44	490	525	525	0.132	tight				Y	FmR	No ISIP
35073501000000	269HNTN	7548	7588		2459	2459	-1153	0.32	37	37	37	0.015	tight						
35073503170000	269HNTN	8030	8092		40	40	-6874	0.00	29		29	0.725	suspect						
35073503340000	269HNTN	8351	8446	2915	1554	2915	-1073	0.35	179	179	179	0.061	tight					FmR	OK
35073503350000	269HNTN	8750	8850	3847	3820	3847	521	0.43	210	305	305	0.079	tight				Y	FmR	OK
35073503360000	269HNTN	8670	8750		812	812	-5912	0.09	241	376	376	0.463							
35073503990000	269HNTN	7975	8080	3513	3513	3513	672	0.43	59	148	148	0.042	tight						
35073504080000	269HNTN	7975	8030	2982	1523	2982	-466	0.37					tight						
35073504120000	269HNTN	8460	8523	3833	3840	3840	900	0.45	3568	3840	3840	1.000					Y	FmR	OK

147

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35093000010001	-98.91362	36.2075	READING &	LOUTHAN	1	SEILING NE	MAJOR	N020	W016	16	1712	DF	19710629	10969	D&AWG	
35093000070001	-98.68686	36.2988	SARKEYS IN	WILLITS	1	WILDCAT	MAJOR	N021	W014	15	1609	DF	19661205	9270	D&AW	
35093000140000	-98.91647	36.42274	SINCLAIR O	E E SPAFFO	1	CAMPBELL	MAJOR	N023	W016	33	1504	GR	19590624	9400	GAS	269HNTN
35093000140000	-98.91647	36.42274	SINCLAIR O	E E SPAFFO	1	CAMPBELL	MAJOR	N023	W016	33	1504	GR	19590624	9400	GAS	269HNTN
35093000140000	-98.91647	36.42274	SINCLAIR O	E E SPAFFO	1	CAMPBELL	MAJOR	N023	W016	33	1504	GR	19590624	9400	GAS	269HNTN
35093000180000	-98.86408	36.3833	PAN AMERIC	ANNA HARRI	1	CEDARDALE N	MAJOR	N022	W016	13	1632	DF	19580108	9359	GAS	405CGGV
35093000280000	-98.86397	36.43255	SINCLAIR O	RAY CAMPBE	1	WILDCAT	MAJOR	N023	W016	36	1509	DF	19511218	8923	D&A-O	
35093000330000	-98.90137	36.16499	CONTINENTA	KIMBALL	1	SEILING NE	MAJOR	N020	W016	34	1692	DF	19520422	11861	GAS	354CSTR
35093000330000	-98.90137	36.16499	CONTINENTA	KIMBALL	1	SEILING NE	MAJOR	N020	W016	34	1692	DF	19520422	11861	GAS	364CSTR
35093000780001	-98.73594	36.1971	SARKEYS IN	MC CONNELL	1	UNNAMED	MAJOR	N020	W014	19	1778	DF	19690915	10238	OIL-W	359MSSP
35093000840000	-98.41801	36.35534	UNION TEXA	GLIDEWELL	1	RINGWOOD	MAJOR	N022	W011	30	1222	DF	19610425	7965	1O&1G	354MNNGZ
35093001060000	-98.28865	36.20863	CLEARY PET	LEMBECK	1-A	ISABELLA SE	MAJOR	N020	W010	17	1185	DF	19630212	9014	OIL	359MSSP
35093001080000	-98.50854	36.41462	UNITED PRO	D H CORNEL	1	CLEO W	MAJOR	N022	W012	5	1282	DF	19630118	7889	GAS	354MNNGZ
35093001350000	-98.93549	36.43993	SINCLAIR O	M F GORANF	1	CAMPBELL W	MAJOR	N023	W016	29	1636	GR	19640720	8583	GAS	354CSTR
35093001350000	-98.93549	36.43993	SINCLAIR O	M F GORANF	1	CAMPBELL W	MAJOR	N023	W016	29	1636	GR	19640720	8583	GAS	354CSTR
35093001390000	-98.41915	36.25164	LIVINGSTON	EPP	1	UNNAMED	MAJOR	N021	W011	31	1272	KB	19640323	8467	GAS	404RDFK
35093001390000	-98.41915	36.25164	LIVINGSTON	EPP	1	UNNAMED	MAJOR	N021	W011	31	1272	KB	19640323	8467	GAS	404RDFK
35093001640000	-98.11546	36.42521	SHELL OIL	CAMPBELL	1-36	WILDCAT	MAJOR	N023	W009	36	1262	DF	19640714	7383	D&A-O	
35093001670000	-98.45211	36.16779	PAN AMERIC	NICHOLS UN	1	UNNAMED	MAJOR	N020	W012	35	1331	DF	19610426	9410	GAS	354CSTR
35093200120000	-98.43617	36.40339	CLEARY PET	ROSE	1-12	RINGWOOD	MAJOR	N022	W012	12	1285	DF	19660708	7794	2O&2G	404OSWG
35093200190000	-98.47505	36.34386	KIRKPATRIC	NICKEL UNI	1	ORIENTA	MAJOR	N022	W012	34	1283	DF	19660728	8147	2 GAS	353MRMC
35093200470000	-98.78422	36.43603	SUN OIL	T J INMAN	1	CAMPBELL E	MAJOR	N023	W015	27	1366	DF	19660906	8140	D&A	
35093200790000	-98.16003	36.20096	TENNECO OI	LUCY FISHE	1	AMES SE	MAJOR	N020	W009	21	1232	KB	19661219	8290	D&A	
35093200790000	-98.16003	36.20096	TENNECO OI	LUCY FISHE	1	AMES SE	MAJOR	N020	W009	21	1232	KB	19661219	8290	D&A	
35093201200000	-98.40135	36.42871	BELCO PETR	KIRKENDALL	2-32	RINGWOOD	MAJOR	N023	W011	32	1352	KB	19670331	7981	D&A-O	
35093201390000	-98.7529	36.43969	HIBBERT R	P D WEST	1	WILDCAT	MAJOR	N023	W015	25	1350	KB	19670605	8092	D&A	
35093201460000	-98.68221	36.32713	TENNECO OI	JAY JORDAN	1	CHEYENNE VA	MAJOR	N021	W014	3	1489	KB	19670821	8927	OIL	269HNTN
35093201460000	-98.68221	36.32713	TENNECO OI	JAY JORDAN	1	CHEYENNE VA	MAJOR	N021	W014	3	1489	KB	19670821	8927	OIL	269HNTN
35093201540000	-98.93542	36.33883	SINCLAIR O	PARKER E B	1	CEDARDALE N	MAJOR	N022	W016	32	1800	TS	19670821	9494	OIL	354CSTR
35093201600000	-98.46546	36.21114	NATIONAL P	KLIEWER	1-A	OKEENE NW	MAJOR	N020	W012	15	1348	KB	19670921	9120	D&A-G	
35093201600000	-98.46546	36.21114	NATIONAL P	KLIEWER	1-A	OKEENE NW	MAJOR	N020	W012	15	1348	KB	19670921	9120	D&A-G	
35093201670000	-98.12876	36.32751	BELCO PET	COULTER UNIT	1-2	SOONER TREN	MAJOR	N021	W009	2	1282	KB	19671022	8032	OIL	202WLCX
35093201710000	-98.25722	36.23732	MID-WEST O	K E FISHER	1	RINGWOOD	MAJOR	N020	W010	3	1163	KB	19671222	8768	GAS	269HNTN
35093201710000	-98.25722	36.23732	MID-WEST O	K E FISHER	1	RINGWOOD	MAJOR	N020	W010	3	1163	KB	19671222	8768	GAS	269HNTN
35093201800000	-98.48769	36.22571	WOODS PET	TAYLOR	1	OKEENE NW	MAJOR	N020	W012	9	1366	DF	19680111	9091	GAS	269HNTN
35093201830000	-98.13336	36.32395	BELCO PETR	SHREVE UNI	1-2	SOONER TREN	MAJOR	N021	W009	2	1306	KB	19671229	8050	D&A-O	
35093201870000	-98.55482	36.21054	CLEARY PET	MARIE JANZ	1-14	WILDCAT	MAJOR	N020	W013	14	1636	DF	19680125	9170	D&A-G	
35093201880000	-98.53998	36.36736	NATOL PETR	GARD	1	RINGWOOD	MAJOR	N022	W013	24	1296	KB	19680127	8266	D&A-G	
35093202010000	-98.47201	36.22025	NATOL PETR	WAHL	1	OKEENE NW	MAJOR	N020	W012	10	1353	KB	19680329	9080	D&A-G	
35093202010000	-98.47201	36.22025	NATOL PETR	WAHL	1	OKEENE NW	MAJOR	N020	W012	10	1353	KB	19680329	9080	D&A-G	
35093202040000	-98.49894	36.22751	WOODS PET	WAHL-B	1	OKEENE NW	MAJOR	N020	W012	8	1420	DF	19680419	9160	D&A-O	
35093202120000	-98.27054	36.24083	MIDWEST OI	HUGHES UNI	1	RINGWOOD	MAJOR	N020	W010	4	1158	KB	19680626	8272	GAS	353MRMC
35093202130001	-98.67728	36.2261	WOODS PET	CLASSEN-A	1	WILDCAT	MAJOR	N020	W014	10	1768	DF	19680517	10000	D&AWG	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35093000010001	269HNTN	10420	10470	4560	4610	4610	1156	0.44	1665	4411	4411	0.957					Y	FmR	OK
35093000070001	269HNTN	8779	8786	3774	3740	3774	939	0.43	1391	1505	1505	0.399					Y	FmR	OK
35093000140000	269HNTN	8337	8377	3650	3270	3650	976	0.44		50	50	0.014	tight	multi-zn	L	h	Y	FmR	OK
35093000140000	269HNTN	8400	8445	1435	1085	1435	-3855	0.17		55	55	0.038	tight	multi-zn	M	l			
35093000140000	269HNTN	8306	8332		3315	3315	301	0.40	390	340	390	0.118	tight	multi-zn	H	m			
35093000180000	269HNTN	8835	8864		40	40	-7146	0.00	20	40	40	1.000	suspect						
35093000280000	269HNTN	8390	8440		1100	1100	-4565	0.13		750	750	0.682							
35093000330000	269HNTN	11150	11230		5450	5450	2182	0.49		4825	4825	0.885		multi-zn	L	h			
35093000330000	269HNTN	10895	10985		1125	1125	-6874	0.10		1125	1125	1.000		multi-zn	H	l			
35093000780001	269HNTN	9708	9720	3208	3717	3717	52	0.38	1044	3717	3717	1.000							
35093000840000	269HNTN	7720	7770	3400	3400	3400	764	0.44	2805	3400	3400	1.000					Y	FmR	OK
35093001060000	269HNTN	8285	8590		380	380	-6588	0.04	70	70	70	0.184	tight						
35093001080000	269HNTN	7700	7889	439	303	439	-5663	0.06	154	181	181	0.412	suspect						
35093001350000	269HNTN	8434	8484	76		76	-6685	0.01	36	36	36	0.474	suspect	multi-zn	L	h			
35093001350000	269HNTN	8379	8429	51	38	51	-6683	0.01	38	38	38	0.745	suspect	multi-zn	H	l			
35093001390000	269HNTN	8400	8467	3586	332	3586	517	0.42	369	852	852	0.238	tight	multi-zn	L	h		FmR	OK
35093001390000	269HNTN	8275	8350	664	539	664	-5650	0.08	449	449	449	0.676		multi-zn	H	l			
35093001640000	269HNTN	7219	7221	2810	2825	2825	116	0.39					tight						
35093001670000	269HNTN	8871	8891	3950	3970	3970	978	0.45	3860	3950	3950	0.995					Y	FmR	OK
35093200120000	269HNTN	7558	7577	3342	3342	3342	895	0.44	2515	3220	3220	0.963					Y	FmR	OK
35093200190000	269HNTN	7879	7906	3496	3496	3496	895	0.44	2807	3458	3458	0.989						FmR	OK
35093200470000	269HNTN	7986	8140		2021	2021	-2428	0.25	244	295	295	0.146	tight						
35093200790000	269HNTN	8090	8133	66	66	66	-6759	0.01	66	54	66	1.000	suspect	multi-zn	H	l			
35093200790000	269HNTN	8096	8147	2271	2385	2385	-1786	0.29	30	31	31	0.013	tight	multi-zn	L	h			
35093201200000	269HNTN	7633	7681	3189	3151	3189	529	0.42	257	371	371	0.116	tight						
35093201390000	269HNTN	7879	7910	41	54	54	-6444	0.01	41	41	41	0.759	suspect						
35093201460000	269HNTN	8492	8509	3647	3657	3657	845	0.43	2598	3392	3392	0.928		multi-zn	L	l		FmR	OK
35093201460000	269HNTN	8512	8556	3753	3753	3753	1004	0.44	595	3528	3528	0.940		multi-zn	H	h	Y	FmR	OK
35093201540000	269HNTN	9151	9233	3925	3913	3925	1008	0.43	920	1251	1251	0.319					Y	FmR	OK
35093201600000	269HNTN	9050	9120	1654	1011	1654	-4215	0.18	165	197	197	0.119	tight	multi-zn	L	h			
35093201600000	269HNTN	8619	8630	1360	637	1360	-4357	0.16	167	40	167	0.123	tight	multi-zn	H	l			
35093201670000	269HNTN	7595	7620	1293	1130	1293	-3557	0.17	82	82	82	0.063	tight						
35093201710000	269HNTN	8050	8073	3374	3345	3374	346	0.42	277	248	277	0.082	tight	multi-zn	L	h		FmR	OK
35093201710000	269HNTN	8026	8046	86	66	86	-6698	0.01	50	50	50	0.581	suspect	multi-zn	H	l			
35093201800000	269HNTN	8575	8635		3778	3778	856	0.44	3555	3555	3555	0.941						FmR	No ISIP
35093201830000	269HNTN	7515	7770	2951	2007	2951	-118	0.38	23	33	33	0.011	tight						
35093201870000	269HNTN	9094	9120	3914	3914	3914	933	0.43	386	3875	3875	0.990						FmR	OK
35093201880000	269HNTN	8056	8256	2441	2896	2896	-732	0.35	203	203	203	0.070	tight						
35093202010000	269HNTN	8609	8623	2638	2591	2638	-1597	0.31	25	15	25	0.009	tight	multi-zn	L	h			
35093202010000	269HNTN	8610	8648	177	2628	2628	-1643	0.30	44	44	44	0.017	tight	multi-zn	H	l			
35093202040000	269HNTN	8678	8690	3750	3763	3763	822	0.43	419	419	419	0.111	tight						
35093202120000	269HNTN	7946	8272	228	457	457	-6131	0.06	269	269	269	0.589	suspect						
35093202130001	269HNTN	9445	9488	4077	4077	4077	1048	0.43	566	1422	1422	0.349					Y	FmR	OK

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35093202180000	-98.48459	36.21309	ASHLAND OI	MARTENS-A	1	OKEENE NW	MAJOR	N020	W012	16	1376	KB	19680312	8830	D&A-O	
35093202250000	-98.41887	36.17671	NATOL PETR	DAN SMITH	1	OKEENE NW	MAJOR	N020	W011	30	1289	KB	19680719	8900	D&A-G	
35093202380000	-98.64692	36.30235	HUNT H L E	STATE 13	2	UNNAMED	MAJOR	N021	W014	13	1593	KB	19681002	9155	OIL	404RDFK
35093202380000	-98.64692	36.30235	HUNT H L E	STATE 13	2	UNNAMED	MAJOR	N021	W014	13	1593	KB	19681002	9155	OIL	404RDFK
35093202390000	-98.72949	36.23515	NATOL PETR	THOMPSON U	1	UNNAMED	MAJOR	N020	W014	6	1763	DF	19681025	10080	OIL	404RDFK
35093202520000	-98.54007	36.22193	CLEARY PET	SCHOEPPEL	1-12	UNNAMED	MAJOR	N020	W013	12	1551	KB	19681125	9060	GAS	354CSTR
35093202520000	-98.54007	36.22193	CLEARY PET	SCHOEPPEL	1-12	UNNAMED	MAJOR	N020	W013	12	1551	KB	19681125	9060	GAS	354CSTR
35093202590000	-98.77072	36.4397	BLAIK OIL	INMAN "A"	1	CAMPBELL E	MAJOR	N023	W015	26	1347	KB	19681116	8180	D&A-G	
35093202590000	-98.77072	36.4397	BLAIK OIL	INMAN "A"	1	CAMPBELL E	MAJOR	N023	W015	26	1347	KB	19681116	8180	D&A-G	
35093202850000	-98.5131	36.35488	CHAMPLIN J	HIEBERT	1	RINGWOOD	MAJOR	N022	W012	29	1282	KB	19690127	8154	GAS	269HNTN
35093202980000	-98.80218	36.43225	BLAIK OIL	MEE	1	CAMPBELL E	MAJOR	N023	W015	33	1388	KB	19690325	7959	OIL	269HNTN
35093203000000	-98.35494	36.22242	CAYMAN COR	ELMER BOEH	1-T	OKEENE NW	MAJOR	N020	W011	10	1322	DF	19690210	8633	GAS	354MNNGZ
35093203040000	-98.12393	36.2081	BASIN PETR	CRAWFORD	14-1	SOONER TREN	MAJOR	N020	W009	14	1239	DF	19690218	8201	OIL	359MSSP
35093203070000	-98.33426	36.41079	KIRKPATRIC	CRAWFORD	1	RINGWOOD	MAJOR	N022	W011	1	1363	KB	19690312	7640	OIL	269HNTN
35093203090000	-98.83786	36.43936	WOODS PET	BARNES-FED	1	CAMPBELL E	MAJOR	N023	W015	30	1550	DF	19690306	8223	D&A-O	
35093203260000	-98.68217	36.31317	WHITEMAN I	R PARKER /	1	UNNAMED	MAJOR	N021	W014	10	1474	KB	19690705	9066	OIL	353MRMC
35093203310000	-98.45482	36.29137	CHAMPLIN P	ALICE HEFF	1	RINGWOOD	MAJOR	N021	W012	14	1250	DF	19690811	8365	GAS	354MNNGU
35093203350000	-98.73954	36.42515	PAN AMERIC	INMAN UNIT	1	TOGO E	MAJOR	N023	W014	31	1347	KB	19690707	8225	GAS	269HNTN
35093203520000	-98.18548	36.23686	WHITE SHIE	FULLER	5-1	AMES SE	MAJOR	N020	W009	5	1202	DF	19700126	8400	GAS	269HNTN
35093203600000	-98.7751	36.4433	BLAIK OIL	SUSAN	1	CAMPBELL E	MAJOR	N023	W015	26	1338	KB	19690826	8015	OIL	359MSSP
35093203620000	-98.85934	36.45031	DUNCAN WAL	VALENTINE	1	UNNAMED	MAJOR	N023	W016	24	1430	DF	19690814	8267	GAS	359MSSP
35093203630000	-98.87735	36.43058	KING RESOU	BARNES	1-35	UNNAMED	MAJOR	N023	W016	35	1611	KB	19690803	8728	GAS	269HNTN
35093203770000	-98.31572	36.30978	SUN OIL	JOHN NICHO	1	RINGWOOD	MAJOR	N021	W010	7	1227	KB	19690908	8130	D&A-G	
35093203860000	-98.61712	36.37204	ANADARKO P	HUBBLE /A/	1	ROSCOE NW	MAJOR	N022	W013	20	1310	DF	19691211	8301	2 GAS	354MSSPU
35093203870000	-98.72248	36.4252	PAN AMERIC	BROWN UNIT	1	TOGO E	MAJOR	N023	W014	32	1326	KB	19691017	8250	D&A-O	
35093203900000	-98.83077	36.27176	MAY PET	RUMSEY	1	WILDCAT	MAJOR	N021	W015	29	1733	KB	19691019	9960	D&A-G	
35093204080000	-98.61605	36.38555	SHENANDOAH	ALBERT JES	1	ROSCOE NW	MAJOR	N022	W013	17	1297	KB	19700202	8180	OIL	353MRMC
35093204080000	-98.61605	36.38555	SHENANDOAH	ALBERT JES	1	ROSCOE NW	MAJOR	N022	W013	17	1297	KB	19700202	8180	OIL	353MRMC
35093204130000	-98.2516	36.22736	SUPERIOR O	COLLEY UNI	1	RINGWOOD	MAJOR	N020	W010	10	1163	KB	19700110	8270	GAS	269HNTN
35093204180000	-98.77522	36.43241	ANADARKO P	BANE	B-1	CAMPBELL E	MAJOR	N023	W015	35	1355	DF	19700111	8250	OIL	269HNTN
35093204190000	-98.81553	36.43346	SARKEYS IN	ANGELL	1	CAMPBELL E	MAJOR	N023	W015	33	1479	DF	19691224	8354	D&A	
35093204280000	-98.77075	36.43242	HIBBERT R	RW INMAN E	1	CAMPBELL E	MAJOR	N023	W015	35	1345	KB	19700318	8144	OIL	269HNTN
35093204310000	-98.15092	36.21164	DIAMOND SH	CAROLYN SU	1	AMES SE	MAJOR	N020	W009	15	1231	KB	19700306	8313	OIL	359MSSP
35093204360000	-98.91277	36.46842	CAYMAN COR	EBY	1	CAMPBELL NW	MAJOR	N023	W016	16	1480	KB	19700310	8286	GAS	359MSSP
35093204500000	-98.19607	36.29865	BARRETT DR	CHARLES RI	1	RINGWOOD	MAJOR	N021	W009	18	1262	KB	19700319	8175	D&A	
35093204540000	-98.17366	36.29866	VIERSEN &	FARBER	1	RINGWOOD	MAJOR	N021	W009	16	1298	KB	19700325	8073	D&A	
35093204570000	-98.57298	36.20656	CLARK CANA	RANDOLPH	1	DANE	MAJOR	N020	W013	15	1674	KB	19700410	9714	D&A-G	
35093204590000	-98.7524	36.42569	PAN AMERIC	SLATER UNI	1	TOGO E	MAJOR	N023	W015	36	1360	KB	19700520	8250	OIL	269HNTN
35093204610000	-98.85911	36.48269	OSBORN W B	JACQUITH	1	UNNAMED	MAJOR	N023	W016	12	1407	DF	19700504	8057	GAS	359MSSP
35093204670000	-98.16539	36.22812	TENNECO OI	R C SUIT U	1-9	AMES SE	MAJOR	N020	W009	9	1221	KB	19700427	8452	D&A	
35093204680000	-98.93559	36.46857	CAYMAN COR	WADKINS	1	CAMPBELL NW	MAJOR	N023	W016	17	1549	KB	19701210	8410	D&A-O	
35093204680000	-98.93559	36.46857	CAYMAN COR	WADKINS	1	CAMPBELL NW	MAJOR	N023	W016	17	1549	KB	19701210	8410	D&A-O	
35093204700000	-98.41031	36.43592	EL PASO NA	PATTERSON	1	RINGWOOD	MAJOR	N023	W011	30	1349	KB	19700610	7672	2 OIL	269HNTN

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35093202180000	269HNTN	8685	8698	749	794	794	-5614	0.09	23	46	46	0.058	tight						
35093202250000	269HNTN	8648	8662	3930	3914	3930	1079	0.45	2846	3903	3903	0.993					Y	FmR	OK
35093202380000	269HNTN	8610	8720	2248	1674	2248	-2293	0.26	148	120	148	0.066	tight	multi-zn	L	h			
35093202380000	269HNTN	8735	8760	894	485	894	-5244	0.10	167	139	167	0.187	tight	multi-zn	H	l			
35093202390000	269HNTN	9566	9591	1530	1480	1530	-4538	0.16		990	990	0.647							
35093202520000	269HNTN	8934	8951	3892	3749	3892	970	0.43	89	320	320	0.082	tight	multi-zn	H	l	Y	FmR	OK
35093202520000	269HNTN	8905	8916	3097	1912	3097	-705	0.35	171	171	171	0.055	tight	multi-zn	L	h			
35093202590000	269HNTN	7931	7971	2508	3367	3367	617	0.42	296	457	457	0.136	tight	multi-zn	L	h			
35093202590000	269HNTN	7920	7930	992	1520	1520	-3314	0.19	372	372	372	0.245	tight	multi-zn	H	l			
35093202850000	269HNTN	7868	7998	2931	2885	2931	-411	0.37	445	472	472	0.161	tight					FmR	OK
35093202980000	269HNTN	7955	7959	3017	2448	3017	-83	0.38	21	21	21	0.007	tight					FmR	OK
35093203000000	269HNTN	8321	8360		158	158	-6698	0.02	39	57	57	0.361	suspect						
35093203040000	269HNTN	8038	8201	411	654	654	-5558	0.08	131	131	131	0.200	tight						
35093203070000	269HNTN	7608	7640	737	737	737	-4692	0.10	63	63	63	0.085	tight						
35093203090000	269HNTN	8135	8169	2260	2195	2260	-1759	0.28	146	171	171	0.076	tight						
35093203260000	269HNTN	8676	8704	3705	3705	3705	738	0.43	303	606	606	0.164	tight					FmR	OK
35093203310000	269HNTN	8070	8120	382	678	678	-5412	0.08	22	61	61	0.090	tight						
35093203350000	269HNTN	7964	7981	3527	3527	3527	951	0.44	105	421	421	0.119	tight				Y	FmR	OK
35093203520000	269HNTN	8144	8146	2832	2832	2832	-854	0.35	320	445	445	0.157	tight					FmR	OK
35093203600000	269HNTN	7920	7927		1371	1371	-3641	0.17	189	443	443	0.323							
35093203620000	269HNTN	8056	8066	3274	3188	3274	405	0.41	22		22	0.007	tight					FmR	OK
35093203630000	269HNTN	8344	8372	3591	3549	3591	962	0.43	929	1420	1420	0.395					Y	FmR	OK
35093203770000	269HNTN	7838	8130		2782	2782	-920	0.34	454	494	494	0.178	tight						
35093203860000	269HNTN	7888	8000	145	183	183	-6296	0.02	43	81	81	0.443	suspect						
35093203870000	269HNTN	7927	8250	3421	3421	3421	433	0.41	108	367	367	0.107	tight						
35093203900000	269HNTN	9542	9560	4923	4152	4923	2760	0.51	822	809	822	0.167	tight						
35093204080000	269HNTN	8060	8180	3457	3559	3559	771	0.44	91	206	206	0.058	tight	multi-zn	L	h		FmR	OK
35093204080000	269HNTN	7875	7920	3259	3425	3425	743	0.43	222	273	273	0.080	tight	multi-zn	H	l	YD	FmR	OK
35093204130000	269HNTN	8081	8112	3581	3341	3581	752	0.44	2522	3004	3004	0.839					Y	FmR	OK
35093204180000	269HNTN	7942	7953	3422	3422	3422	761	0.43	830	1091	1091	0.319						FmR	OK
35093204190000	269HNTN	7911	8059	3382	3336	3382	693	0.42	246	434	434	0.128	tight					FmR	OK
35093204280000	269HNTN	7951	7962	3382	3382	3382	656	0.42	351	701	701	0.207	tight					FmR	OK
35093204310000	269HNTN	7984	8305	230	768	768	-5422	0.09	66	66	66	0.086	tight						
35093204360000	269HNTN	8172	8280	3649	3521	3649	1047	0.44	232	142	232	0.064	tight				Y	FmR	OK
35093204500000	269HNTN	7980	8175	833	279	833	-5122	0.10	65	65	65	0.078	tight						
35093204540000	269HNTN	7972	8073	371	232	371	-5977	0.05	64	64	64	0.173	tight						
35093204570000	269HNTN	9212	9225	3923	3923	3923	886	0.43	3923	3923	3923	1.000						FmR	OK
35093204590000	269HNTN	7988	8002	1891	1656	1891	-2575	0.24	47	82	82	0.043	tight						
35093204610000	269HNTN	7874	8057	2742	2422	2742	-753	0.34	281	325	325	0.119	tight						
35093204670000	269HNTN	8246	8290	2865	2865	2865	-908	0.35	843	1766	1766	0.616						FmR	OK
35093204680000	269HNTN	8253	8280	1162	1213	1213	-4122	0.15	21	21	21	0.017	tight	multi-zn	L	h			
35093204680000	269HNTN	8284	8310	1060	1209	1209	-4161	0.15	65	65	65	0.054	tight	multi-zn	H	l			
35093204700000	269HNTN	7487	7672		3027	3027	187	0.39	1067	794	1067	0.352					YD	FmR	No ISIP

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35093204740000	-98.35717	36.17772	TENNECO OI	R O BOZELL	1	OKEENE NW	MAJOR	N020	W011	27	1219	KB	19700713	8944	D&A-O	
35093204810000	-98.60041	36.38017	ANADARKO P	GARD	A1-1	ROSCOE NW	MAJOR	N022	W013	16	1300	DF	19700813	8220	2 GAS	354CSTR
35093205170000	-98.47765	36.21293	JONES & PE	WAHL	1	OKEENE NW	MAJOR	N020	W012	16	1350	GR	19711201	8864	D&A-G	
35093205210000	-98.55845	36.22553	FERGUSON O	LOVELL	1	OKEENE NW	MAJOR	N020	W013	11	1631	GR	19710121	9141	GAS	354CSTR
35093205210000	-98.55845	36.22553	FERGUSON O	LOVELL	1	OKEENE NW	MAJOR	N020	W013	11	1631	GR	19710121	9141	GAS	354CSTR
35093205320000	-98.3038	36.19194	RODMAN COR	EDDIE METZ	1	STAR	MAJOR	N020	W010	19	1181	KB	19710801	8620	OIL	404OSWG
35093205360000	-98.3945	36.32756	LVO CORP	COPPOCK H	1	RINGWOOD	MAJOR	N021	W011	5	1256	KB	19701217	8000	D&A	
35093205370000	-98.78687	36.3961	CAYMON COR	GRAHAM	1	TOGO S	MAJOR	N022	W015	10	1396	KB	19710125	8578	D&A-O	
35093205390000	-98.52196	36.32409	CLEARY PET	WICHERT	1-6	UNNAMED	MAJOR	N021	W012	6	1308	DF	19710420	8388	2 GAS	354MNNG
35093205410000	-98.78875	36.42506	HELMERICH	INMAN	1	CAMPBELL E	MAJOR	N023	W015	34	1379	KB	19710120	8251	OIL	269HNTN
35093205410000	-98.78875	36.42506	HELMERICH	INMAN	1	CAMPBELL E	MAJOR	N023	W015	34	1379	KB	19710120	8251	OIL	269HNTN
35093205410000	-98.78875	36.42506	HELMERICH	INMAN	1	CAMPBELL E	MAJOR	N023	W015	34	1379	KB	19710120	8251	OIL	269HNTN
35093205860000	-98.6465	36.35298	ASHLAND OI	BYFIELD	1-25	CHEYENNE VA	MAJOR	N022	W014	25	1358	KB	19710625	8510	GAS	359MSSP
35093205950000	-98.54318	36.2789	PUBLISHERS	MCGEE	1	WILDCAT	MAJOR	N021	W013	24	1416	KB	19710809	8760	2 GAS	354CSTR
35093206260000	-98.68641	36.33424	TENNECO OI	E C V L H	4-2	CHEYENNE VA	MAJOR	N022	W014	34	1492	KB	19711018	8689	1O&1W	269HNTN
35093206360000	-98.54205	36.29339	SNEE & EBE	MARTENS	1	ROSCOE	MAJOR	N021	W013	13	1354	KB	19711202	8650	OIL	353MRMC
35093206450000	-98.64755	36.17915	EASON OIL	EVERETT O	1	WILDCAT	MAJOR	N020	W014	25	1693	DF	19720320	10115	D&A-O	
35093206480000	-98.20057	36.29862	BLAIK OIL	RICE	1	RINGWOOD	MAJOR	N021	W009	18	1268	KB	19720418	8120	OIL	269HNTN
35093206560000	-98.69554	36.32366	TENNECO OI	U S A	3-4	CHEYENNE VA	MAJOR	N021	W014	4	1645	KB	19711230	8882	D&A	
35093206760000	-98.89529	36.2368	CLARK CANA	DVORAK	1	SEILING NE	MAJOR	N020	W016	3	1847	KB	19720421	10620	OIL	354CSTR
35093206870000	-98.57361	36.37218	KIRKPATRIC	SMITH-JORD	1	ROSCOE NW	MAJOR	N022	W013	22	1339	KB	19720708	8216	OIL	
35093207150000	-98.40119	36.28421	BLAIK OIL	HUGHES UNI	1	RINGWOOD	MAJOR	N021	W011	20	1217	KB	19720918	8257	2 GAS	404RDFK
35093207230000	-98.56456	36.38033	KIRKPATRIC	KLIEWER	1-14	ROSCOE NW	MAJOR	N022	W013	14	1310	KB	19720827	8108	D&A-G	
35093207260000	-98.57378	36.38027	KIRKPATRIC	KLIEWER	1-15	ROSCOE NW	MAJOR	N022	W013	15	1315	KB	19721106	8153	GAS	
35093207260000	-98.57378	36.38027	KIRKPATRIC	KLIEWER	1-15	ROSCOE NW	MAJOR	N022	W013	15	1315	KB	19721106	8153	GAS	
35093207400000	-98.89839	36.43696	ZOLLER-DAN	HARMON	1	CEDARDALE N	MAJOR	N023	W016	27	1604	KB	19721205	8600	GAS	269HNTN
35093207730000	-98.20044	36.2615	GETTY OIL	H G DITTME	1	RINGWOOD	MAJOR	N021	W009	30	1211	GR	19730215	8350	GAS	269HNTN
35093207730000	-98.20044	36.2615	GETTY OIL	H G DITTME	1	RINGWOOD	MAJOR	N021	W009	30	1211	GR	19730215	8350	GAS	269HNTN
35093207770000	-98.54286	36.23308	BONRAY OIL	KUSCH	1	DANE	MAJOR	N020	W013	1	1533	KB	19730324	9100	GAS	269HNTN
35093207770000	-98.54286	36.23308	BONRAY OIL	KUSCH	1	DANE	MAJOR	N020	W013	1	1533	KB	19730324	9100	GAS	269HNTN
35093207810000	-98.74728	36.42933	FERGUSON O	INMAN	1	CAMPBELL E	MAJOR	N023	W015	36	1347	KB	19730209	8202	D&A	
35093207970000	-98.79331	36.42504	HELMERICH	INMAN /A/	1	CAMPBELL E	MAJOR	N023	W015	34	1393	KB	19731009	8255	OIL	269HNTN
35093208060000	-98.20044	36.26972	GETTY OIL	G UMDENSTO	1	RINGWOOD	MAJOR	N021	W009	30	1223	GR	19730520	8291	D&A-G	
35093208770000	-98.80613	36.42492	HELMERICH	DOOLIN	1	CAMPBELL E	MAJOR	N023	W015	33	1562	KB	19731228	8245	D&A-O	
35093209010000	-98.44773	36.22184	PETROLEUM	DAVIS	1	OKEENE NW	MAJOR	N020	W012	11	1317	KB	19740214	8741	D&A-O	
35093209010000	-98.44773	36.22184	PETROLEUM	DAVIS	1	OKEENE NW	MAJOR	N020	W012	11	1317	KB	19740214	8741	D&A-O	
35093209070000	-98.79329	36.42141	HELMERICH	BOUSE	1	CAMPBELL E	MAJOR	N023	W015	34	1397	KB	19740305	8158	D&A-O	
35093209070000	-98.79329	36.42141	HELMERICH	BOUSE	1	CAMPBELL E	MAJOR	N023	W015	34	1397	KB	19740305	8158	D&A-O	
35093209320000	-98.72698	36.42337	MARLIN OIL	JUDD	1	CHEYENNE VA	MAJOR	N023	W014	32	1330	GR	19750506	8215	2 OIL	359MSSP
35093209530000	-98.59802	36.33842	CLINTON OI	JORDAN	1	CHEYENNE VA	MAJOR	N022	W013	33	1419	KB	19750522	8600	OIL	359MSSP
35093209560000	-98.63538	36.27903	TEXAS O&G	SCHOEPPEL	1	DANE	MAJOR	N021	W013	19	1458	KB	19741130	8788	OIL	354CSTR
35093209690000	-98.2362	36.26335	FRENCH L R JR	DETRICK /B/	2	RINGWOOD	MAJOR	N021	W010	26	1233	DF	19741105	8510	D&A-OG	
35093210100000	-98.83734	36.2428	PIONEER PR	JELLISON	1-6	SEILING NE	MAJOR	N020	W015	6	1866	KB	19750518	10340	2 GAS	354CSTR

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35093204740000	269HNTN	8510	8540	66	50	66	-7179	0.01					tight						
35093204810000	269HNTN	8070	8220	3557	3582	3582	783	0.44	185	261	261	0.073	tight						
35093205170000	269HNTN	8593	8685	3903	3773	3903	1059	0.45	1444	1930	1930	0.494					Y	FmR	OK
35093205210000	269HNTN	8993	9005	3789	3888	3888	987	0.43	1214	1235	1235	0.318		multi-zn	H	h			
35093205210000	269HNTN	9003	9020		3483	3483	101	0.39	90	108	108	0.031	tight	multi-zn	L	l			
35093205320000	269HNTN	8234	8240	3503	3319	3503	474	0.43	148	260	260	0.074	tight					FmR	OK
35093205360000	269HNTN	7878	7894	1981	1184	1981	-2378	0.25	83	145	145	0.073	tight						
35093205370000	269HNTN	8264	8286		1928	1928	-2744	0.23	43	43	43	0.022	tight						
35093205390000	269HNTN	8254	8388	3532	3532	3532	516	0.42	184	230	230	0.065	tight						
35093205410000	269HNTN	7963	7997	2382	2433	2433	-1386	0.30	185	223	223	0.092	tight	multi-zn	M	m			
35093205410000	269HNTN	7960	7979	2394	2624	2624	-957	0.33	95	108	108	0.041	tight	multi-zn	L	h			
35093205410000	269HNTN	7803	7968	2101	2228	2228	-1798	0.28	210	223	223	0.100	tight	multi-zn	H	l			
35093205860000	269HNTN	8168	8184	3542	3442	3542	791	0.43	44	81	81	0.023	tight				Y	FmR	OK
35093205950000	269HNTN	8460	8468	3650		3650	797	0.43	82	539	539	0.148	tight				Y	FmR	No FSIP
35093206260000	269HNTN	8612	8620	2135	2020	2135	-2537	0.25	566	1204	1204	0.564						FmR	OK
35093206360000	269HNTN	8323	8339	2104	2749	2749	-1073	0.33	16	32	32	0.012	tight						
35093206450000	269HNTN	9540	9611	4138	4100	4138	981	0.43	2786	3972	3972	0.960					Y	FmR	OK
35093206480000	269HNTN	7937	7990	164	108	164	-6369	0.02	65	77	77	0.470	suspect						
35093206560000	269HNTN	8590	8700	3550	3575	3575	633	0.41	1067	3550	3550	0.993						FmR	OK
35093206760000	269HNTN	10335	10480	4479	4499	4499	1042	0.43	3072	4499	4499	1.000					Y	FmR	OK
35093206870000	269HNTN	7976	8005	3437	3437	3437	725	0.43	13	19	19	0.006	tight					FmR	OK
35093207150000	269HNTN	7900	7973	1549	1771	1771	-2947	0.22	111	148	148	0.084	tight						
35093207230000	269HNTN	8018	8037	3463	3437	3463	720	0.43	1502	3306	3306	0.955						FmR	OK
35093207260000	269HNTN	7905	7914	3236	3358	3358	623	0.42	1376	1307	1376	0.410		multi-zn	H	l		FmR	OK
35093207260000	269HNTN	7902	7914	3462	3410	3462	846	0.44	142	638	638	0.184	tight	multi-zn	L	h	Y	FmR	OK
35093207400000	269HNTN	8362	8600	2617	3346	3346	200	0.39	138	231	231	0.069	tight						
35093207730000	269HNTN	8128	8178	3359	3345	3359	257	0.41	190	112	190	0.057	tight	multi-zn	L	h			
35093207730000	269HNTN	8176	8265	431	1583	1583	-3650	0.19	99	89	99	0.063	tight	multi-zn	H	l			
35093207770000	269HNTN	8767	8864	3817	3825	3825	895	0.43	221	304	304	0.079	tight	multi-zn	H	h	YD	FmR	OK
35093207770000	269HNTN	9010	9031	2149	2678	2678	-1739	0.30	44	44	44	0.016	tight	multi-zn	L	l			
35093207810000	269HNTN	7927	7936	54	214	214	-6129	0.03	54	511	511	2.388	suspect						
35093207970000	269HNTN	7850	7991	2624	2667	2667	-863	0.33	436	914	914	0.343						FmR	OK
35093208060000	269HNTN	8165	8291	484	540	540	-5907	0.07	234	261	261	0.483							
35093208770000	269HNTN	8169	8177	2859	2823	2859	-467	0.35	273	409	409	0.143	tight						
35093209010000	269HNTN	8661	8741	3849	3849	3849	853	0.44	3849	3849	3849	1.000		multi-zn	H	h		FmR	OK
35093209010000	269HNTN	8440	8520	611	658	658	-5788	0.08	188	188	188	0.286	tight	multi-zn	L	l			
35093209070000	269HNTN	7846	8025	3079	3079	3079	-6	0.38	244	380	380	0.123	tight	multi-zn	L	h	YD	FmR	OK
35093209070000	269HNTN	8012	8022	2972	3015	3015	-141	0.38	198	396	396	0.131	tight	multi-zn	H	l		FmR	OK
35093209320000	269HNTN	7835	8045	2148	2126	2148	-2096	0.27	77	152	152	0.071	tight						
35093209530000	269HNTN	8225	8300	260	411	411	-5997	0.05	93	93	93	0.226	tight						
35093209560000	269HNTN	8650	8788	905	1874	1874	-3300	0.21	99	124	124	0.066	tight						
35093209690000	269HNTN	8250	8510	2422	2400	2422	-2068	0.28	680	725	725	0.299	tight				YD	FmR	OK
35093210100000	269HNTN	9980	10082	4065	4065	4065	526	0.40	943	1620	1620	0.399		multi-zn	H	l	YD	FmR	OK

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35093210100000	-98.83734	36.2428	PIONEER PR	JELLISON	1-6	SEILING NE	MAJOR	N020	W015	6	1866	KB	19750518	10340	2 GAS	354CSTR
35093210250000	-98.83621	36.22697	PIONEER PR	MARTIN	1-7	SEILING NE	MAJOR	N020	W015	7	1823	KB	19750523	10438	GAS	269HNTN
35093210420000	-98.84019	36.25005	ASHLAND OI	V FOUTTY	1-31	SEILING NE	MAJOR	N021	W015	31	1832	KB	19751008	10250	OIL	354CSTRB
35093210420000	-98.84019	36.25005	ASHLAND OI	V FOUTTY	1-31	SEILING NE	MAJOR	N021	W015	31	1832	KB	19751008	10250	OIL	354CSTRB
35093210570000	-98.8269	36.22684	PIONEER PR	MARTIN	1-8	SEILING NE	MAJOR	N020	W015	8	1809	KB	19751116	10383	D&A-O	
35093211260000	-98.16841	36.21334	DYCO PET	MUNKRES	1-A	RINGWOOD	MAJOR	N020	W009	16	1209	GR	19760417	8360	OIL	269HNTN
35093211260000	-98.16841	36.21334	DYCO PET	MUNKRES	1-A	RINGWOOD	MAJOR	N020	W009	16	1209	GR	19760417	8360	OIL	269HNTN
35093211350000	-98.8097	36.24119	TEXAS O&G	BOEHS	1	SEILING NE	MAJOR	N020	W015	4	1811	KB	19760428	10211	D&A-O	
35093211590000	-98.82725	36.24068	PIONEER PR	RUMSEY	1-5	SEILING NE	MAJOR	N020	W015	5	1846	KB	19761114	10300	OIL	354CSTR
35093211740000	-98.64201	36.34937	ASHLAND OI	BYFIELD	2-25	CHEYENNE VA	MAJOR	N022	W014	25	1356	KB	19761022	8541	GAS	269HNTN
35093212650000	-98.80952	36.22722	RAMBLER OI	RUMSEY	1-9	ORION SE	MAJOR	N020	W015	9	1805	KB	19770620	10300	GAS	269HNTN
35093212780000	-98.4315	36.35905	UNION TEXA	GLIDEWELL-	2	RINGWOOD	MAJOR	N022	W012	25	1224	KB	19770814	8000	GAS	359MSSP
35093213450000	-98.81838	36.22716	PIONEER PR	HURT	1-8	SEILING NE	MAJOR	N020	W015	8	1832	KB	19780227	10350	GAS	353MRMC
35093213880000	-98.33708	36.21895	ELDER & VA	NIGHTENGAL	1	RINGWOOD	MAJOR	N020	W011	11	1299	DF	19780322	8600	OIL	354MNNG
35093214250000	-98.84812	36.49543	OSBORN W B	JAQUITH	2	CAMPBELL E	MAJOR	N023	W015	6	1366	KB	19780712	8020	GAS	353MRMC
35093215460000	-98.33143	36.18009	RESOURCES	BIERIG	1	OKEENE NW	MAJOR	N020	W011	25	1185	GR	19781123	8616	D&A	
35093216140000	-98.46093	36.22017	RESOURCES	DAVIS	1	OKEENE NW	MAJOR	N020	W012	10	1343	KB	19790611	8730	OIL	269HNTN
35093216520000	-98.46092	36.22651	RESOURCES	KARBER	1-10	OKEENE NW	MAJOR	N020	W012	10	1334	GR	19790430	8680	D&A-G	
35093217760000	-98.44212	36.22452	FERGUSON O&G	EMMA	1	OKEENE NW	MAJOR	N020	W012	11	1308	KB	19791220	8760	OIL	269HNTN
35093218010000	-98.45656	36.23283	TEXAS O&G	FAST B	1	OKEENE NW	MAJOR	N020	W012	2	1318	KB	19800215	8700	GAS	269HNTN
35093220370000	-98.45436	36.21557	OLD DOMINI	AL-KAR FAR	1	OKEENE NW	MAJOR	N020	W012	14	1324	KB	19811107	8725	GAS	404RDFK
35093220710000	-98.44661	36.22819	ENNEX PROD	E-D	1	OKEENE NW	MAJOR	N020	W012	11	1312	KB	19810426	8700	GAS	269HNTN
35093231070000	-98.83225	36.43848	WALKER COR	BARNES LIL	1	CAMPBELL	MAJOR	N023	W015	29	1457	GR	19860310	8352	OIL	269HNTN
35093300170000	-98.51936	36.19657	PAN AMERIC	MC DONALD	1	OKEENE NW	MAJOR	N020	W012	19	1454	KB	19651007	9424	GAS	403ATOK
35093300440000	-98.25384	36.39558	HODGE T F	A P RUTH-A	1	RINGWOOD NE	MAJOR	N022	W010	10	1314	DF	19650304	7680	OIL	359MSSP
35093300700000	-98.41468	36.41437	CLEARY PET	FICKEL	1	RINGWOOD	MAJOR	N022	W011	6	1328	KB	19651028	7755	1O&3G	404OSWG
35093300700000	-98.41468	36.41437	CLEARY PET	FICKEL	1	RINGWOOD	MAJOR	N022	W011	6	1328	KB	19651028	7755	1O&3G	404OSWG
35093300700000	-98.41468	36.41437	CLEARY PET	FICKEL	1	RINGWOOD	MAJOR	N022	W011	6	1328	KB	19651028	7755	1O&3G	404OSWG
35093300760000	-98.43217	36.41119	ASHLAND OIL	CLEO SPRINGS	1	RINGWOOD	MAJOR	N022	W012	1	1284	DF	19651202	7768	4 GAS	404OSWG
35093300820001	-98.41484	36.42506	LIVINGSTON	BURK	1-31	CLEO NE	MAJOR	N023	W011	31	1327	KB	19650901	7666	OIL-W	404OSWG
35093301240000	-98.1688	36.20839	BLACKSTOCK H L	HAND	1	AMES SE	MAJOR	N020	W009	16	1222	KB	19650506	8690	1O&1G	359MSSP
35093301440000	-98.49089	36.36749	EARLSBORO	KROUSE UNI	1	RINGWOOD	MAJOR	N022	W012	21	1265	DF	19660120	8130	GAS	404RDFK
35093301450000	-98.73607	36.4142	JENNINGS P	INMAN	1	TOGO E	MAJOR	N022	W014	6	1360	DF	19660303	8356	GAS	404OSWGL
35093301650000	-98.42833	36.42503	CLEARY PET	STORY	1	RINGWOOD	MAJOR	N023	W012	36	1296	DF	19650909	7692	2 GAS	404OSWG
35093301750000	-98.16432	36.19741	MAYFLO OIL	LULA M MYE	1-21	AMES SE	MAJOR	N020	W009	21	1217	DF	19660214	8340	OIL	359MSSP
35093301830000	-98.79327	36.43688	HIBBERT R E	INMAN	1	CAMPBELL	MAJOR	N023	W015	27	1383	DF	19660510	8000	OIL	269HNTN
35093301910000	-98.9132	36.40388	SAMEDAN OI	MANZELMAN	1	CEDARDALE N	MAJOR	N022	W016	9	1653	GR	19650923	8544	D&A	
35093302030000	-98.83335	36.43232	PAN AMERIC	BARNES UNI	1	CAMPBELL E	MAJOR	N023	W015	32	1649	DF	19650902	8425	D&A-O	
35093302150000	-98.16783	36.22228	DAVIDOR &	M LENHENBA	1	AMES SE	MAJOR	N020	W009	9	1219	KB	19650916	8393	OIL	359MSSP
35093302340000	-98.15076	36.19529	FERGUSON O	GREGORY	1	AMES SE	MAJOR	N020	W009	22	1223	KB	19660517	8285	D&A	
35093302350000	-98.90381	36.4178	MAYFLO OIL	USA WHEELE	1-3	CEDARDALE N	MAJOR	N022	W016	3	1623	DF	19660217	8560	D&A	
35093302520000	-98.79782	36.43231	PAN AMERIC	U S A INMA	1	CAMPBELL E	MAJOR	N023	W015	34	1397	KB	19650920	8100	OIL	269HNTN
35093303250000	-98.47336	36.37075	NATIONAL C	DIRKS	1	ORIENTA	MAJOR	N022	W012	22	1245	DF	19660906	7940	OIL	353MRMC

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35093210100000	269HNTN	9894	9912	4206	4172	4206	999	0.42	141	141	141	0.034	tight	multi-zn	L	h		FmR	OK
35093210250000	269HNTN	9933	9957	4253	4308	4308	1131	0.43	1418	1708	1708	0.396					Y	FmR	OK
35093210420000	269HNTN	9833	9900	2724	2554	2724	-2210	0.28	844	888	888	0.326		multi-zn	H	l			
35093210420000	269HNTN	9840	9860	3757	2529	3757	52	0.38	826	890	890	0.237	tight	multi-zn	L	h			
35093210570000	269HNTN	9920	9933	3794	3958	3958	388	0.40	129	386	386	0.098	tight						
35093211260000	269HNTN	8080	8140	2186	2186	2186	-2230	0.27	1782	1972	1972	0.902		multi-zn	H	l		FmR	OK
35093211260000	269HNTN	8220	8360	2966	2476	2966	-773	0.35	38	38	38	0.013	tight	multi-zn	L	h		FmR	OK
35093211350000	269HNTN	9559	9690	2153	3348	3348	-679	0.35	150	240	240	0.072	tight						
35093211590000	269HNTN	9850	9894	3120	2538	3120	-1338	0.32	178	151	178	0.057	tight						
35093211740000	269HNTN	8182	8210	1547	2047	2047	-2452	0.25	184	109	184	0.090	tight						
35093212650000	269HNTN	9812	9900	4016		4016	542	0.41	3051	3194	3194	0.795						FmR	No FSIP
35093212780000	269HNTN	7725	7805	2942	2942	2942	-254	0.38	229	2942	2942	1.000						FmR	OK
35093213450000	269HNTN	9874	9930	3954	3930	3954	405	0.40	122	141	141	0.036	tight					FmR	OK
35093213880000	269HNTN	8290	8368	593	857	857	-5226	0.10	184	118	184	0.215	tight						
35093214250000	269HNTN	7764	7877	927	839	927	-4517	0.12	88	66	88	0.095	tight						
35093215460000	269HNTN	8426	8445	212	678	678	-5802	0.08	47	42	47	0.069	tight						
35093216140000	269HNTN	8575	8634	3604	3463	3604	460	0.42	170	317	317	0.088	tight					FmR	OK
35093216520000	269HNTN	8523	8553	1266	1254	1266	-4496	0.15	58	70	70	0.055	tight						
35093217760000	269HNTN	8472	8484	1122	1179	1179	-4641	0.14	494	507	507	0.430							
35093218010000	269HNTN	8474	8544	1102	2634	2634	-1561	0.31					tight						
35093220370000	269HNTN	8553	8563	3635	3699	3699	716	0.43	3624	3699	3699	1.000						FmR	OK
35093220710000	269HNTN	8457	8474	2321	3166	3166	-353	0.37	139	139	139	0.044	tight						
35093231070000	269HNTN	8041	8055	375	395	395	-5749	0.05	103	179	179	0.453	suspect						
35093300170000	269HNTN	8956	8959	4000	4000	4000	1097	0.45				0.000	tight				Y	FmR	OK
35093300440000	269HNTN	7535	7675	1708	531	1708	-2688	0.22	130	464	464	0.272	tight						
35093300700000	269HNTN	7602	7610	2633	2633	2633	-620	0.35					tight	multi-zn		l			
35093300700000	269HNTN	7620	7620	3200	3275	3275	751	0.43					tight	multi-zn		m			
35093300700000		7605	7605	3300	3300	3300	820	0.43					tight	multi-zn		h			
35093300760000	269HNTN	7540	7552		3424	3424	1095	0.45	2930	3373	3373	0.985					Y	FmR	No ISIP
35093300820001	269HNTN	7607	7609	3375	3375	3375	976	0.44					tight						
35093301240000	269HNTN	8094	8125	3300	3300	3300	194	0.41	420	580	580	0.176	tight				Y	FmR	OK
35093301440000	269HNTN	7884	7926	2138	2009	2138	-2063	0.27	78	130	130	0.061	tight						
35093301450000	269HNTN	8050	8356	3480	3391	3480	488	0.42	460	2185	2185	0.628						FmR	OK
35093301650000	269HNTN	7622	7690	3324	3324	3324	754	0.43	232	464	464	0.140	tight				Y	FmR	OK
35093301750000	269HNTN	8135	8148	3248	3240	3248	54	0.40	1200	2619	2619	0.806						FmR	OK
35093301830000	269HNTN	7852	7920		2110	2110	-1999	0.27	248	301	301	0.143	tight				YD	FmR	No ISIP
35093301910000	269HNTN	8460	8522	3079	3002	3079	-247	0.36	1894	2715	2715	0.882						FmR	OK
35093302030000	269HNTN	8268	8300	3527	3478	3527	934	0.42	118	252	252	0.071	tight				Y	FmR	OK
35093302150000	269HNTN	8085	8125	48	30	48	-6803	0.01				0.000	tight						
35093302340000	269HNTN	8104	8134		228	228	-6421	0.03	65	65	65	0.285	tight						
35093302350000	269HNTN	8470	8535	1208	1076	1208	-4314	0.14	945	945	945	0.782							
35093302520000	269HNTN	7953	7956	3700		3700	1398	0.47					tight				Y	FmR	No FSIP
35093303250000	269HNTN	7733	7742	3375	3375	3375	761	0.44	1280	2342	2342	0.694					YD	FmR	OK

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35093355880001	-98.70406	36.34248	HUBER J M	PHILLIPS	3	CHEYENNE VA	MAJOR	N022	W014	33	1461	KB	19720407	8808	OIL-W	269HNTN
35093355980000	-98.89902	36.41144	SUNRAY DX	USA BOESCH	1	CAMPBELL W	MAJOR	N022	W016	3	1659	DF	19600106	8865	D&A	
35093355990000	-98.91815	36.41467	SINCLAIR O	CORA G CAS	1	CAMPBELL W	MAJOR	N022	W016	4	1493	DF	19600120	8595	GAS	269HNTN
35093355990000	-98.91815	36.41467	SINCLAIR O	CORA G CAS	1	CAMPBELL W	MAJOR	N022	W016	4	1493	DF	19600120	8595	GAS	269HNTN
35093355990000	-98.91815	36.41467	SINCLAIR O	CORA G CAS	1	CAMPBELL W	MAJOR	N022	W016	4	1493	DF	19600120	8595	GAS	269HNTN
35093355990000	-98.91815	36.41467	SINCLAIR O	CORA G CAS	1	CAMPBELL W	MAJOR	N022	W016	4	1493	DF	19600120	8595	GAS	269HNTN
35093357160001	-98.38228	36.32504	LVO CORP	COPPOCK /A/	1	RINGWOOD	MAJOR	N021	W011	4	1268	GR	19700605	7969	GAS-WO	269HNTN
35093357190001	-98.42478	36.3049	WESTHOMA O	NIGHTENGAL	1	RINGWOOD	MAJOR	N021	W011	7	1224	DF	19700421	8220	D&AW	
35093357740000	-98.8113	36.44315	PAN AMERIC	MONFORT UN	1	CAMPBELL E	MAJOR	N023	W015	28	1405	KB	19620521	8200	2 OIL	353MRMC
35093357840000	-98.29441	36.38189	CLEARY PET	SPEECE UNI	1	RINGWOOD NW	MAJOR	N022	W010	17	1325	DF	19640522	7790	GAS	354MNNGU
35093358650000	-98.93093	36.41488	SINCLAIR O	LLOYD VICK	1	CAMPBELL W	MAJOR	N022	W016	5	1620	GR	19620629	8748	GAS	269HNTN
35093358670000	-98.91768	36.40028	SINCLAIR O	MANZELMAN	1	CAMPBELL W	MAJOR	N022	W016	9	1645	DF	19621012	8810	GAS	269HNTN
35093358850000	-98.18215	36.21208	BOND ROLAN	MYERS	1	AMES SE	MAJOR	N020	W009	17	1202	DF	19640713	8185	OIL	359MSSP
35093358850000	-98.18215	36.21208	BOND ROLAN	MYERS	1	AMES SE	MAJOR	N020	W009	17	1202	DF	19640713	8185	OIL	359MSSP
35093361010000	-98.81114	36.45405	PAN AMERIC	HUTCHINSON	1	CAMPBELL E	MAJOR	N023	W015	21	1353	DF	19630527	8050	D&A-O	
35093361080000	-98.82379	36.43882	PAN AMERIC	BARNES UNI	2-A	CAMPBELL E	MAJOR	N023	W015	29	1431	KB	19640413	8179	D&A-G	
35093361080000	-98.82379	36.43882	PAN AMERIC	BARNES UNI	2-A	CAMPBELL E	MAJOR	N023	W015	29	1431	KB	19640413	8179	D&A-G	
35093361080000	-98.82379	36.43882	PAN AMERIC	BARNES UNI	2-A	CAMPBELL E	MAJOR	N023	W015	29	1431	KB	19640413	8179	D&A-G	
35093361080000	-98.82379	36.43882	PAN AMERIC	BARNES UNI	2-A	CAMPBELL E	MAJOR	N023	W015	29	1431	KB	19640413	8179	D&A-G	
35093361110000	-98.91767	36.43963	SINCLAIR O	BLANCHE YO	1	CAMPBELL W	MAJOR	N023	W016	28	1506	GR	19621214	8488	D&A-O	
35093361110000	-98.91767	36.43963	SINCLAIR O	BLANCHE YO	1	CAMPBELL W	MAJOR	N023	W016	28	1506	GR	19621214	8488	D&A-O	
35093361120000	-98.94896	36.4292	SINCLAIR O	DANIEL E G	1	CAMPBELL W	MAJOR	N023	W016	31	1676	GR	19630802	8740	GAS	269HNTN
35093500130001	-98.38344	36.41069	CLEARY PET	JETT	1	RINGWOOD	MAJOR	N022	W011	4	1336	KB	19650702	7707	GAS-W	404OSWG
35129201030000	-99.46615	35.88592	MCCULLOCH-	MORGAN ET	1-6	WILDCAT	ROGER ML	N016	W021	6	2252	KB	19700329	17433	D&A-O	
35129201030000	-99.46615	35.88592	MCCULLOCH-	MORGAN ET	1-6	WILDCAT	ROGER ML	N016	W021	6	2252	KB	19700329	17433	D&A-O	
35129201030000	-99.46615	35.88592	MCCULLOCH-	MORGAN ET	1-6	WILDCAT	ROGER ML	N016	W021	6	2252	KB	19700329	17433	D&A-O	
35129201030000	-99.46615	35.88592	MCCULLOCH-	MORGAN ET	1-6	WILDCAT	ROGER ML	N016	W021	6	2252	KB	19700329	17433	D&A-O	
35129201030000	-99.46615	35.88592	MCCULLOCH-	MORGAN ET	1-6	WILDCAT	ROGER ML	N016	W021	6	2252	KB	19700329	17433	D&A-O	
35129201190000	-99.93532	35.7732	FOREST	WILTON EAR	1	WILDCAT	ROGER ML	N015	W026	14	2312	DF	19710704	20181	J&A-G	
35129201280000	-99.60168	35.7786	GASSANADAR	WICKHAM RA	1-13	ROLL SE	ROGER ML	N015	W023	13	2278	DF	19720916	19690	GAS	404MRMN
35129201280000	-99.60168	35.7786	GASSANADAR	WICKHAM RA	1-13	ROLL SE	ROGER ML	N015	W023	13	2278	DF	19720916	19690	GAS	404MRMN
35129201540000	-99.93735	35.70749	MCCULLOCH	GARVER	1-11	WILDCAT	ROGER ML	N014	W026	11	2417	KB	19750423	21755	D&A-G	
35129201770000	-99.46734	35.97285	AMERICAN Q	JIMMY WILS	1-5	PEEK S	ROGER ML	N017	W021	5	2045	KB	19751108	15888	OIL	405CGGV
35129201770000	-99.46734	35.97285	AMERICAN Q	JIMMY WILS	1-5	PEEK S	ROGER ML	N017	W021	5	2045	KB	19751108	15888	OIL	405CGGV
35129201770000	-99.46734	35.97285	AMERICAN Q	JIMMY WILS	1-5	PEEK S	ROGER ML	N017	W021	5	2045	KB	19751108	15888	OIL	405CGGV
35129202810000	-99.46268	35.92388	ARKLA EXPL	HARRELL	1-29	PEEK S	ROGER ML	N017	W021	29	2142	KB	19780724	16800	D&A-G	
35129202810000	-99.46268	35.92388	ARKLA EXPL	HARRELL	1-29	PEEK S	ROGER ML	N017	W021	29	2142	KB	19780724	16800	D&A-G	
35129203130000	-99.45976	35.82308	WOODS PET	G SWITZER	1	LEEDEY SW	ROGER ML	N016	W021	32	2006	KB	19790220	18470	GAS	404RDFK
35151000090001	-98.73912	36.71637	HARPER OIL	BROCKMAN	1	WILDCAT	WOODS	N026	W014	19	1463	KB	19760517	6625	D&AW	
35151000180000	-98.60262	36.54451	AMERADA HE	W H FARRIS	1	OAKDALE NW	WOODS	N024	W013	21	1414	KB	19550907	8130	OIL	202SMPS
35151000180000	-98.60262	36.54451	AMERADA HE	W H FARRIS	1	OAKDALE NW	WOODS	N024	W013	21	1414	KB	19550907	8130	OIL	202SMPS
35151000190000	-98.95962	36.60684	MCDURMOTT	IVA MURROW	1	TEGARDEN	WOODS	N027	W016	19	1789	DF	19541102	7238	GAS	359MSSP
35151000350001	-98.68647	36.46804	CONTINENTA	HALL HEIRS	1	WILDCAT	WOODS	N023	W014	15	1438	KB	19660222	7930	D&AW	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35093355880001	269HNTN	8313	8430	3581	3581	3581	732	0.42	893	2453	2453	0.685					Y	FmR	OK
35093355980000	269HNTN	8551	8622	895	690	895	-5038	0.10	500	500	500	0.559							
35093355990000	269HNTN	8308	8353	3655	3685	3685	1065	0.44	2260	2710	2710	0.735		multi-zn	M	h	Y	FmR	OK
35093355990000	269HNTN	8358	8403		1755	1755	-3136	0.21	475	560	560	0.319		multi-zn	L	m			
35093355990000	269HNTN	8458	8503	60	120	120	-6752	0.01	40	60	60	0.500	suspect	multi-zn	M	m			
35093355990000	269HNTN	8408	8453	45	45	45	-6863	0.01	45	45	45	1.000	suspect	multi-zn	H	l			
35093357160001	269HNTN	7894	7900	3378	3378	3378	633	0.43	1424	1453	1453	0.430					YD	FmR	OK
35093357190001	269HNTN	7909	7955	3435		3435	656	0.43	3382	3435	3435	1.000					Y	FmR	No FSIP
35093357740000	269HNTN	7940	7940	3450	3500	3500	992	0.44					tight						
35093357840000	269HNTN	7708	7790	3353	3292	3353	746	0.43	565	1641	1641	0.489					Y	FmR	OK
35093358650000	269HNTN	8433	8458	3625	3612	3625	958	0.43	1863	2178	2178	0.601					YD	FmR	OK
35093358670000	269HNTN	8502	8593	3674	3674	3674	953	0.43	2442	2903	2903	0.790					YD	FmR	OK
35093358850000	269HNTN	8117	8185	3242	3192	3242	-11	0.40	189	1106	1106	0.341		multi-zn	L	h	YD	FmR	OK
35093358850000	269HNTN	8062	8115	9	7	9	-6894	0.00	7	7	7	0.778	suspect	multi-zn	H	l			
35093361010000	269HNTN	7864	7866	1175		1175	-3986	0.15					tight						
35093361080000	269HNTN	8035	8038	1575	200	1575	-3220	0.20					tight	multi-zn		m			
35093361080000	269HNTN	8044	8047	1200	150	1200	-4035	0.15					tight	multi-zn		m			
35093361080000	269HNTN	8126	8129	4125	370	4125	2173	0.51					tight	multi-zn		h			
35093361080000	269HNTN	8053	8056	1200	200	1200	-4044	0.15					tight	multi-zn		l			
35093361110000	269HNTN	8355	8415	3309	2903	3309	207	0.39	88	88	88	0.027	tight	multi-zn	L	h			
35093361110000	269HNTN	8250	8350	345	859	859	-4997	0.10	74	74	74	0.086	tight	multi-zn	H	l			
35093361120000	269HNTN	8490	8540	3630	3615	3630	942	0.43		132	132	0.036	tight				Y	FmR	OK
35093500130001	269HNTN	7678	7707	3350	3328	3350	833	0.43	79	241	241	0.072	tight					FmR	OK
35129201030000	269HNTN	17163	17329	7518	7581	7581	1226	0.44	4158	7269	7269	0.959		multi-zn	M	m		FmR	OK
35129201030000	269HNTN	17162	17349	7621	7621	7621	1292	0.44	4504	7621	7621	1.000		multi-zn	H	h	Y	FmR	OK
35129201030000	269HNTN	17010	17160	4091	3568	4091	-6110	0.24	2987	2987	2987	0.730		multi-zn	M	l			
35129201030000	269HNTN	16931	17004	5743	4463	5743	-2401	0.34	3261	3261	3261	0.568		multi-zn	L	m			
35129201030000	269HNTNU	16928	17010	6232	4817	6232	-1356	0.37					tight	multi-zn		m			
35129201190000	269HNTN	19618	19766	8797	7402	8797	1464	0.45	3531	7359	7359	0.837					Y	FmR	OK
35129201280000	269HNTN	19455	19690	9194	8762	9194	2360	0.47	6799	6851	6851	0.745		multi-zn	L	l			
35129201280000	269HNTN	19224	19466	9312	9059	9312	2838	0.48	7064	7106	7106	0.763		multi-zn	H	h			
35129201540000	269HNTN	21110	21134	9026	8863	9026	694	0.43	5009	5009	5009	0.555							
35129201770000	269HNTN	15710	15888	6957	6957	6957	1118	0.44	966	3570	3570	0.513		multi-zn	M	h	Y	FmR	OK
35129201770000	269HNTN	15702	15720	5006	4328	5006	-2909	0.32	2038	2086	2086	0.417		multi-zn	L	l			
35129201770000	269HNTN	15549	15683	1686	5415	5415	-1993	0.35	1686	4185	4185	0.773		multi-zn	H	m			
35129202810000	269HNTN	16620	16638	7240	7240	7240	1074	0.44	3345	7174	7174	0.991		multi-zn	H	l		FmR	OK
35129202810000	269HNTN	16307	16343	7230	7230	7230	1347	0.44	2618	3287	3287	0.455		multi-zn	L	h			
35129203130000	269HNTNU	18005	18092	6280		6280	-2581	0.35	3610		3610	0.575							
35151000090001	269HNTN	6459	6625	2603	2603	2603	436	0.39	2192	2603	2603	1.000						FmR	OK
35151000180000	269HNTN	7125	7140		3060	3060	855	0.43	705	885	885	0.289	tight	multi-zn	H	h		FmR	No ISIP
35151000180000	269HNTN	7180	7236		1575	1575	-2435	0.22		435	435	0.276	tight	multi-zn	L	l			
35151000190000	269HNTN	6593	6602		10	10	-4791	0.00		5	5	0.500	suspect						
35151000350001	269HNTN	7765	7795	92	41	92	-6159	0.01	41	41	41	0.446	suspect						

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35151000370000	-99.02795	36.76052	DEEP ROCK	COY PHILLI	1	WILDCAT	WOODS	N026	W017	4	1615	DF	19510807	7610	D&A-G	
35151000760001	-98.59197	36.69401	HALL-JONES	MINNIE	1-34	ALVA SE	WOODS	N026	W013	34	1388	DF	19650517	6510	D&AWO	
35151000760001	-98.59197	36.69401	HALL-JONES	MINNIE	1-34	ALVA SE	WOODS	N026	W013	34	1388	DF	19650517	6510	D&AWO	
35151000760001	-98.59197	36.69401	HALL-JONES	MINNIE	1-34	ALVA SE	WOODS	N026	W013	34	1388	DF	19650517	6510	D&AWO	
35151000770000	-98.58031	36.45358	STATEX PET	PHILLIPS U	1	WILDCAT	WOODS	N023	W013	22	1443	DF	19610301	7916	D&A	
35151000810000	-98.89884	36.55605	MAYFLO OIL	DE VILBISS	1	WILDCAT	WOODS	N024	W016	15	1542	DF	19610419	8150	D&A-O	
35151000810000	-98.89884	36.55605	MAYFLO OIL	DE VILBISS	1	WILDCAT	WOODS	N024	W016	15	1542	DF	19610419	8150	D&A-O	
35151001010000	-98.63622	36.67249	ASHLAND OI	MACKEY	1	WILDCAT	WOODS	N025	W013	6	1415	DF	19630827	6720	D&A-O	
35151001080000	-98.87504	36.5403	ASHLAND OI	KELLN	1	WAYNOKA S	WOODS	N024	W016	23	1540	DF	19620918	7705	GAS	405CGGV
35151001130000	-98.84601	36.56954	SINCLAIR O	LOREN V DE	1	WILDCAT	WOODS	N024	W015	7	1552	DF	19620515	7538	D&A-O	
35151001220000	-98.78417	36.49771	MARION OIL	HULL	1	WILDCAT	WOODS	N023	W015	3	1497	DF	19640922	8500	D&A-O	
35151001440000	-98.89091	36.54876	TEXOMA PRO	BUREAU OF	1	WILDCAT	WOODS	N024	W016	22	1527	KB	19570123	8480	D&A-O	
35151001440000	-98.89091	36.54876	TEXOMA PRO	BUREAU OF	1	WILDCAT	WOODS	N024	W016	22	1527	KB	19570123	8480	D&A-O	
35151200240000	-98.7897	36.62186	AMERADA HE	BEARD ESTA	1	WAYNOKA NE	WOODS	N025	W015	26	1730	DF	19660913	7272	GAS	405CGGV
35151200260000	-98.7495	36.61408	GREAT WEST	MORRIS UNI	1	GREENSBURG	WOODS	N025	W014	30	1565	KB	19660726	7190	D&A-O	
35151200270000	-98.83414	36.67256	CLEARY PET	FEESE	1-5	UNNAMED	WOODS	N025	W015	5	1558	DF	19660823	7540	OIL	354CSTR
35151200430000	-98.68161	36.69399	CREST EXPL	YOHN	1-35	WILDCAT	WOODS	N026	W014	35	1412	KB	19660822	7273	D&A-G	
35151200550001	-98.56281	36.45787	ANADARKO P	SACKET /A/	2	OAKDALE	WOODS	N023	W013	23	1428	GR	19720225	7872	D&AWO	
35151200670000	-98.67703	36.71959	CLEARY PET	MC GILL	1-23	UNNAMED	WOODS	N026	W014	23	1454	KB	19670117	6550	GAS	269HNTN
35151200860000	-98.78557	36.80157	CALVERT MI	MORSBACH	1	UNNAMED	WOODS	N027	W015	23	1505	DF	19670327	6310	GAS	269HNTN
35151200980000	-98.76838	36.80129	CALVERT MI	MCKEEVER	1	AVARD N	WOODS	N027	W015	24	1525	KB	19670503	6347	GAS	269HNTN
35151201020000	-98.79581	36.79386	CALVERT MI	FULLERTON	1	AVARD N	WOODS	N027	W015	27	1525	KB	19670530	6383	D&A	
35151201060001	-99.09022	36.7885	CHAMPLIN PET	SMITH UNIT	1	FREEDOM NW	WOODS	N027	W018	25	1670	KB	19690715	6805	OIL-WO	269HNTN
35151201080000	-98.7774	36.52449	HUBER J M	HULL	1	WILDCAT	WOODS	N024	W015	26	1530	KB	19670728	7886	D&A-O	
35151201080000	-98.7774	36.52449	HUBER J M	HULL	1	WILDCAT	WOODS	N024	W015	26	1530	KB	19670728	7886	D&A-O	
35151201210000	-98.54235	36.65037	WOODS PET	JOHNSON UN	1	WILDCAT	WOODS	N025	W013	13	1382	DF	19670907	7042	D&A-O	
35151201210000	-98.54235	36.65037	WOODS PET	JOHNSON UN	1	WILDCAT	WOODS	N025	W013	13	1382	DF	19670907	7042	D&A-O	
35151201210000	-98.54235	36.65037	WOODS PET	JOHNSON UN	1	WILDCAT	WOODS	N025	W013	13	1382	DF	19670907	7042	D&A-O	
35151201290001	-99.09027	36.77401	APACHE COR	SHADID UNI	1	FREEDOM NW	WOODS	N027	W018	36	1592	KB	19671011	6802	D&AWO	
35151201320000	-98.7956	36.80157	CALVERT MI	PORTER	1	AVARD N	WOODS	N027	W015	22	1546	KB	19670926	6294	GAS	269HNTN
35151201430000	-98.92611	36.55209	YUCCA PETR	GOVERNMENT	1	WILDCAT	WOODS	N024	W016	17	1414	KB	19671224	7551	D&A-G	
35151201450000	-98.66853	36.51545	JONES & PE	MURRY	1	WILDCAT	WOODS	N024	W014	35	1550	DF	19661220	7724	D&A-G	
35151201470000	-98.83174	36.83034	OSBORN W B	KLETKE	1	AVARD NW	WOODS	N027	W015	8	1618	KB	19680217	6220	GAS	269HNTN
35151201760000	-98.84993	36.83033	OSBORN W B	MCCOY	1	AVARD NW	WOODS	N027	W015	7	1727	GR	19680606	6365	OIL	269HNTN
35151201790000	-98.68868	36.70677	CLEARY PET	PFLEIDER	1-27	HOPETON N	WOODS	N026	W014	27	1444	DF	19680611	6625	GAS	269HNTN
35151201860000	-98.55139	36.63223	CAMEO OIL	VORE	1	DACOMA S	WOODS	N025	W013	24	1359	KB	19680823	7030	D&A-O	
35151201870000	-98.6864	36.55895	INTERNATIO	MCCRAY UNI	1	WILDCAT	WOODS	N024	W014	15	1560	DF	19680906	7541	D&A	
35151201870000	-98.6864	36.55895	INTERNATIO	MCCRAY UNI	1	WILDCAT	WOODS	N024	W014	15	1560	DF	19680906	7541	D&A	
35151201900000	-98.69721	36.74322	ANADARKO P	WILSON-F	1	HOPETON N	WOODS	N026	W014	10	1455	DF	19680916	6500	OIL	269HNTN
35151201920000	-99.1158	36.85467	COX EDWIN	STEWART	1	WILDCAT	WOODS	N027	W018	3	1738	KB	19680921	6567	D&A-G	
35151201930000	-98.8294	36.80313	ATLANTIC R	MARCUM UNI	4	AVARD NW	WOODS	N027	W015	20	1578	KB	19681008	6335	OIL	269HNTN
35151201940000	-98.91215	36.80833	CITIES SER	SHARP-B	1	UNNAMED	WOODS	N027	W016	22	1757	KB	19681017	6532	OIL	269HNTN
35151201940000	-98.91215	36.80833	CITIES SER	SHARP-B	1	UNNAMED	WOODS	N027	W016	22	1757	KB	19681017	6532	OIL	269HNTN

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35151000370000	269HNTN	6766	6774		2870	2870	1013	0.42					tight				Y	FmR	No ISIP
35151000760001	269HNTN	6435	6455	2345	2770	2770	890	0.43	419	1574	1574	0.568		multi-zn	M	m		FmR	OK
35151000760001	269HNTN	6368	6495	2840	2630	2840	1001	0.44	1980	2840	2840	1.000		multi-zn	H	h	Y	FmR	OK
35151000760001	269HNTN	6435	6450	2744	2744	2744	839	0.43	286	512	512	0.187	tight	multi-zn	L	l		FmR	OK
35151000770000	269HNTN	7730	7780	85	55	85	-6154	0.01	55	55	55	0.647	suspect						
35151000810000	269HNTN	7589	7605	3312	3312	3312	1060	0.44	2087	3298	3298	0.996		multi-zn	H	h	Y	FmR	OK
35151000810000	269HNTN	7569	7590	3205	3150	3205	844	0.42		110	110	0.034	tight	multi-zn	L	l		FmR	OK
35151001010000	269HNTN	6623	6637	2714	2409	2714	615	0.41	62	248	248	0.091	tight				YD	FmR	OK
35151001080000	269HNTN	7672	7686	3288	3288	3288	925	0.43	1467	3083	3083	0.938						FmR	OK
35151001130000	269HNTN	7476	7535	3297	3202	3297	1107	0.44	443	580	580	0.176	tight				Y	FmR	OK
35151001220000	269HNTN	7621	7703	2671	1467	2671	-462	0.35	63	36	63	0.024	tight						
35151001440000	269HNTN	7563	7592		3250	3250	924	0.43	2000	3200	3200	0.985		multi-zn	L	h		FmR	No ISIP
35151001440000	269HNTN	7568	7578		25	25	-5997	0.00		25	25	1.000	suspect	multi-zn	H	l			
35151200240000	269HNTN	7235	7270	2933	2933	2933	768	0.40	556	2933	2933	1.000						FmR	OK
35151200260000	269HNTN	7132	7150	2964	2996	2996	858	0.42	264	1115	1115	0.372						FmR	OK
35151200270000	269HNTN	6927	6967	2925	2925	2925	881	0.42	103	2227	2227	0.761					Y	FmR	OK
35151200430000	269HNTN	6560	6620	2825	2825	2825	867	0.43	737	2573	2573	0.911					Y	FmR	OK
35151200550001	269HNTN	7720	7872	3365	3375	3375	814	0.43	322	757	757	0.224	tight				Y	FmR	OK
35151200670000	269HNTN	6389	6500	2806	2806	2806	988	0.43	1217	1710	1710	0.609					Y	FmR	OK
35151200860000	269HNTN	6165	6310	2656	2658	2658	911	0.42	2114	2107	2114	0.795						FmR	OK
35151200980000	269HNTN	6176	6347	2621	2621	2621	815	0.41	2118	2392	2392	0.913						FmR	OK
35151201020000	269HNTN	6240	6383	2689	2689	2689	925	0.42	2689		2689	1.000					Y	FmR	OK
35151201060001	269HNTN	6712	6800		2781	2781	851	0.41	46	70	70	0.025	tight				Y	FmR	No ISIP
35151201080000	269HNTN	7472	7495	3199	3238	3238	998	0.43	3174	3199	3199	0.988		multi-zn	H	h	Y	FmR	OK
35151201080000	269HNTN	7558	7602	3059	3046	3059	506	0.40	133	235	235	0.077	tight	multi-zn	L	l		FmR	OK
35151201210000	269HNTN	6658	6737	2881	2890	2890	860	0.43	545	2872	2872	0.994		multi-zn	H	m	Y	FmR	OK
35151201210000		7017	7042	3026	3026	3026	848	0.43	47	474	474	0.157	tight	multi-zn	M	h		FmR	OK
35151201210000	269HNTN	6646	6660	2843	2843	2843	836	0.43	189	244	244	0.086	tight	multi-zn	L	l		FmR	OK
35151201290001	269HNTN	6700	6749	183	1211	1211	-2553	0.18	18	18	18	0.015	tight						
35151201320000	269HNTN	6210	6262		2594	2594	862	0.41	1994	2217	2217	0.855						FmR	No ISIP
35151201430000	269HNTN	7472	7551	3268	3268	3268	891	0.43	323	603	603	0.185	tight				YD	FmR	OK
35151201450000	269HNTN	7610	7717	3314	3314	3314	960	0.43	958	3085	3085	0.931					Y	FmR	OK
35151201470000	269HNTN	6100	6220	2409	2409	2409	579	0.39	86	91	91	0.038	tight					FmR	OK
35151201760000	269HNTN	6238	6343	2341	2314	2341	418	0.37	128	146	146	0.062	tight					FmR	OK
35151201790000	269HNTN	6546	6625	2835	2835	2835	916	0.43	1132	1460	1460	0.515						FmR	OK
35151201860000	269HNTN	6611	6720	2490	2582	2582	192	0.38	90	231	231	0.089	tight					FmR	OK
35151201870000	269HNTN	7318	7420	3125	3168	3168	953	0.43	2740	3125	3125	0.986		multi-zn	H	h	Y	FmR	OK
35151201870000	269HNTN	7424	7457	232	558	558	-4697	0.07	23	32	32	0.057	tight	multi-zn	L	l			
35151201900000	269HNTN	6288	6500	2784	2645	2784	942	0.43	2084	2014	2084	0.749					Y	FmR	OK
35151201920000	269HNTN	6490	6567	132	299	299	-4186	0.05	43	48	48	0.161	tight						
35151201930000	269HNTN	6181	6258	2473	2473	2473	638	0.40	1349	1955	1955	0.791					YD	FmR	OK
35151201940000	269HNTN	6400	6485	2669	2669	2669	1012	0.41	871	1313	1313	0.492		multi-zn	L	h	Y	FmR	OK
35151201940000	269HNTN	6455	6485	86		86	-4543	0.01	57		57	0.663	suspect	multi-zn	H	l			

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35151201950000	-98.79312	36.48313	BONRAY OIL	HULL UNIT	1	WILDCAT	WOODS	N023	W015	10	1450	KB	19681021	7843	D&A	
35151202020000	-98.73339	36.68515	ASHLAND OI	MABEL ROMJ	1	WILDCAT	WOODS	N026	W014	32	1485	KB	19681110	6800	D&A	
35151202080000	-98.90572	36.8031	CITIES SER	MARCUM A	1	CORA	WOODS	N027	W016	22	1741	KB	19681224	6491	D&A-O	
35151202100000	-98.69113	36.44075	CALVERT FU	HEPNER	1	WILDCAT	WOODS	N023	W014	27	1378	KB	19690107	8050	D&A	
35151202200000	-98.78009	36.73418	ANADARKO P	TANNER /A/	1	UNNAMED	WOODS	N026	W015	14	1485	DF	19690320	6650	GAS	354MSSPU
35151202210000	-98.75098	36.68527	KIRKPATRIC	PARKER UNI	1	WILDCAT	WOODS	N026	W014	31	1499	KB	19690418	6900	D&A	
35151202400000	-98.71788	36.48676	CHAMPLIN PET	H B ENGLISH	1	WILDCAT	WOODS	N023	W014	8	1498	DF	19690809	7976	D&A-OG	
35151202460000	-98.8136	36.83028	OSBORN W B	MARCUM-SHE	1	AVARD NW	WOODS	N027	W015	9	1556	KB	19690907	6145	OIL	269HNTN
35151202500000	-98.77777	36.74328	ANADARKO P	ELSIE VARN	1-A	AVARD	WOODS	N026	W015	11	1514	DF	19691022	6537	GAS	359MSSP
35151202550000	-98.90044	36.56967	DIAMOND SH	L V DEVILB	1	WILDCAT	WOODS	N024	W016	10	1487	KB	19691021	7585	D&A	
35151202560000	-98.82066	36.73778	PIONEER PR	BROWN-LANE	1	WILDCAT	WOODS	N026	W015	16	1524	KB	19691218	6592	D&A-G	
35151202570000	-99.02283	36.76358	MAY PET	MARCELLA H	1	WILDCAT	WOODS	N026	W017	3	1639	DF	19691024	7240	D&A-G	
35151202620000	-98.90857	36.50874	NATIONAL C	WHITLAW	1	WILDCAT	WOODS	N024	W016	33	1396	KB	19691103	7915	D&A	
35151202730000	-98.74116	36.63176	PETROLEUM	GOUCHER UN	1	WILDCAT	WOODS	N025	W014	19	1533	DF	19691220	7110	D&A-G	
35151202740000	-99.02199	36.77314	DIAMOND SH	KAMAS	1	TEGARDEN	WOODS	N027	W017	34	1683	KB	19700211	7125	D&A-O	
35151202740000	-99.02199	36.77314	DIAMOND SH	KAMAS	1	TEGARDEN	WOODS	N027	W017	34	1683	KB	19700211	7125	D&A-O	
35151202750000	-98.64798	36.43868	KIRKPATRIC	HEPNER	1-25	OAKDALE	WOODS	N023	W014	25	1408	DF	19700210	8065	GAS	269HNTN
35151202820000	-99.021	36.77929	MAY PET	KAMAS	2	TEGARDEN	WOODS	N027	W017	34	1710	KB	19700305	6825	D&A-O	
35151202840000	-98.91918	36.80131	GRAHAM-MIC	SNODDY	1-21	CORA	WOODS	N027	W016	21	1789	KB	19700428	6615	GAS	269HNTN
35151202900000	-98.68688	36.42523	KIRKPATRIC	HEPNER UNI	1-34	UNNAMED	WOODS	N023	W014	34	1311	KB	19700728	8100	GAS	269HNTN
35151202980000	-98.66759	36.47117	SNEE & EBE	BAYS	1	WILDCAT	WOODS	N023	W014	14	1476	KB	19700710	8306	D&A	
35151203050000	-98.77078	36.54085	SOUTHERN U	MORRIS UNI	1	WILDCAT	WOODS	N024	W015	23	1566	KB	19700918	7615	D&A-O	
35151203050000	-98.77078	36.54085	SOUTHERN U	MORRIS UNI	1	WILDCAT	WOODS	N024	W015	23	1566	KB	19700918	7615	D&A-O	
35151203140000	-99.21042	36.80778	SOUTHLAND	DEVINE 23	1	WILDCAT	WOODS	N027	W019	23	1588	KB	19701208	6922	D&A-G	
35151203150000	-98.63674	36.69049	BLAIK OIL	MCARTHUR	1	DACOMA NW	WOODS	N026	W013	31	1402	KB	19701123	6600	D&A-O	
35151203150000	-98.63674	36.69049	BLAIK OIL	MCARTHUR	1	DACOMA NW	WOODS	N026	W013	31	1402	KB	19701123	6600	D&A-O	
35151203210000	-98.94166	36.80683	DUNCAN WAL	SMITHSON U	1	TEGARDEN	WOODS	N027	W016	20	1832	KB	19710125	6680	GAS	269HNTN
35151203210000	-98.94166	36.80683	DUNCAN WAL	SMITHSON U	1	TEGARDEN	WOODS	N027	W016	20	1832	KB	19710125	6680	GAS	269HNTN
35151203230000	-98.7244	36.67785	MAGNESS PE	WENZEL	5-1	WILDCAT	WOODS	N025	W014	5	1460	KB	19701222	6761	D&A-G	
35151203280000	-98.91261	36.80117	GRAHAM-MICHAEL	SNODDY	1-22	CORA	WOODS	N027	W016	22	1754	KB	19710113	6565	D&A	
35151203370000	-98.92595	36.79591	TEX-STAR	SMITHSON	1	CORA	WOODS	N027	W016	28	1782	KB	19710512	6700	D&A-O	
35151203370000	-98.92595	36.79591	TEX-STAR	SMITHSON	1	CORA	WOODS	N027	W016	28	1782	KB	19710512	6700	D&A-O	
35151203480000	-99.09021	36.78125	FERGUSON O	SHADID	1	FREEDOM NW	WOODS	N027	W018	36	1652	KB	19710922	6769	D&A-O	
35151203510000	-98.61165	36.41105	HELMERICH	CLOW UNIT	1	OAKDALE	WOODS	N022	W013	5	1329	KB	19711213	8034	GAS	404OSWG
35151203640000	-98.67709	36.61794	LITTLE QUI	CHAFFIN	1	OAKDALE	WOODS	N025	W014	26	1460	KB	19711204	7137	D&A	
35151203660000	-98.68604	36.5963	LITTLE QUI	RIGGS	1	WILDCAT	WOODS	N025	W014	34	1510	KB	19720214	7300	D&A-G	
35151203660000	-98.68604	36.5963	LITTLE QUI	RIGGS	1	WILDCAT	WOODS	N025	W014	34	1510	KB	19720214	7300	D&A-G	
35151203670000	-98.9057	36.807	AN-SON COR	MARCUM	1	CORA	WOODS	N027	W016	22	1750	KB	19720316	6500	D&A	
35151203770000	-98.62734	36.3981	HELMERICH	VORE UNIT	1-7	OAKDALE	WOODS	N022	W013	7	1297	KB	19720818	8059	GAS	353MRMC
35151203840000	-98.6234	36.70679	WIL-MC OIL	HAGER	1	ALVA SE	WOODS	N026	W013	29	1416	KB	19720820	6540	D&A-G	
35151203920000	-98.77506	36.45783	TENNECO OI	L FLOYD UN	1-23	UNNAMED	WOODS	N023	W015	23	1343	KB	19721221	8150	GAS	354CSTR
35151204460000	-98.59649	36.70849	COTTON PET	ROMJUE	1	ALVA SE	WOODS	N026	W013	28	1405	KB	19740226	6480	D&A-O	
35151204540000	-98.66422	36.47333	FERGUSON O	LOGES	1	WILDCAT	WOODS	N023	W014	14	1478	KB	19741112	7912	D&A-G	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35151201950000	269HNTN	7678	7698	1664	3414	3414	1094	0.44	125	1	125	0.037	tight						
35151202020000	269HNTN	6720	6800	161	115	161	-4969	0.02	69	69	69	0.429	suspect						
35151202080000	269HNTN	6420	6491	286	557	557	-3552	0.09	200	314	314	0.564							
35151202100000	269HNTN	7835	8050	1548	1825	1825	-2747	0.23	776	776	776	0.425							
35151202200000	269HNTN	6428	6650	2676	2690	2690	620	0.40	2462	2676	2676	0.995					Y	FmR	OK
35151202210000	269HNTN	6752	6900	2769	2769	2769	554	0.40	1716	2769	2769	1.000						FmR	OK
35151202400000	269HNTN	7780	7807	210	1026	1026	-4103	0.13	56	30	56	0.055	tight						
35151202460000	269HNTN	6012	6145	2423	2427	2427	630	0.39	816	1330	1330	0.548						FmR	OK
35151202500000	269HNTN	6396	6537	2575		2575	515	0.39					tight					FmR	No FSIP
35151202550000	269HNTN	7455	7567	3130	3130	3130	651	0.41	278	2232	2232	0.713						FmR	OK
35151202560000	269HNTN	6454	6588	2561	2603	2603	534	0.40	1592	2340	2340	0.899					YD	FmR	OK
35151202570000	269HNTN	6768	6785	2715	2715	2715	693	0.40	342	2715	2715	1.000						FmR	OK
35151202620000	269HNTN	7796	7886	3450	3450	3450	929	0.44	152	3450	3450	1.000					YD	FmR	OK
35151202730000	269HNTN	7040	7062		2902	2902	712	0.41	485	1498	1498	0.516					YD	FmR	No ISIP
35151202740000	269HNTN	6751	6805	2692	2565	2692	667	0.40	244	423	423	0.157	tight	multi-zn	L	h	Y	FmR	OK
35151202740000	269HNTN	6696	6760	2662	2582	2662	648	0.39	140	544	544	0.204	tight	multi-zn	H	l		FmR	OK
35151202750000	269HNTN	7788	7848	3384	3384	3384	837	0.43	118	236	236	0.070	tight				Y	FmR	OK
35151202820000	269HNTN	6729	6745	2641	2641	2641	645	0.39	104	181	181	0.069	tight					FmR	OK
35151202840000	269HNTN	6490	6585	2518	2518	2518	619	0.38	769	1265	1265	0.502						FmR	OK
35151202900000	269HNTN	7838	7848	3454	3429	3454	891	0.44	415	772	772	0.224	tight				Y	FmR	OK
35151202980000	269HNTN	7759	7770	61	41	61	-6163	0.01	41	37	41	0.672	suspect						
35151203050000	269HNTN	7448	7466	3138	3138	3138	848	0.42	1980	3138	3138	1.000		multi-zn	H	h	YD	FmR	OK
35151203050000	269HNTN	7493	7526	2880	2855	2880	234	0.38	45	57	57	0.020	tight	multi-zn	L	l		FmR	OK
35151203140000	269HNTN	6790	6818	83	83	83	-5052	0.01		83	83	1.000	suspect						
35151203150000	269HNTN	6524	6543	2643	2643	2643	543	0.40	567	1838	1838	0.695		multi-zn	H	h	Y	FmR	OK
35151203150000	269HNTN	6440	6534	2610	2505	2610	481	0.40	318	681	681	0.261	tight	multi-zn	L	l			
35151203210000	269HNTN	6595	6680	2480	2480	2480	485	0.37	46	92	92	0.037	tight	multi-zn	L	h	YD	FmR	OK
35151203210000	269HNTN	6591	6680	2465	2465	2465	453	0.37	38	140	140	0.057	tight	multi-zn	H	l		FmR	OK
35151203230000	269HNTN	6718	6760	2700	2700	2700	506	0.40	954	2312	2312	0.856						FmR	OK
35151203280000	269HNTN	6466	6545	121	96	121	-4531	0.02	24	38	38	0.314	suspect						
35151203370000	269HNTN	6556	6662	2432	2408	2432	350	0.37	459	1518	1518	0.624		multi-zn	H	h	YD	FmR	OK
35151203370000	269HNTN	6608	6618	2358	2358	2358	235	0.36	54	95	95	0.040	tight	multi-zn	L	l			
35151203480000	269HNTN	6724	6767	1905	1879	1905	-1018	0.28	72	137	137	0.072	tight				YD	FmR	OK
35151203510000	269HNTN	7775	7820	83	83	83	-6313	0.01	41	41	41	0.494	suspect						
35151203640000	269HNTN	7067	7098	2961	2993	2993	799	0.42	2830	2961	2961	0.989					Y	FmR	OK
35151203660000	269HNTN	7167	7189	2943	2975	2975	719	0.41	911	2814	2814	0.946		multi-zn	H	h	Y	FmR	OK
35151203660000	269HNTN	7190	7245	2975	2943	2975	663	0.41	423	650	650	0.218	tight	multi-zn	L	l		FmR	OK
35151203670000	269HNTN	6391	6500	750	883	883	-2851	0.14	176	176	176	0.199	tight					FmR	OK
35151203770000	269HNTN	7805	7901	291	944	944	-4574	0.12	85	109	109	0.115	tight					FmR	damaged
35151203840000	269HNTN	6370	6540	2544	2507	2544	347	0.39	1623	2029	2029	0.798					YD	FmR	OK
35151203920000	269HNTN	7851	8150	3241	3292	3292	273	0.40	416	442	442	0.134	tight						
35151204460000	269HNTN	6426	6480	2536	2536	2536	379	0.39	1727	2512	2512	0.991						FmR	OK
35151204540000	269HNTN	7725	7766	1155	216	1155	-3804	0.15	46	46	46	0.040	tight	multi-zn	L	l			

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35151204540000	-98.66422	36.47333	FERGUSON O	LOGES	1	WILDCAT	WOODS	N023	W014	14	1478	KB	19741112	7912	D&A-G	
35151204630000	-98.68601	36.72321	WIL-MC OIL	JOSEPH	1	HOPETON N	WOODS	N026	W014	22	1451	ES	19740424	6516	D&A-G	
35151204720000	-98.93926	36.70516	TUTHILL S	BOLAND	1	UNNAMED	WOODS	N026	W016	29	1664	KB	19740916	7075	GAS	404RDFK
35151205020000	-99.04732	36.71444	TUTHILL S	EDEN	1	WILDCAT	WOODS	N026	W017	20	1515	KB	19741120	7378	D&A-O	
35151205030000	-98.83128	36.58227	PUBLISHERS	M R CAMP	1	WAYNOKA NE	WOODS	N024	W015	5	1603	DF	19750130	7520	D&A-G	
35151205190000	-98.71632	36.54558	SKELLY OIL	E S HALTOM	1	WILDCAT	WOODS	N024	W014	20	1654	KB	19750127	8500	D&A-G	
35151205190000	-98.71632	36.54558	SKELLY OIL	E S HALTOM	1	WILDCAT	WOODS	N024	W014	20	1654	KB	19750127	8500	D&A-G	
35151205430000	-98.99339	36.7178	TUTHILL S	CHAMBERLAI	1	FAIRVALLEY SI	WOODS	N026	W017	23	1585	KB	19750717	6970	GAS	404RDFK
35151205880000	-98.93024	36.71463	PIONEER PR	BOLAND	1-21	BRACE E	WOODS	N026	W016	21	1757	KB	19760602	7035	GAS	404RDFK
35151206520000	-98.86623	36.55319	BONRAY OIL	KELLIN UNI	1	WILDCAT	WOODS	N024	W016	13	1536	KB	19760910	7665	D&A-O	
35151206760000	-98.60698	36.45056	CIMARRON P	REIHM	CPC	OAKDALE	WOODS	N023	W013	20	1453	KB	19761104	7756	D&A-O	
35151207000000	-98.66262	36.48834	AMOCO PROD	SARGENT-WA	1	WILDCAT	WOODS	N023	W014	11	1508	KB	19770122	7802	D&A	
35151207180000	-98.85891	36.69255	WARD L O O	LANDRETH	1	BRACE NE	WOODS	N026	W015	31	1554	KB	19770218	6871	D&A-G	
35151207350000	-98.84087	36.83034	OSBORN W B	KLETKE	2	AVARD NW	WOODS	N027	W015	8	1656	KB	19770614	6277	OIL	269HNTN
35151207470000	-98.93082	36.72692	PIONEER PR	MILLER	1-16	AVARD NW	WOODS	N026	W016	16	1742	KB	19770623	6983	D&A-G	
35151208130000	-98.7752	36.47239	CRESLENN O	LEE FLOYD	1	CAMPBELL E	WOODS	N023	W015	14	1427	KB	19780501	7960	D&A-O	
35151209880000	-98.78421	36.47236	DEMINEX US	BAIRD	2	CAMPBELL	WOODS	N023	W015	15	1386	KB	19810212	7874	D&A-O	
35151211020000	-98.84078	36.54591	CLEMENTS E	KELLN	1	WAYNOKA S	WOODS	N024	W015	19	1516	KB	19801225	7626	D&A-G	
35151213110000	-98.87627	36.79217	IREY CORP	WINTERS	1	AVARD NW	WOODS	N027	W016	25	1751	KB	19820422	6610	GAS	269HNTN
35151213920000	-98.90346	36.79404	IREX CORP	SMITHSON O	1	AVARD NW	WOODS	N027	W016	27	1752	KB	19830925	6581	D&A	
35151214010000	-98.80575	36.80222	IREX CORP	BLOYD	1	AVARD NW	WOODS	N027	W015	22	1554	KB	19831019	6428	OIL	269HNTN
35151214400000	-98.60665	36.71487	IREX CORP	HOPETON	21-1	ALVA SE	WOODS	N026	W013	21	1428	KB	19840305	6531	GAS	269HNTN
35151215240000	-98.75065	36.4667	MACLAND EN	WILSON	1	CAMPBELL	WOODS	N023	W015	13	1420	KB	19850519	8092	D&A	
35151300050000	-98.6906	36.68949	EARLSBORO	YOHN UNIT	1	GREENSBURG	WOODS	N026	W014	34	1432	KB	19651230	6732	D&A-O	
35151300250000	-98.58746	36.70483	CALVERT DR	BROWN	1	ALVA SE	WOODS	N026	W013	27	1392	DF	19650812	6460	GAS	269HNTN
35151300300000	-98.54004	36.41442	MARION OIL	HODGDEN	1	CLEO WEST	WOODS	N022	W013	1	1273	KB	19650222	7793	D&A-G	
35151300350000	-98.58021	36.42895	HUMBLE OIL	C L RICH	1	OAKDALE SW	WOODS	N023	W013	34	1362	DF	19650701	7845	GAS	404RDFK
35151300360000	-98.62506	36.43977	CALVERT DR	DIETZ	1	OAKDALE SW	WOODS	N023	W013	30	1045	DF	19650204	7950	OIL	404OSWG
35151300410001	-98.86841	36.58932	NATOL PETR	TISUE	1	WAYNOKA NE	WOODS	N024	W016	1	1528	KB	19660809	7510	D&AWG	
35151300650000	-98.76737	36.61787	AMERADA HE	AARON MORR	1	WILDCAT	WOODS	N025	W015	25	1680	DF	19650429	7611	D&A-O	
35151300990000	-98.60077	36.71552	CALVERT MI	BONNER UNI	1	ALVA SE	WOODS	N026	W013	21	1428	KB	19660303	6520	GAS	269HNTN
35151302090000	-98.7501	36.60272	SAMEDAN OI	KUTZ	1	GREENSBURG	WOODS	N025	W014	31	1578	GR	19660802	8303	2 GAS	319MSRH
35151302110000	-98.92416	36.67273	KING-STEVE	SCHMOLCKE	1-A	WAYNOKA N	WOODS	N025	W016	4	1741	DF	19660118	7312	2 GAS	406TNKW
35151303670001	-98.74441	36.67614	CALVERT FU	WENZEL	1	WILDCAT	WOODS	N025	W014	6	1486	DF	19680828	6856	D&AWG	
35151352360000	-98.59368	36.54452	AMERADA HE	R E COPENH	1	OAKDALE NW	WOODS	N024	W013	21	1412	GR	19560815	7499	OIL	202SMPS
35151352390000	-98.54694	36.62494	AMERADA HE	CHARLEY KA	1	DACOMA S	WOODS	N025	W013	24	1355	DF	19570918	7156	D&A	
35151352400000	-98.60713	36.54452	AMERADA HE	ROBERT MOR	1	OAKDALE NW	WOODS	N024	W013	20	1416	GR	19560425	7608	GAS	404BRVL
35151352420000	-98.60263	36.54089	AMERADA HE	F O SMITH	1	OAKDALE NW	WOODS	N024	W013	21	1417	GR	19560509	7518	OIL	404CHRK
35151352540001	-98.96527	36.80231	CLEARY PET	DAVIDSON	1-19	TEGARDEN	WOODS	N027	W016	19	1758	DF	19680729	6840	GAS-W	404OSWG
35151352570000	-98.61619	36.58436	GULF OIL	SADIE KEFF	1	WILDCAT	WOODS	N024	W013	5	1409	ES	19571002	7502	D&A-O	
35151500050000	-98.66433	36.42826	SUPERIOR O	HEPNER UNI	1	WILDCAT	WOODS	N023	W014	35	1329	DF	19650713	8038	D&A	
35151500080000	-98.60262	36.55087	PETROLEUM	HANSEN	1-16	OAKDALE NW	WOODS	N024	W013	16	1408	KB	19631111	7495	GAS	405CGGV
35153000070000	-99.26149	36.50545	SINCLAIR O	TROY PHILL	1	WOODWARD N	WOODWAR	N023	W019	5	2052	DF	19580409	9863	GAS	402MRRW

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35151204540000	269HNTN	7723	7737	1288	167	1288	-3489	0.17	346	104	346	0.269	tight	multi-zn	H	h			
35151204630000	269HNTN	6492	6508	951	933	951	-3012	0.15	54	135	135	0.142	tight					FmR	OK
35151204720000	269HNTN	6909	7037	2767	2767	2767	578	0.39	1155	2363	2363	0.854						FmR	OK
35151205020000	269HNTN	6905	7038	2850	2845	2850	606	0.40	1038	2127	2127	0.746						FmR	OK
35151205030000	269HNTN	7430	7520	3070	2496	3070	685	0.41	645	646	646	0.210	tight					FmR	OK
35151205190000	269HNTN	7638	7686	2963	2673	2963	340	0.39	308	440	440	0.148	tight	multi-zn	L	l	YD	FmR	OK
35151205190000	269HNTN	7589	7622		3136	3136	776	0.41	2129	3092	3092	0.986		multi-zn	H	h			
35151205430000	269HNTN	6930	6970	2744	2789	2789	613	0.40	252	573	573	0.205	tight				YD	FmR	OK
35151205880000	269HNTN	6980	7035	2742	2742	2742	619	0.39	2205	2742	2742	1.000					Y	FmR	OK
35151206520000	269HNTN	7574	7612		3137	3137	670	0.41	832	2643	2643	0.843						FmR	No ISIP
35151206760000	269HNTN	7730	7756	2972	3276	3276	742	0.42	34	34	34	0.010	tight						
35151207000000	269HNTN	7679	7802		826	826	-4518	0.11	138	321	321	0.389							
35151207180000	269HNTN	6745	6871	2714	2723	2723	539	0.40	1696	2583	2583	0.949					YD	FmR	OK
35151207350000	269HNTN	6140	6277	587	522	587	-3359	0.09	48	174	174	0.296	tight						
35151207470000	269HNTN	6934	6983	2711	2723	2723	615	0.39	2030	2711	2711	0.996							
35151208130000	269HNTN	7700	7780	3233	3060	3233	600	0.42	381	1764	1764	0.546							
35151209880000	269HNTN	7663	7698	603	1010	1010	-4140	0.13	106	106	106	0.105	tight						
35151211020000	269HNTN	7556	7626	3137	3137	3137	636	0.41	3137	3137	3137	1.000					YD	FmR	OK
35151213110000	269HNTN	6460	6610	2431	2441	2441	390	0.37	203	200	203	0.083	tight						
35151213920000	269HNTN	6455	6536	2336	2411	2411	401	0.37	148	137	148	0.061	tight						
35151214010000	269HNTN	6228	6275	2181	2294	2294	212	0.37	571	702	702	0.306						FmR	OK
35151214400000	269HNTN	6385	6494	2712		2712	766	0.42	1381		1381	0.509						FmR	No FSIP
35151215240000	269HNTN	7866	7905	1655	813	1655	-2926	0.21	54	64	64	0.039	tight						
35151300050000	269HNTN	6644	6731		2800	2800	723	0.42	336	2717	2717	0.970						FmR	No ISIP
35151300250000	269HNTN	6340	6440	2788	2788	2788	948	0.43	2611	2717	2717	0.975						FmR	OK
35151300300000	269HNTN	7743	7793	3269	3223	3269	510	0.42		1933	1933	0.591						FmR	OK
35151300350000	269HNTN	7723	7725	975	125	975	-4266	0.13					tight						
35151300360000	269HNTN	6950	7760	247	143	247	-6184	0.03	62	77	77	0.312	suspect						
35151300410001	269HNTN	7449	7510	3233	3224	3233	971	0.43	505	1373	1373	0.425					YD	FmR	OK
35151300650000	269HNTN	7206	7230	2987	2987	2987	874	0.41	810	2987	2987	1.000					Y	FmR	OK
35151300990000	269HNTN	6338	6462	2752	2743	2752	884	0.43	1746	2210	2210	0.803						FmR	OK
35151302090000	269HNTN	7060	7079	2970	2920	2970	886	0.42	2371	2739	2739	0.922					Y	FmR	OK
35151302110000	269HNTN	7216	7230	2891	2959	2959	874	0.41	11	340	340	0.115	tight				Y	FmR	OK
35151303670001	269HNTN	6802	6813	2867	2833	2867	839	0.42	277	693	693	0.242	tight					FmR	OK
35151352360000	269HNTN	7126	7140		3101	3101	941	0.43	633	1447	1447	0.467					Y	FmR	No ISIP
35151352390000	269HNTN	6714	6733		2930	2930	923	0.44	150	2255	2255	0.770					Y	FmR	No ISIP
35151352400000	269HNTN	7161	7195		2790	2790	221	0.39	365	550	550	0.197	tight						
35151352420000	269HNTN	7179	7199		2855	2855	358	0.40	40	426	426	0.149	tight					FmR	No ISIP
35151352540001	269HNTN	6540	6640	200	336	336	-4159	0.05	132	245	245	0.729	suspect						
35151352570000	269HNTN	7046	7094		3130	3130	1046	0.44		275	275	0.088	tight				Y	FmR	No ISIP
35151500050000	269HNTN	7788	7829		1669	1669	-2911	0.21	45	59	59	0.035	tight						
35151500080000	269HNTN	7127	7177	1105	643	1105	-3393	0.15	46	92	92	0.083	tight						
35153000070000	269HNTN	9277	9322		225	225	-6786	0.02					tight						

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35153000130000	-99.31727	36.19746	MAGNOLIA P	J C BORDEN	1A	WILDCAT	WOODWAR	N020	W020	22	2164	KB	19560322	13538	D&A-G	
35153000130000	-99.31727	36.19746	MAGNOLIA P	J C BORDEN	1A	WILDCAT	WOODWAR	N020	W020	22	2164	KB	19560322	13538	D&A-G	
35153000130000	-99.31727	36.19746	MAGNOLIA P	J C BORDEN	1A	WILDCAT	WOODWAR	N020	W020	22	2164	KB	19560322	13538	D&A-G	
35153000130000	-99.31727	36.19746	MAGNOLIA P	J C BORDEN	1A	WILDCAT	WOODWAR	N020	W020	22	2164	KB	19560322	13538	D&A-G	
35153000130000	-99.31727	36.19746	MAGNOLIA P	J C BORDEN	1A	WILDCAT	WOODWAR	N020	W020	22	2164	KB	19560322	13538	D&A-G	
35153000270000	-99.29149	36.38524	UNION OIL	SHERMAN	1	WOODWARD S	WOODWAR	N022	W020	13	2036	DF	19570410	11272	D&A-G	
35153000300000	-98.97128	36.42932	ZAVOICO B	W M VICKER	1	WILDCAT	WOODWAR	N023	W017	36	1684	DF	19491111	9261	D&A-O	
35153000390000	-99.01194	36.35428	SIGNAL OIL	F BRADSHAW	1	WILDCAT	WOODWAR	N022	W017	27	1781	KB	19511030	9524	D&A-O	
35153000400000	-99.26591	36.49472	SINCLAIR O	COMUNITY O	1	WILDCAT	WOODWAR	N023	W019	6	2019	KB	19510703	10238	D&A-O	
35153000400000	-99.26591	36.49472	SINCLAIR O	COMUNITY O	1	WILDCAT	WOODWAR	N023	W019	6	2019	KB	19510703	10238	D&A-O	
35153000470000	-99.13198	36.45501	PARKER G C	HENSLEY	1	WILDCAT	WOODWAR	N023	W018	21	1968	DF	19600803	9260	D&A-O	
35153000500001	-99.32956	36.55958	GETTY OIL	EIKE V	1	WILDCAT	WOODWAR	N024	W020	15	2127	KB	19681019	9350	D&AWG	
35153000500001	-99.32956	36.55958	GETTY OIL	EIKE V	1	WILDCAT	WOODWAR	N024	W020	15	2127	KB	19681019	9350	D&AWG	
35153000500001	-99.32956	36.55958	GETTY OIL	EIKE V	1	WILDCAT	WOODWAR	N024	W020	15	2127	KB	19681019	9350	D&AWG	
35153000500001	-99.32956	36.55958	GETTY OIL	EIKE V	1	WILDCAT	WOODWAR	N024	W020	15	2127	KB	19681019	9350	D&AWG	
35153000620000	-99.15286	36.64024	PURE OIL	HENDERSON	1	WILDCAT	WOODWAR	N025	W018	17	1729	DF	19610405	8614	D&A-G	
35153001020001	-99.54482	36.45452	DAVIS EDWA	PEOPLES ST	1	TANGIER NW	WOODWAR	N023	W022	22	2145	DF	19770515	11400	D&AWO	
35153001540000	-99.45447	36.55487	ASHLAND OI	FERGUSON	1	WILDCAT	WOODWAR	N024	W021	16	1948	DF	19660203	10005	D&A-G	
35153001550001	-99.41366	36.51451	MACKELLAR	PHILLIP FE	1	WILDCAT	WOODWAR	N024	W021	35	2030	KB	19660809	10406	D&AWG	
35153200250000	-99.38166	36.50053	WESSLEY PE	HAGEMAN ES	1	WILDCAT	WOODWAR	N023	W020	6	2018	KB	19661018	10070	D&A	
35153200310000	-99.08941	36.43144	SAMEDAN OI	CAMPBELL	1	QUINLAN NW	WOODWAR	N023	W018	35	1852	DF	19661213	9175	D&A-G	
35153200310000	-99.08941	36.43144	SAMEDAN OI	CAMPBELL	1	QUINLAN NW	WOODWAR	N023	W018	35	1852	DF	19661213	9175	D&A-G	
35153200410000	-99.02383	36.42856	SAMEDAN OI	STATE	1-33	QUINLAN	WOODWAR	N023	W017	33	1724	KB	19670310	9069	GAS	354CSTR
35153200560000	-99.25755	36.34288	SHELL OIL	STOCKING	1-32	WILDCAT	WOODWAR	N022	W019	32	1971	KB	19670706	11300	D&A-O	
35153200580000	-99.1946	36.67551	NORTHERN O	T P STOUT	1	WILDCAT	WOODWAR	N025	W019	1	1829	KB	19670723	7924	D&A	
35153200590000	-99.08038	36.44047	SAMEDAN OI	MARY C GAR	1	WILDCAT	WOODWAR	N023	W018	25	1853	DF	19670622	9123	D&A	
35153200590000	-99.08038	36.44047	SAMEDAN OI	MARY C GAR	1	WILDCAT	WOODWAR	N023	W018	25	1853	DF	19670622	9123	D&A	
35153200640000	-99.25577	36.51226	SHELL OIL	BILLIE JEA	1-32	UNNAMED	WOODWAR	N024	W019	32	2068	KB	19670815	9494	D&A-G	
35153200680000	-99.56282	36.35729	SHELL OIL	LOCHMAN	1-28	TANGIER NW	WOODWAR	N022	W022	28	2210	KB	19671227	11917	GAS	402MRRW
35153200750000	-99.18081	36.47299	VIERSEN &	CASAD UNIT	1	UNNAMED	WOODWAR	N023	W019	13	1963	DF	19680112	9308	GAS	269HNTN
35153200790000	-99.00819	36.45924	CALVERT FU	JOHNSON	1	WILDCAT	WOODWAR	N023	W017	22	1682	KB	19671220	8685	D&A-G	
35153200790000	-99.00819	36.45924	CALVERT FU	JOHNSON	1	WILDCAT	WOODWAR	N023	W017	22	1682	KB	19671220	8685	D&A-G	
35153200970000	-99.14975	36.38263	ASHLAND OI	Z M RAMEY	1	WILDCAT	WOODWAR	N022	W018	17	1891	KB	19680318	9833	D&A-O	
35153200980000	-99.09725	36.45407	HALL-JONES	BARTOW	1	QUINLAN NW	WOODWAR	N023	W018	23	1999	DF	19680404	9155	D&A-O	
35153201010000	-99.32524	36.16917	VIERSEN &	GRIFFITH U	1	UNNAMED	WOODWAR	N020	W020	34	2221	KB	19680728	12934	2 GAS	269HNTNU
35153201010000	-99.32524	36.16917	VIERSEN &	GRIFFITH U	1	UNNAMED	WOODWAR	N020	W020	34	2221	KB	19680728	12934	2 GAS	269HNTNU
35153201030000	-99.16776	36.48394	VIERSEN &	TRISSEL UN	1	MOORELAND N	WOODWAR	N023	W018	7	2033	DF	19680514	9278	D&A-G	
35153201170000	-99.0712	36.48195	PAN AMERIC	BURR-ANDER	1	QUINLAN NW	WOODWAR	N023	W018	12	1738	KB	19681007	8672	D&A-O	
35153201210000	-99.21681	36.35733	WOODS PET	PEACH	1	WILDCAT	WOODWAR	N022	W019	27	1834	DF	19681012	10207	D&A-G	
35153201220000	-99.3038	36.19746	CAMERON GE	A A CAMERO	23	UNNAMED	WOODWAR	N020	W020	23	2150	DF	19681206	12378	OIL	403ATOK
35153201220000	-99.3038	36.19746	CAMERON GE	A A CAMERO	23	UNNAMED	WOODWAR	N020	W020	23	2150	DF	19681206	12378	OIL	403ATOK
35153201220000	-99.3038	36.19746	CAMERON GE	A A CAMERO	23	UNNAMED	WOODWAR	N020	W020	23	2150	DF	19681206	12378	OIL	403ATOK
35153201280000	-98.98548	36.4004	MIDWEST OI	MCFADDEN	1	UNNAMED	WOODWAR	N022	W017	11	1657	KB	19681128	9020	GAS	354CSTR

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35153000130000	269HNTN	12314	12328		5170	5170	954	0.42		2400	2400	0.464		multi-zn	M	l		FmR	No ISIP
35153000130000	269HNTN	12340	12349		5245	5245	1095	0.42		3600	3600	0.686		multi-zn	M	m		FmR	No ISIP
35153000130000	269HNTN	12340	12390		5430	5430	1451	0.44	2830	4670	4670	0.860		multi-zn	M	m	Y	FmR	No ISIP
35153000130000	269HNTN	12360	12366		5270	5270	1131	0.43		5145	5145	0.976		multi-zn	H	m		FmR	No ISIP
35153000130000	269HNTN	12110	12260		5930	5930	2657	0.48		515	515	0.087	tight	multi-zn	L	h			
35153000270000	269HNTN	10287	10312		3760	3760	-190	0.36	890	735	735	0.195	tight						
35153000300000	251CMNL	8820	8903		3700	3700	738	0.42		3500	3500	0.946					Y	FmR	No ISIP
35153000390000	269HNTN	9260	9289		4000	4000	1094	0.43	2000	3975	3975	0.994					Y	FmR	No ISIP
35153000400000	269HNTN	9310	9325		1200	1200	-4725	0.13		425	425	0.354		multi-zn	H	l			
35153000400000	269HNTN	9359	9380		2800	2800	-1339	0.30		350	350	0.125	tight	multi-zn	L	h			
35153000470000	301BDRC	8966	9040	1050	105	1050	-4814	0.12		50	50	0.048	tight						
35153000500001	269HNTN	9240	9350	3737	3737	3737	814	0.40	94	796	796	0.213	tight	multi-zn	M	m	Y	FmR	OK
35153000500001	269HNTN	9182	9190	3679	3707	3707	909	0.40	1444	1444	1444	0.390		multi-zn	H	h			
35153000500001	269HNTN	9193	9239	271	129	271	-6529	0.03	86	100	100	0.369	suspect	multi-zn	M	l			
35153000500001	269HNTN	9182	9190	1513	3495	3495	453	0.38	71	71	71	0.020	tight	multi-zn	L	m			
35153000620000	269HNTN	7781	7842	3260	3230	3260	898	0.42	2255	3230	3230	0.991					Y	FmR	OK
35153001020001	269HNTN	10699	10758	365	375	375	-7807	0.03	375	164	375	1.000	suspect						
35153001540000	269HNTN	8966	9005	3696	3107	3696	891	0.41	491	1249	1249	0.338					Y	FmR	OK
35153001550001	269HNTN	9637	9900	3527	3244	3527	-285	0.36					tight				Y	FmR	OK
35153200250000	269HNTN	9840	9875	84		84	-7676	0.01	42	42	42	0.500	suspect						
35153200310000	269HNTN	8853	8925	3698	3698	3698	880	0.41	3467	3698	3698	1.000		multi-zn	H	h	Y	FmR	OK
35153200310000	269HNTN	8800	8858	3398	3639	3639	820	0.41	887	887	887	0.244	tight	multi-zn	L	l			
35153200410000	269HNTN	8748	8756		602	602	-5737	0.07	21	43	43	0.071	tight						
35153200560000	269HNTN	10248	10322	2397	1666	2397	-3196	0.23	91	368	368	0.154	tight						
35153200580000	269HNTN	7814	7912		1016	1016	-3898	0.13		16	16	0.016	tight						
35153200590000	269HNTN	8765	8797	1187	1110	1187	-4391	0.13	53	53	53	0.045	tight	multi-zn	L	l			
35153200590000	269HNTN	8725	8765	1340	1085	1340	-4030	0.15	66	66	66	0.049	tight	multi-zn	H	h			
35153200640000	269HNTN	9220	9260	3780	3789	3789	956	0.41	112	132	132	0.035	tight				Y	FmR	OK
35153200680000	269HNTN	11556	11917	4740	4765	4765	540	0.40	4601	4765	4765	1.000					Y	FmR	OK
35153200750000	269HNTN	8911	8994	3623	3431	3623	760	0.40	692	757	757	0.209	tight						
35153200790000	269HNTN	8496	8685	3783	3783	3783	1132	0.44	1120	2107	2107	0.557		multi-zn	L	h	Y	FmR	OK
35153200790000	269HNTN	8367	8425	86	86	86	-6558	0.01	216	86	216	2.512	suspect	multi-zn	H	l			
35153200970000	269HNTN	9513	9530	3993	3993	3993	948	0.42	66	133	133	0.033	tight				Y	FmR	OK
35153200980000	269HNTN	8853	8907	3190	1811	3190	-48	0.36	70	70	70	0.022	tight						
35153201010000	269HNTN	12588	12620		5300	5300	999	0.42		1258	1258	0.237	tight	multi-zn	L	h		FmR	No ISIP
35153201010000	269HNTN	12670	12705		5392	5392	1112	0.42		1534	1534	0.284	tight	multi-zn	H	l	YD	FmR	No ISIP
35153201030000	269HNTN	9050	9075	3688	3656	3688	889	0.41	829	3656	3656	0.991						FmR	OK
35153201170000	269HNTN	8420	8557	3522	3542	3542	798	0.41	694	2936	2936	0.829						FmR	OK
35153201210000	269HNTN	9877	9890	3979	4007	4007	561	0.41	301	433	433	0.108	tight				Y	FmR	OK
35153201220000	269HNTNM	12090	12195	2765	2550	2765	-4099	0.23	1425	1425	1425	0.515		multi-zn	M	m			
35153201220000	269HNTNU	12000	12085	2093	1688	2093	-5434	0.17	1394	1394	1394	0.666		multi-zn	H	l			
35153201220000	269HNTNL	12310	12310	5300	5300	5300	1238	0.43					tight	multi-zn		h			
35153201280000	269HNTN	8688	8842	2386	2513	2513	-1781	0.28	85	85	85	0.034	tight						

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35153201320000	-99.40577	36.20836	CLEARY PET	TAYLOR	1-14	WILDCAT	WOODWAR	N020	W021	14	2272	KB	19681228	12997	D&A-G	
35153201330000	-99.27023	36.44409	RAMSEY ENG	GARTEN	1	WILDCAT	WOODWAR	N023	W019	30	1857	KB	19690213	9845	D&A-O	
35153201460000	-99.31731	36.1793	VIERSEN &	IRWIN UNIT	1	VICI	WOODWAR	N020	W020	27	2178	DF	19690327	12580	D&A-G	
35153201460000	-99.31731	36.1793	VIERSEN &	IRWIN UNIT	1	VICI	WOODWAR	N020	W020	27	2178	DF	19690327	12580	D&A-G	
35153201480000	-99.22015	36.48651	ASHLAND OI	LAURA TRIS	1	WILDCAT	WOODWAR	N023	W019	10	1973	KB	19690501	9615	D&A-G	
35153201500000	-99.28558	36.56152	MIDWEST OI	LEHMAN	1	UNNAMED	WOODWAR	N024	W020	13	2160	DF	19690612	9303	GAS	402MRRW
35153201500000	-99.28558	36.56152	MIDWEST OI	LEHMAN	1	UNNAMED	WOODWAR	N024	W020	13	2160	DF	19690612	9303	GAS	402MRRW
35153201620000	-99.44983	36.57297	CAYMAN COR	FERGUSON	1	WILDCAT	WOODWAR	N024	W021	9	1953	KB	19690824	9112	D&A	
35153201690000	-99.03499	36.43216	JONES & PE	ROBERTS UN	1	QUINLAN NW	WOODWAR	N023	W017	32	1735	DF	19690914	9010	GAS	354CSTR
35153201750000	-99.16783	36.46947	KING RESOU	TRISSEL	1-18	MOORELAND N	WOODWAR	N023	W018	18	1987	KB	19690823	9310	D&A-G	
35153201840001	-99.59503	36.29233	MIAMI OIL	DRISKELL	1	WILDCAT	WOODWAR	N021	W022	18	2247	KB	19710216	12500	D&AWO	
35153201890000	-99.10935	36.55595	SHENANDOAH	E L MADDUX	1	QUINLAN NW	WOODWAR	N024	W018	15	1749	KB	19700116	8248	GAS	354CSTR
35153201920000	-99.47702	36.55134	OSBORN W B	FERGUSON	1	WILDCAT	WOODWAR	N024	W021	17	2055	DF	19700124	10125	D&A	
35153201960000	-99.57994	36.5519	JONES & PE	DEVORE UNI	1	FORT SUPPLY	WOODWAR	N024	W022	17	2067	GR	19700715	10058	GAS	354CSTR
35153201960000	-99.57994	36.5519	JONES & PE	DEVORE UNI	1	FORT SUPPLY	WOODWAR	N024	W022	17	2067	GR	19700715	10058	GAS	354CSTR
35153202120000	-99.07182	36.4891	COX EDWIN	HINDERLITE	1	QUINLAN NW	WOODWAR	N023	W018	12	1696	DF	19700525	8600	D&A-G	
35153202120000	-99.07182	36.4891	COX EDWIN	HINDERLITE	1	QUINLAN NW	WOODWAR	N023	W018	12	1696	DF	19700525	8600	D&A-G	
35153202150000	-99.17258	36.24341	CITIES SER	NEWMAN	1	WILDCAT	WOODWAR	N020	W019	1	1871	KB	19700612	11345	D&A-G	
35153202180000	-99.48715	36.39733	SOUTHLAND	C E CHESTN	1	WILDCAT	WOODWAR	N022	W021	7	2267	KB	19700702	11192	D&A-G	
35153202180000	-99.48715	36.39733	SOUTHLAND	C E CHESTN	1	WILDCAT	WOODWAR	N022	W021	7	2267	KB	19700702	11192	D&A-G	
35153202310000	-99.25412	36.62036	MESA PET	JANZEN	1-28	WILDCAT	WOODWAR	N025	W019	28	1874	DF	19700824	8566	D&A-G	
35153202350000	-98.97356	36.41661	WOODS PET	WHITLAW UN	1	CEDARDALE N	WOODWAR	N022	W017	1	1660	KB	19700821	8905	D&A	
35153202370000	-99.09673	36.58411	HELMERICH	HOLLOWAY U	1	CEDARDALE N	WOODWAR	N024	W018	2	1755	KB	19701104	8130	D&A-G	
35153202460000	-99.28749	36.74504	SUN OIL	LUCAS	1	LOVEDALE	WOODWAR	N026	W019	7	1649	KB	19710210	7530	GAS	402MRRW
35153202610000	-99.0461	36.48993	ARKLA EXPL	HARPER UNI	8-1	WILDCAT	WOODWAR	N023	W017	8	1723	DF	19710415	8619	D&A-O	
35153202730000	-99.21168	36.76332	TEXAS O&G	USA	1	EDITH S	WOODWAR	N026	W019	2	1679	KB	19710819	7300	GAS	406TNKW
35153202950000	-99.27416	36.57082	HADSON OHI	RUTTMAN /U	1	BOILING SPRIN	WOODWAR	N024	W019	7	2145	DF	19720102	9240	GAS	402MRRW
35153203150000	-99.44107	36.52565	MONSANTO C	PHIL	1	WILDCAT	WOODWAR	N024	W021	27	1967	DF	19720502	10011	D&A-G	
35153203440000	-99.04394	36.5026	VIERSEN &	SIMMONS UN	5-1	WILDCAT	WOODWAR	N023	W017	5	1753	KB	19720825	8559	D&A-G	
35153204930001	-99.54478	36.46894	DAVIS EDWA	W DALE THO	1	TANGIER	WOODWAR	N023	W022	15	2140	DF	19770912	11510	D&AWO	
35153204930001	-99.54478	36.46894	DAVIS EDWA	W DALE THO	1	TANGIER	WOODWAR	N023	W022	15	2140	DF	19770912	11510	D&AWO	
35153205550001	-99.60026	36.56165	PUBLISHERS	WILSON GAR	1	FORT SUPPLY	WOODWAR	N024	W022	18	2088	KB	19800806	10640	D&AW	
35153205600000	-99.42066	36.51666	WOODS PET	FERGUSON	35-1	UNNAMED	WOODWAR	N024	W021	35	2015	KB	19741127	9785	GAS	402MRRW
35153206260001	-99.08082	36.50317	HANOVER MANAG	KUERSTEINER	1-A	CEDARDALE N	WOODWAR	N023	W018	1	1704	DF	19760422	8482	OIL-WO	354CSTR
35153206410000	-99.46868	36.44261	HILLIARD O	PHILLIPS-D	1	UNNAMED	WOODWAR	N023	W021	29	2063	DF	19751218	11220	2 GAS	269HNTN
35153206850000	-99.33664	36.18012	ASHLAND OI	WEAVER /B/	1	VICI	WOODWAR	N020	W020	28	2237	KB	19770622	12830	GAS	269HNTN
35153206850000	-99.33664	36.18012	ASHLAND OI	WEAVER /B/	1	VICI	WOODWAR	N020	W020	28	2237	KB	19770622	12830	GAS	269HNTN
35153206890001	-99.35085	36.19149	ASHLAND EXPL	ANTIS	1-20	VICI	WOODWAR	N020	W020	20	2216	KB	19771231	12817	GAS-WO	354MSSPU
35153207810000	-99.01588	36.23979	ASHLAND EX	FOX UNIT	2-4	CHESTER W	WOODWAR	N020	W017	4	1738	DF	19771118	10530	GAS	359MSSP
35153207830000	-99.26571	36.49834	WOODS PET	HIGHFILL	6-1	WOODWARD N	WOODWAR	N023	W019	6	2028	KB	19770805	10244	D&A-O	
35153209080000	-99.2463	36.22604	ATLANTIC R	ARCO-NFC T	1	WILDCAT	WOODWAR	N020	W019	8	1971	GR	19780923	11775	D&A	
35153209080000	-99.2463	36.22604	ATLANTIC R	ARCO-NFC T	1	WILDCAT	WOODWAR	N020	W019	8	1971	GR	19780923	11775	D&A	
35153210800000	-99.26357	36.69993	NATIONAL C	DOTTER	1-29	LOVEDALE	WOODWAR	N026	W019	29	1784	KB	19800726	7950	D&A	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35153201320000	269HNTN	12674	12776	336	4479	4479	-872	0.35	1532	1554	1554	0.347							
35153201330000	269HNTN	9570	9596	4006	4006	4006	876	0.42	1254	1322	1322	0.330					Y	FmR	OK
35153201460000	269HNTN	12380	12450	2563	2059	2563	-4760	0.21	1373	1373	1373	0.536		multi-zn	L	h			
35153201460000	269HNTN	12450	12560	2372	2049	2372	-5281	0.19	1392	1382	1392	0.587		multi-zn	H	l			
35153201480000	269HNTN	9226	9242	3766	3787	3787	875	0.41	37	187	187	0.049	tight				Y	FmR	OK
35153201500000	269HNTN	9134	9158	3677	3677	3677	910	0.40	230	1336	1336	0.363		multi-zn	H	h	Y	FmR	OK
35153201500000	269HNTN	9085	9143	3150	1244	3150	-209	0.34	23	115	115	0.037	tight	multi-zn	L	l			
35153201620000	269HNTN	8862	8924	38	325	325	-6272	0.04	91	114	114	0.351	suspect						
35153201690000	269HNTN	8676	8700	2020	1390	2020	-2621	0.23	560	560	560	0.277	tight						
35153201750000	269HNTN	9035	9061	1073	890	1073	-4766	0.12	457	457	457	0.426							
35153201840001	269HNTN	12261	12274	4637	4337	4637	-55	0.38	1074	1074	1074	0.232	tight						
35153201890000	269HNTN	8124	8158	3369	3305	3369	836	0.41	106	423	423	0.126	tight				Y	FmR	OK
35153201920000	269HNTN	9796	9858	672	731	731	-6231	0.07	249	292	292	0.399							
35153201960000	269HNTN	9897	9990	1764	1449	1764	-4129	0.18	864	682	864	0.490		multi-zn	H	l			
35153201960000	269HNTN	9883	10058	2017	996	2017	-3653	0.20	43	65	65	0.032	tight	multi-zn	L	h			
35153202120000	269HNTN	8410	8440	3576	3550	3576	946	0.42	520	559	559	0.156	tight	multi-zn	L	h	Y	FmR	OK
35153202120000	269HNTN	8316	8385	1861	1506	1861	-2687	0.22	515	515	515	0.277	tight	multi-zn	H	l			
35153202150000	269HNTN	10990	11035	4704	4704	4704	952	0.43	186	418	418	0.089	tight				Y	FmR	OK
35153202180000	269HNTN	10980	11004	4348	1523	4348	614	0.40	928	936	936	0.215	tight	multi-zn	L	h	Y	FmR	OK
35153202180000	269HNTN	10998	11023		4308	4308	509	0.39	651	953	953	0.221	tight	multi-zn	H	l		FmR	No ISIP
35153202310000	269HNTN	8324	8490	3427	3427	3427	754	0.40	2855	3427	3427	1.000					Y	FmR	OK
35153202350000	269HNTN	8597	8609	476	1142	1142	-4493	0.13	62	72	72	0.063	tight						
35153202370000	269HNTN	7885	8052	3230	3240	3240	671	0.40	553	1005	1005	0.310					YD	FmR	OK
35153202460000	269HNTN	7468	7530	3110	3045	3110	807	0.41	65	108	108	0.035	tight						
35153202610000	269HNTN	8362	8382	3433	3476	3476	816	0.41	2248	3173	3173	0.913					Y	FmR	OK
35153202730000	269HNTN	7158	7300	620	2634	2634	44	0.36					tight						
35153202950000	269HNTN	9002	9022		3629	3629	927	0.40					tight				Y	FmR	No ISIP
35153203150000	269HNTN	9485	9570	3593	3745	3745	451	0.39	1028	1053	1053	0.281	tight						
35153203440000	269HNTN	8343	8363	3453	3389	3453	816	0.41	370	2262	2262	0.655						FmR	OK
35153204930001	269HNTN	10594	10650	3947	3522	3947	-22	0.37	2687	2366	2687	0.681		multi-zn	L	h	Y	FmR	OK
35153204930001	269HNTN	10574	10602		2300	2300	-3516	0.22		1575	1575	0.685		multi-zn	H	l		FmR	No ISIP
35153205550001	269HNTN	9851	9956	907	747	907	-5917	0.09	506	533	533	0.588							
35153205600000	269HNTN	9715	9765	3412	3397	3412	-412	0.35	1647	2846	2846	0.834						FmR	OK
35153206260001	269HNTN	8223	8263	3468	3468	3468	899	0.42	2607	3468	3468	1.000						FmR	OK
35153206410000	269HNTN	10340	10356	4399		4399	1167	0.42	1144		1144	0.260	tight				Y	FmR	No FSIP
35153206850000	269HNTN	12400	12675	5546	5267	5546	1489	0.44	2243	2424	2424	0.437		multi-zn	L	h		FmR	OK
35153206850000	269HNTN	12450	12830		5187	5187	562	0.40	1907	5175	5175	0.998		multi-zn	H	l	YD	FmR	No ISIP
35153206890001	269HNTN	12594	12733	5520	5247	5520	1354	0.43	1483	3664	3664	0.664					YF	FmR	OK
35153207810000	269HNTN	10090	10130	4031	429	4031	277	0.40	1627	3337	3337	0.828						FmR	OK
35153207830000	269HNTN	9326	9385	3843	3843	3843	908	0.41	117	200	200	0.052	tight				Y	FmR	OK
35153209080000	269HNTN	11665	11750	4978	4978	4978	926	0.42	3798	4933	4933	0.991		multi-zn	H	h	Y	FmR	OK
35153209080000	269HNTN	11356	11456	88	131	131	-9203	0.01	88	110	110	0.840	suspect	multi-zn	L	l			
35153210800000	269HNTN	7870	7883	640		640	-4723	0.08	10		10	0.016	tight						

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
35153212820000	-99.3419	36.4849	GRAHAM EXP	RILEY	1	WOODWARD N	WOODWAR	N023	W020	9	2026	KB	19820609	10000	D&A-G	
35153300350001	-99.23293	36.19704	BREWER OIL	MATHEWS	1	WILDCAT	WOODWAR	N020	W019	21	2080	KB	19680805	12056	D&AWG	
35153300370000	-99.09169	36.42601	ASHLAND OI	CAMPBELL J	1	WILDCAT	WOODWAR	N023	W018	35	1871	DF	19650311	9241	D&A-O	
35153300370000	-99.09169	36.42601	ASHLAND OI	CAMPBELL J	1	WILDCAT	WOODWAR	N023	W018	35	1871	DF	19650311	9241	D&A-O	
35153300510000	-99.02484	36.44392	ASHLAND OI	MULLINS WM	1	QUINLAN NW	WOODWAR	N023	W017	28	1655	DF	19660203	9528	D&A	
35153351880001	-99.2925	36.39707	SAMEDAN OIL	HUNDORF	1	UNNAMED	WOODWAR	N022	W020	12	2045	DF	19660809	10477	D&AW	
35153351880001	-99.2925	36.39707	SAMEDAN OIL	HUNDORF	1	UNNAMED	WOODWAR	N022	W020	12	2045	DF	19660809	10477	D&AW	
35153352050000	-99.16701	36.55645	PHILLIPS P	CALDWELL-F	1	QUINLAN NW	WOODWAR	N024	W018	18	2078	DF	19600330	8761	GAS	354CSTR
35153352910000	-99.34631	36.48312	GOFF-LEEPE	HARRISON	1	WILDCAT	WOODWAR	N023	W020	9	2009	DF	19611017	10026	D&A-O	
35153353190000	-99.52848	36.56798	PAN AMERIC	STTE BRD A	1	FORT SUPPLY	WOODWAR	N024	W022	11	1978	DF	19630401	9985	OIL	404DSMS
35153353190000	-99.52848	36.56798	PAN AMERIC	STTE BRD A	1	FORT SUPPLY	WOODWAR	N024	W022	11	1978	DF	19630401	9985	OIL	404DSMS
42179000040001	-100.54099	35.45741	GULF OIL	LALLIE E WEBB	1	WILDCAT	GRAY	H&GN	A6	1	2730	KB	19640513	13531	D&AW	
42179005920000	-100.5993	35.53743	HUMBLE OIL & REI	ROBERTA F LON	1	LAKETON E	GRAY	H&GN	A6	68	2978	DF	19671226	12973	D&A-G	
42179301450000	-100.62486	35.5061	PHILLIPS PET	FRANKLIN D	1	WILDCAT	GRAY	H&GN	A6	53	2854	KB	19720814	13594	D&A-G	
42179303020000	-100.56839	35.56969	TESORO PETROLI	BERRY	1	WILDCAT	GRAY	H&GN	A6	72	3019	KB	19760210	12380	D&A	
42179305890000	-100.7012	35.61034	AMAREX INC	LOCKE TRUST	1	LAKETON	GRAY	BS&F	M2	121	3105	DF	19771028	11066	D&A	
42179306770000	-100.64351	35.46713	BOSWELL ENERG	FRANKLIN RANC	1-19	WILDCAT	GRAY	H&GN	A6	19	2742	KB	19790411	11976	D&A	
42179306770000	-100.64351	35.46713	BOSWELL ENERG	FRANKLIN RANC	1-19	WILDCAT	GRAY	H&GN	A6	19	2742	KB	19790411	11976	D&A	
42179350040000	-100.66116	35.46109	PAN AMERICAN	J B FRANKLIN	1	WILDCAT	GRAY	H&GN	A6	18	2720	KB	19660622	13203	D&A-OG	
42179350040000	-100.66116	35.46109	PAN AMERICAN	J B FRANKLIN	1	WILDCAT	GRAY	H&GN	A6	18	2720	KB	19660622	13203	D&A-OG	
42179350040000	-100.66116	35.46109	PAN AMERICAN	J B FRANKLIN	1	WILDCAT	GRAY	H&GN	A6	18	2720	KB	19660622	13203	D&A-OG	
42179350150000	-100.55525	35.58833	STANDARD OIL OF	R B MATHERS 3	1	UNNAMED	GRAY	H&GN	A6	74	2870	KB	19661122	12859	D&A-OG	
42195300720000	-101.18298	36.45865	SIDWELL OIL & GA	C D ALEXANDER	1	BRILLHART	HANSFORD	WCRR	1	3	3021	KB	19721031	8657	D&A-OG	
42195302440000	-101.19182	36.43658	TEX-STAR O&G	GULF-ALEXANDI	1	BRILLHART	HANSFORD	WCRR	1	9	3027	KB	19780826	8620	D&A-OG	
42195302440000	-101.19182	36.43658	TEX-STAR O&G	GULF-ALEXANDI	1	BRILLHART	HANSFORD	WCRR	1	9	3027	KB	19780826	8620	D&A-OG	
42211000730000	-100.47231	35.79948	HUMBLE OIL	MIAMI CATTLE	1	WILDCAT	HEMPHILL	H&GN	A2	37	2800	KB	19651112	16710	D&A-G	
42211000730000	-100.47231	35.79948	HUMBLE OIL	MIAMI CATTLE	1	WILDCAT	HEMPHILL	H&GN	A2	37	2800	KB	19651112	16710	D&A-G	
42211000730000	-100.47231	35.79948	HUMBLE OIL	MIAMI CATTLE	1	WILDCAT	HEMPHILL	H&GN	A2	37	2800	KB	19651112	16710	D&A-G	
42211200890000	-100.08319	35.98778	SAMEDAN MIDWE	RIO BRAVO	2	FELDMAN	HEMPHILL	H&TC	42	23	2539	KB	19680322	15655	D&A-G	
42211300220000	-100.22234	35.92194	MCCULLOCH OIL I	MATHERS RANC	1	MATHERS RAN	HEMPHILL	FLOWE		###	2405	DF	19700304	17017	GAS	269HNTN
42211300220000	-100.22234	35.92194	MCCULLOCH OIL I	MATHERS RANC	1	MATHERS RAN	HEMPHILL	FLOWE		###	2405	DF	19700304	17017	GAS	269HNTN
42211300220000	-100.22234	35.92194	MCCULLOCH OIL I	MATHERS RANC	1	MATHERS RAN	HEMPHILL	FLOWE		###	2405	DF	19700304	17017	GAS	269HNTN
42211300310000	-100.44595	35.92796	CONTINENTAL OIL	E R MILLER	1	WILDCAT	HEMPHILL	H&GN	M1	85	2922	KB	19700417	18225	D&A-G	
42211300600000	-100.21234	35.91927	MCCULLOCH OIL (	MATHERS RANC	2	MATHERS RAN	HEMPHILL	JACKSO			2479	DF	19700928	17016	GAS	269HNTN
42211300620001	-100.5204	35.69438	HAMON JAKE L	LOCKE CATTLE	1	LOCKE	HEMPHILL	H&GN	A2	40	2815	KB	19701002	13930	GAS-WO	169ABCK
42211300680000	-100.1991	35.90811	PHILCON DEVELO	HUMPHREYS	1	UNNAMED	HEMPHILL	H&TC	41	163	2466	KB	19710322	17407	GAS	406DGLS
42211300720000	-100.52484	35.69413	HAMON JAKE L	LOCKE CATTLE	2	HAMON LOCKE	HEMPHILL	H&GN	A2	39	2838	KB	19710316	13850	GAS	202SMPS
42211300750000	-100.2231	35.89142	MCCULLOCH OIL-S	MATHERS RANC	4	MATHERS RAN	HEMPHILL	H&TC	41	158	2281	KB	19710330	20080	GAS	269HNTN
42211300750000	-100.2231	35.89142	MCCULLOCH OIL-S	MATHERS RANC	4	MATHERS RAN	HEMPHILL	H&TC	41	158	2281	KB	19710330	20080	GAS	269HNTN
42211300820000	-100.26778	35.84221	DIAMOND SHAMR(	CHARLES H WRI	1-11	UNNAMED	HEMPHILL	H&TC	41	117	2435	KB	19710716	18257	GAS	269HNTN
42211300820000	-100.26778	35.84221	DIAMOND SHAMR(	CHARLES H WRI	1-11	UNNAMED	HEMPHILL	H&TC	41	117	2435	KB	19710716	18257	GAS	269HNTN
42211300850000	-100.52037	35.69049	HAMON JAKE L	LOCKE CATTLE	3	HAMON LOCKE	HEMPHILL	H&GN	A2	37	2848	KB	19710416	13880	2 GAS	169ABCK
42211300860000	-100.41504	35.88376	DIAMOND SHAMR(	D Q ISAACS SR	1	UNNAMED	HEMPHILL	CURTIS			2412	KB	19710617	17700	GAS	402MRRWL

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
35153212820000	269HNTN	9860	9893	3632	4008	4008	752	0.41	90	77	90	0.022	tight						
35153300350001	269HNTN	11729	11769	4975	4785	4975	1010	0.42	1165	1226	1226	0.246	tight						
35153300370000	269HNTN	8957	8959	4000	4000	4000	1514	0.45					tight	multi-zn		h			
35153300370000	269HNTN	8951	8953	3825	3675	3825	1144	0.43					tight	multi-zn		l			
35153300510000	269HNTN	8744	8767	3792	3790	3792	1043	0.43	1493	3372	3372	0.889					Y	FmR	OK
35153351880001	269HNTN	10220	10268	1491	1301	1491	-5017	0.15	1130	1130	1130	0.758		multi-zn					
35153351880001	269HNTN	10266	10393	4129	3575	4129	-1513	0.40	1145	1145	1145	0.277	tight	multi-zn					
35153352050000	269HNTN	8635	8695	2430	3300	3300	480	0.38	1455	3205	3205	0.971						FmR	damaged
35153352910000	269HNTN	9898	10026	4145	3830	4145	897	0.41	930	1030	1030	0.248	tight				Y	FmR	OK
35153353190000	269HNTN	9726	9729	2450	100	2450	-2482	0.25					tight	multi-zn		h			
35153353190000	269HNTN	9615	9618	1200	100	1200	-5059	0.12					tight	multi-zn		l			
42179000040001	269HNTN	12112	12117	4963	5028	5028	1426	0.41	5191	4232	5191	1.032						FmR	OK
42179005920000	269HNTN	10986	11250	3951	3908	3951	225	0.35	737	998	998	0.253	tight						
42179301450000	269HNTN	12056	12108	4992	4879	4992	1481	0.41	1436	3139	3139	0.629					Y	FmR	OK
42179303020000	269HNTN	11850	11938	3346	4292	4292	311	0.36	3346	3979	3979	0.927							
42179305890000	269HNTN	10647	11066	3810	3757	3810	233	0.34	163	325	325	0.085	tight						
42179306770000	269HNTN	11286	11324	2634	3278	3278	-1533	0.29	1086	2634	2634	0.804		multi-zn	L	h			
42179306770000	269HNTN	10879	10941		43	43	-8107	0.00		43	43	1.000	suspect	multi-zn	H	l			
42179350040000	269HNTN	11240	11300	4284	3260	4284	633	0.38	1434	1337	1434	0.335		multi-zn	H	l			
42179350040000	269HNTN	11430	11451	4948	4837	4948	1910	0.43	1172	1171	1172	0.237	tight	multi-zn	M	h			
42179350040000	269HNTN	11212	11228	4590	3822	4590	1363	0.41		948	948	0.207	tight	multi-zn	L	m			
42179350150000	269HNTN	12650	12699	5213	5213	5213	1382	0.41	1056	4177	4177	0.801						FmR	OK
42195300720000	269HNTN	8605	8636	2740	2674	2740	277	0.32	165	675	675	0.246	tight					FmR	OK
42195302440000	269HNTN	8492	8620	3091	3091	3091	1054	0.36	214	235	235	0.076	tight	multi-zn	H	h	Y	FmR	OK
42195302440000	269HNTN	8502	8530	3012	3012	3012	974	0.35	47	71	71	0.024	tight	multi-zn	L	l			
42211000730000	269HNTN	14992	15156	5245	5690	5690	-119	0.38	2766	2843	2843	0.500		multi-zn	M	l			
42211000730000	269HNTN	15330	15509	5734	6533	6533	1340	0.42	3031	3119	3119	0.477		multi-zn	L	m			
42211000730000	269HNTN	14695	14795	6481	6297	6481	1943	0.44	2932	3325	3325	0.513		multi-zn	H	h			
42211200890000	269HNTN	15240	15655	2808	2274	2808	-7077	0.18	1129	1308	1308	0.466							
42211300220000	269HNTN	16750	16845	7961	7905	7961	2680	0.47	2198	4383	4383	0.551		multi-zn	L	h	Y	FmR	OK
42211300220000	269HNTN	16845	16929	7961	7961	7961	2596	0.47	3700	6556	6556	0.824		multi-zn	H	m		FmR	OK
42211300220000	269HNTN	16700	16750	2717	2444	2717	-8502	0.16	1981	2008	2008	0.739		multi-zn	M	l			
42211300310000	269HNTN	17852	18225	7611	7554	7611	1065	0.42	3913	3970	3970	0.522							
42211300600000	269HNTN	16739	16939	7952	7925	7952	2641	0.47	2435	2136	2435	0.306						FmR	OK
42211300620001	269HNTN	12136	12500	815	772	815	-7932	0.07	365	386	386	0.474							
42211300680000	269HNTN	17110	17292	3327	3427	3427	-7456	0.20	3152	3264	3264	0.952							
42211300720000	269HNTN	12170	12412	165	236	236	-9066	0.02	47	94	94	0.398	suspect						
42211300750000	269HNTN	17231	17440	7970	7906	7970	1981	0.46	2990	2572	2990	0.375		multi-zn	L	h		FmR	OK
42211300750000	269HNTN	17229	17350	950	927	950	-13026	0.05	827	927	927	0.976		multi-zn	H	l			
42211300820000	269HNTN	17985	18085	7993		7993	1539	0.44	2436	2881	2881	0.360		multi-zn	H	l		FmR	No FSIP
42211300820000	269HNTN	17918	17985	8033	7529	8033	1725	0.45	2158	911	2158	0.269	tight	multi-zn	L	h		FmR	OK
42211300850000	269HNTN	12386	12595	5295	4942	5295	1640	0.42	4294	4514	4514	0.853					Y	FmR	OK
42211300860000	269HNTN	16280	16490	4150	3408	4150	-5153	0.25	1969	2062	2062	0.497		multi-zn	L	h			

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
42211300860000	-100.41504	35.88376	DIAMOND SHAMR(	D Q ISAACS SR	1	UNNAMED	HEMPHILL	CURTIS			2412	KB	19710617	17700	GAS	402MRRWL
42211300880000	-100.229	35.90814	MCCULLOCH OIL &	MATHERS RANC	5	MATHERS RAN	HEMPHILL	H&TC	41	165	2364	KB	19710802	17431	GAS	269HNTN
42211300920000	-100.52528	35.69051	HAMON JAKE L	HOLLAND	1	LOCKE	HEMPHILL	H&GN	A2	38	2853	KB	19720417	13853	GAS	202SMPS
42211300960000	-100.1228	35.78804	MCCULLOCH OIL &	MATHERS RANC	6	MATHERS RAN	HEMPHILL	H&TC	41	159	2292	KB	19711004	17594	GAS	269HNTN
42211300980000	-100.24112	35.89178	MCCULLOCH OIL	MATHERS RANC	7	MATHERS RAN	HEMPHILL	H&TC	41	157	2285	KB	19711015	17700	GAS	269HNTN
42211301080000	-100.22197	35.86351	STEPHENS PROD	LUCILLE WRIGH	1	WILDCAT	HEMPHILL	H&TC	41	124	2290	DF	19711119	18097	D&A-G	
42211301090000	-100.27708	35.84036	DIAMOND SHAMR(	WAYNE-CLEVEL	1-11	BIG TIMBER CR	HEMPHILL	H&TC	41	118	2520	KB	19720201	18366	GAS	269HNTN
42211301130000	-100.24667	35.90341	MCCULLOCH OIL	MATHERS RANC	10	MATHERS RAN	HEMPHILL	H&TC	41	166	2440	KB	19720301	17530	GAS	269HNTN
42211301240000	-100.19171	35.88591	AMAREX INC	USA CANATSER	1	MATHERS RAN	HEMPHILL	H&TC	41	160	2284	KB	19720501	17764	GAS	269HNTN
42211301240000	-100.19171	35.88591	AMAREX INC	USA CANATSER	1	MATHERS RAN	HEMPHILL	H&TC	41	160	2284	KB	19720501	17764	GAS	269HNTN
42211301330000	-100.26128	35.90068	MCCULLOCH OIL E	MATHERS RANC	12	MATHERS RAN	HEMPHILL	H&TC	41	167	2332	KB	19730216	17414	GAS	269HNTN
42211301480000	-100.51089	35.62494	SUN OIL	O V BAILEY	1	WILDCAT	HEMPHILL	H&GN	A2	12	2980	KB	19720626	15732	D&A	
42211301490000	-100.18486	35.87659	AMAREX INC	CONATSER	1-14	MATHERS RAN	HEMPHILL	H&TC	41	147	2266	KB	19720914	17850	GAS	269HNTN
42211301590000	-100.19443	35.89677	PHILCON DEVELO	HUMPHREYS	2	MATHERS RAN	HEMPHILL	H&TC	41	163	2371	KB	19721005	17523	GAS	269HNTN
42211301710000	-100.07391	35.83899	AMARILLO OIL	BURTON	1	UNNAMED	HEMPHILL	H&TC	41	106	2320	KB	19731217	19175	GAS	402MRRW
42211302000000	-100.10547	36.01698	MONSANTO CO	HODGSON	1	FELDMAN	HEMPHILL	H&TC	42	42	2643	KB	19730620	15245	GAS	404CHRK
42211302000000	-100.10547	36.01698	MONSANTO CO	HODGSON	1	FELDMAN	HEMPHILL	H&TC	42	42	2643	KB	19730620	15245	GAS	404CHRK
42211302070000	-100.21461	35.89197	MCCULLOCH OIL E	MATHERS RANC	19	MATHERS RAN	HEMPHILL	H&TC	41	159	2313	KB	19730122	17577	D&A-G	
42211302390000	-100.25885	35.87714	MCCULLOCH OIL (	IDS-STATEX-WR	1-15	HEMPHILL	HEMPHILL	H&TC	41	151	2298	KB	19730809	17665	GAS	000GRWS
42211302790000	-100.06648	35.87721	EL PASO NATURA	GENE HOWE	3	HOWE RANCH	HEMPHILL	H&TC	41	140	2703	GR	19740121	17500	GAS	269HNTN
42211302820000	-100.06862	35.89937	DIAMOND SHAMR(	LEWIS H HUMPH	1-34	MATHERS RAN	HEMPHILL	G&M	1	34	2460	KB	19731211	17007	GAS	269HNTN
42211303300000	-100.41898	35.6974	MCCULLOCH OIL	ARRINGTON-B	1	HEMPHILL	HEMPHILL	H&GN	A2	45	2693	KB	19750630	20000	GAS	000GRWS
42211304440000	-100.14421	35.7037	HOOVER & BRACK	ALEXANDER	1	WASHITA CREI	HEMPHILL	POITEV		1	2465	KB	19751124	20701	GAS	402MRRW
42211304660000	-100.18781	35.86266	HOOVER & BRACK	ISAACS	1	MATHERS RAN	HEMPHILL	H&TC	41	126	2293	KB	19750716	18000	D&A-G	
42211306870000	-100.48425	35.64304	HOOVER & BRACK	PRICE	1	WILDCAT	HEMPHILL	H&GN	A2	17	2932	GR	19770416	16170	D&A-G	
42211309530000	-100.27902	35.68666	AMAREX INC	FILLINGIM-TEAS	1	BUFFALO WAL	HEMPHILL	H&GN	M1	87	2618	KB	19781120	20530	GAS	402MRRW
42233306280000	-101.47438	35.98911	SUN OIL	ROBERTS	1	WILDCAT	HUTCHNSN	T&NO	ST	104	3275	KB	19781014	8640	D&A	
42295300710000	-100.03438	36.25621	CLARK CANADIAN	PARKER	1	LIPSCOMB E	LIPSCOMB	H&TC	43	618	2275	KB	19720416	14350	D&A-G	
42295300790000	-100.50848	36.13817	PHILLIPS PET	RACHEL-A	1	UNNAMED	LIPSCOMB	H&TC	43	292	2801	KB	19721123	13750	GAS	402MRRWL
42295302010000	-100.1743	36.1232	HAMON JAKE L	JONES	1	WILDCAT	LIPSCOMB	H&TC	43	255	2643	KB	19751108	14635	D&A-OG	
42357201440000	-100.7608	36.22073	PHILLIPS PET	LINA 'C'	1	PSHIGODA	OCHLTREE	H&TC	43	570	2891	DF	19680716	11900	GAS	353STLS
42357203000000	-101.04234	36.15776	PHILLIPS PET	NITSCHKE /A/	1	HANSFORD	OCHLTREE	T&NO	4T	110	3061	DF	19670105	10150	GAS	402MRRWL
42357301520000	-100.61496	36.19812	TEXAS PACIFIC OI	PARNELL BROTI	1	WILDCAT	OCHLTREE	H&TC	43	474	2694	DF	19680720	12112	D&A-G	
42357301520000	-100.61496	36.19812	TEXAS PACIFIC OI	PARNELL BROTI	1	WILDCAT	OCHLTREE	H&TC	43	474	2694	DF	19680720	12112	D&A-G	
42357314220000	-100.86395	36.41628	MRR OIL	BOLERJACK	1-48	PERRYTON	OCHLTREE	AHRENI	11	48	2963	KB	19850507	9955	OIL	354CSTR
42357601890000	-100.79771	36.35144	TEXAS PACIFIC OI	H C BRILLHART	1	PERRYTON W	OCHLTREE	H&TC	43	925	2927	KB	19670809	10355	OIL	404MRMN
42393000490001	-101.0396	35.78416	FEDERAL PETROL	THEIS	1	WILDCAT	ROBERTS	I&GN	2	179	2861	KB	19680820	11800	D&AWOG	
42393000720000	-100.81529	35.70367	PHILLIPS PET	LOCKE	1-A		ROBERTS	I&GN	2	18	3107	DF	19560820	9960	1O&1G	406LCMP
42393300060000	-100.76811	35.97295	DIAMOND SHAMR(	MORRISON ETAI	1-21	WILDCAT	ROBERTS	H&TC	42	212	2480	DF	19690914	12140	D&A	
42393300250000	-100.98761	35.8896	WESTERN STATE	REYNOLDS	1	WILDCAT	ROBERTS	EL&RR	D	8	2687	KB	19720407	12040	D&A-OG	
42393300250000	-100.98761	35.8896	WESTERN STATE	REYNOLDS	1	WILDCAT	ROBERTS	EL&RR	D	8	2687	KB	19720407	12040	D&A-OG	
42393300540000	-100.69275	35.89311	HELMERICH & PAY	ANNIE JONES TF	1	WILDCAT	ROBERTS	EL&RR	A2	13	2608	KB	19730515	13040	D&A-G	
42393300540000	-100.69275	35.89311	HELMERICH & PAY	ANNIE JONES TF	1	WILDCAT	ROBERTS	EL&RR	A2	13	2608	KB	19730515	13040	D&A-G	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
42211300860000	269HNTN	16180	16490	3129	2851	3129	-7349	0.19	1595	1695	1695	0.542		multi-zn	H	l			
42211300880000	269HNTN	16953	17207	7978		7978	2314	0.46	3325	3709	3709	0.465						FmR	No FSIP
42211300920000	269HNTN	12415	12650	4885	3240	4885	708	0.39	679	463	679	0.139	tight					FmR	OK
42211300960000	269HNTN	17154	17590	7198	7758	7758	1386	0.44	3580	3597	3597	0.464							
42211300980000	269HNTN	17306	17500	8006	8006	8006	2002	0.46	4539	4878	4878	0.609						FmR	OK
42211301080000	269HNTN	17860	17978	7878	7878	7878	1254	0.44	5833	6824	6824	0.866						FmR	OK
42211301090000	269HNTN	18099	18366	7627	7563	7627	556	0.42	4143	4175	4175	0.547							
42211301130000	269HNTN	17083	17530	7900		7900	1899	0.45	4289	3972	4289	0.543						FmR	No FSIP
42211301240000	269HNTN	17430	17640	8356	8356	8356	2614	0.47	3872	3281	3872	0.463		multi-zn	L	h		FmR	OK
42211301240000	269HNTN	17361	17390	3824	3906	3906	-6706	0.22	3350	3330	3350	0.858		multi-zn	H	l			
42211301330000	269HNTN	17104	17377	7854	7854	7854	1845	0.45	3886	2785	3886	0.495						FmR	OK
42211301480000	269HNTN	14075	14225	5642	5559	5642	888	0.40	2953	4119	4119	0.730						FmR	OK
42211301490000	269HNTN	17552	17714	8182	7908	8182	2148	0.46	3481	3296	3481	0.425					Y	FmR	OK
42211301590000	269HNTN	17245	17523	7966	7966	7966	1979	0.45	3897	3063	3897	0.489						FmR	OK
42211301710000	269HNTN	18880	19175	7532	6644	7532	-657	0.39	3966	4069	4069	0.540							
42211302000000	269HNTN	14982	15245	3343	3692	3692	-4662	0.24	2299	2299	2299	0.623		multi-zn	L	h			
42211302000000	269HNTN	14875	14950	2353	2326	2353	-7247	0.16	2299	2298	2299	0.977		multi-zn	H	l			
42211302070000	269HNTN	17057	17557	7400	7883	7883	1709	0.45	2944	3948	3948	0.501							
42211302390000	269HNTN	17325	17665	3971	4802	4802	-5040	0.27	3204	3204	3204	0.667							
42211302790000	269HNTN	16832	17500	7709	7615	7709	1781	0.44	877	711	877	0.114	tight					FmR	OK
42211302820000	269HNTN	16800	17007	7973	7973	7973	2599	0.47	3300	3364	3364	0.422					Y	FmR	OK
42211303300000	269HNTN	19169	19533	8237	8237	8237	874	0.42	5997	7372	7372	0.895					Y	FmR	OK
42211304440000	269HNTN	20325	20701	932	9489	9489	2170	0.46	9321	9321	9321	0.982							
42211304660000	269HNTN	17780	18000	7035		7035	-578	0.39	3036	3036	3036	0.432							
42211306870000	269HNTN	15255	16170	6053	5973	6053	-221	0.37	2914	3005	3005	0.496							
42211309530000	269HNTN	20040	20530	9547		9547	2619	0.47	4856	4934	4934	0.517							
42233306280000	269HNTN	7975	8032	2739	2739	2739	1133	0.34		2631	2631	0.961					Y	FmR	OK
42295300710000	269HNTN	13062	13225	3729	2898	3729	-2931	0.28	2270		2270	0.609							
42295300790000	269HNTN	13446	13750	5863		5863	1660	0.43	1485	1724	1724	0.294	tight						
42295302010000	269HNTN	14006	14103	4262	3930	4262	-2294	0.30	2332	2332	2332	0.547							
42357201440000	269HNTN	11063	11138	2355	2070	2355	-3182	0.21	510	482	510	0.217	tight						
42357203000000	269HNTN	9372	9430	3486	3486	3486	1128	0.37	1386	2137	2137	0.613					Y	FmR	OK
42357301520000	269HNTN	11276	11310	4611	4538	4611	1300	0.41		973	973	0.211	tight	multi-zn	L	h			
42357301520000	269HNTN	11276	11310	3943	2504	3943	-136	0.35		982	982	0.249	tight	multi-zn	H	l			
42357314220000	269HNTN	9778	9812	1868	1906	1906	-2750	0.19	194	369	369	0.194	tight						
42357601890000	269HNTN	9870	9946	3595	3058	3595	712	0.36	87	218	218	0.061	tight						
42393000490001	269HNTN	10488	10520	3992	3969	3992	926	0.38	902	952	952	0.238	tight						
42393000720000	269HNTN	9675	9757		2800	2800	-628	0.29		100	100	0.036	tight						
42393300060000	269HNTN	10565	10719	7316	3794	7316	7494	0.68	527	606	606	0.083	tight						
42393300250000	269HNTN	11135	11205	4311	4184	4311	753	0.38	1204	1331	1331	0.309		multi-zn	L	l		FmR	OK
42393300250000	269HNTN	10912	11119	4475	4475	4475	1192	0.40	1714	2700	2700	0.603		multi-zn	H	h	Y	FmR	OK
42393300540000	269HNTN	12470	12620	5930	5709	5930	2741	0.47	1618	1784	1784	0.301		multi-zn	H	h			
42393300540000	269HNTN	12700	12794	1885	5283	5283	1175	0.41	687	687	687	0.130	tight	multi-zn	L	l			

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
42393352620000	-100.78316	35.68791	PHILLIPS PET	GAY	2	UNNAMED	ROBERTS	BS&F	M-2	201	3113	DF	19550905	12122	2 OIL	406LCMP
42393352620000	-100.78316	35.68791	PHILLIPS PET	GAY	2	UNNAMED	ROBERTS	BS&F	M-2	201	3113	DF	19550905	12122	2 OIL	406LCMP
42393352620000	-100.78316	35.68791	PHILLIPS PET	GAY	2	UNNAMED	ROBERTS	BS&F	M-2	201	3113	DF	19550905	12122	2 OIL	406LCMP
42393600620000	-100.97624	35.68253	PAN AMERICAN	A A SMITH	1	WILDCAT	ROBERTS	I&GN	2	137	3184	KB	19671208	9926	D&A-O	
42393610120000	-100.6015	35.85727	AMARILLO OIL	R A FLOWERS	1	MENDOTA NW	ROBERTS	BS&F	C	6	2861	KB	19721223	15160	GAS	402MRRW
42483001010000	-100.40375	35.59557	PHILLIPS PET	LEE C	1	GAGEBY CREE	WHEELER	H&GN	M1	80	2773	DF	19641028	17102	2 GAS	269HNTN
42483001010000	-100.40375	35.59557	PHILLIPS PET	LEE C	1	GAGEBY CREE	WHEELER	H&GN	M1	80	2773	DF	19641028	17102	2 GAS	269HNTN
42483023890000	-100.35672	35.57921	PHILLIPS PET	THORN-A	1	GAGEBY CREE	WHEELER	H&GN	M1	63	2696	KB	19660808	16075	D&A-G	
42483300160000	-100.34767	35.48473	TEXSTAR EXPLOR	S E MOBEETIE U	1	UNNAMED	WHEELER	H&GN	A4	30	2595	GR	19710421	13485	OIL	269HNTN
42483300160000	-100.34767	35.48473	TEXSTAR EXPLOR	S E MOBEETIE U	1	UNNAMED	WHEELER	H&GN	A4	30	2595	GR	19710421	13485	OIL	269HNTN
42483300160000	-100.34767	35.48473	TEXSTAR EXPLOR	S E MOBEETIE U	1	UNNAMED	WHEELER	H&GN	A4	30	2595	GR	19710421	13485	OIL	269HNTN
42483300180000	-100.34668	35.43547	GULF OIL	SIVAGE	1	WILDCAT	WHEELER	H&GN	A8	56	2605	KB	19700523	14660	D&A	
42483300180000	-100.34668	35.43547	GULF OIL	SIVAGE	1	WILDCAT	WHEELER	H&GN	A8	56	2605	KB	19700523	14660	D&A	
42483300190000	-100.33179	35.47086	BASIN PET	S E MOBEETIE 2	1	UNNAMED	WHEELER	H&GN	A4	12	2578	KB	19700724	13718	GAS	269HNTN
42483300200001	-100.35451	35.56967	HUBER J M CORP	TREADWELL-B	1	GAGEBY CREE	WHEELER	SIMPSO		8	2677	DF	19700914	15794	D&AWG	
42483300200001	-100.35451	35.56967	HUBER J M CORP	TREADWELL-B	1	GAGEBY CREE	WHEELER	SIMPSO		8	2677	DF	19700914	15794	D&AWG	
42483300200001	-100.35451	35.56967	HUBER J M CORP	TREADWELL-B	1	GAGEBY CREE	WHEELER	SIMPSO		8	2677	DF	19700914	15794	D&AWG	
42483300240000	-100.4015	35.58656	PHILLIPS PET	CARWILE-B	1	GAGEBY CREE	WHEELER	H&GN	A5	98	2820	KB	19660801	17788	D&A-G	
42483300240000	-100.4015	35.58656	PHILLIPS PET	CARWILE-B	1	GAGEBY CREE	WHEELER	H&GN	A5	98	2820	KB	19660801	17788	D&A-G	
42483300500000	-100.43991	35.59738	AMOCO PROD	C WALSER	1	WILDCAT	WHEELER	BS&F		3	2781	KB	19711028	15298	D&A-G	
42483300530000	-100.45708	35.57381	PIONEER PRODUC	SHINN UNIT	1	WILDCAT	WHEELER	H&GN	A5	86	2861	KB	19711107	14450	D&A-G	
42483300540000	-100.51685	35.57918	PHILLIPS PET	BAILEY-A	1	WILDCAT	WHEELER	H&GN	A5	92	2831	DF	19720225	13864	D&A-OG	
42483300540000	-100.51685	35.57918	PHILLIPS PET	BAILEY-A	1	WILDCAT	WHEELER	H&GN	A5	92	2831	DF	19720225	13864	D&A-OG	
42483300570000	-100.07938	35.36806	FREEPORT SULPH	SIDNEY FABIAN	1	MILLS RANCH	WHEELER	H&GN	A7	45	2182	KB	19721030	21195	GAS	269HNTN
42483300580000	-100.38384	35.6158	KERR-MCGEE COI	GEORGE	1	GAGEBY CREE	WHEELER	H&GN	M1	74	2752	KB	19721010	20162	D&A-G	
42483300600000	-100.48082	35.4274	COLORADO INTER	JOHNSON	1	WILDCAT	WHEELER	H&GN	A9	24	2613	GR	19720911	13754	D&A-G	
42483300600000	-100.48082	35.4274	COLORADO INTER	JOHNSON	1	WILDCAT	WHEELER	H&GN	A9	24	2613	GR	19720911	13754	D&A-G	
42483300600000	-100.48082	35.4274	COLORADO INTER	JOHNSON	1	WILDCAT	WHEELER	H&GN	A9	24	2613	GR	19720911	13754	D&A-G	
42483300600000	-100.48082	35.4274	COLORADO INTER	JOHNSON	1	WILDCAT	WHEELER	H&GN	A9	24	2613	GR	19720911	13754	D&A-G	
42483300900000	-100.26682	35.45508	AMAREX INC	STILES-WALKER	1	WILDCAT	WHEELER	H&GN	A4	5	2488	KB	19740819	16824	D&A	
42483300910000	-100.25821	35.40456	GETTY OIL	S K WILLIAMS UI	1	UNNAMED	WHEELER	T&NO	E	2	2574	KB	19741009	17250	GAS	269HNTN
42483300910000	-100.25821	35.40456	GETTY OIL	S K WILLIAMS UI	1	UNNAMED	WHEELER	T&NO	E	2	2574	KB	19741009	17250	GAS	269HNTN
42483300950000	-100.12236	35.38069	AMAREX INC	MOORE UNIT	1	MILLS RANCH	WHEELER	TINDAL		1	2289	DF	19750716	21391	GAS	402MRRW
42483301080000	-100.24489	35.38272	HELMERICH & PAY	PYLE-DAVIS	1	WHEELER-PAN	WHEELER	POITEV		1	2437	KB	19750711	15008	GAS	269HNTN
42483301080000	-100.24489	35.38272	HELMERICH & PAY	PYLE-DAVIS	1	WHEELER-PAN	WHEELER	POITEV		1	2437	KB	19750711	15008	GAS	269HNTN
42483301200000	-100.23816	35.36996	HELMERICH & PAY	GIERHART UNIT	1	WHEELER-PAN	WHEELER	H&GN	A8	32	2367	KB	19750809	14608	D&A-G	
42483301200000	-100.23816	35.36996	HELMERICH & PAY	GIERHART UNIT	1	WHEELER-PAN	WHEELER	H&GN	A8	32	2367	KB	19750809	14608	D&A-G	
42483301210000	-100.23175	35.46262	PHILLIPS PET	FARRIS-C	1	FARRIS	WHEELER	H&GN	A4	18	2466	KB	19761028	16510	GAS	269HNTN
42483301230000	-100.2326	35.39182	GETTY OIL	UNA SANDERS	1	WHEELER-PAN	WHEELER	POITEV		3	2498	KB	19760423	15250	GAS	269HNTN
42483301290000	-100.15213	35.36804	COQUINA OIL	BURRELL	1	WILDCAT	WHEELER	H&GN	A7	49	2297	KB	19760908	21753	D&A-G	
42483301290000	-100.15213	35.36804	COQUINA OIL	BURRELL	1	WILDCAT	WHEELER	H&GN	A7	49	2297	KB	19760908	21753	D&A-G	
42483301330000	-100.28339	35.5372	AMARILLO OIL	LANCASTER	1-58	UNNAMED	WHEELER	H&GN	A4	58	2583	KB	19760909	18900	GAS	402MRRW
42483301500000	-100.50793	35.5347	SKELLY OIL	V MURRELL	1	UNNAMED	WHEELER	H&GN	A5	69	2709	KB	19770113	12861	2 GAS	202SMPS

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
42393352620000	269HNTN	9270	9470		2700	2700	-551	0.29	850	1500	1500	0.556		multi-zn	H	h			
42393352620000	269HNTN	9070	9090		2500	2500	-601	0.28		500	500	0.200	tight	multi-zn	M	m			
42393352620000	269HNTN	9066	9267		1350	1350	-3251	0.15		50	50	0.037	tight	multi-zn	L	l			
42393600620000	269HNTN	8983	8986	1600		1600	-2361	0.18					tight						
42393610120000	269HNTN	14768	15160	7430	6722	7430	3679	0.49	2549	3414	3414	0.459					Y	FmR	OK
42483001010000	269HNTN	15068	15150	6500	6500	6500	1601	0.43	3409	2984	3409	0.524		multi-zn	L	l		FmR	OK
42483001010000	269HNTN	15152	15228	6566	6513	6566	1665	0.43	3520	4107	4107	0.625		multi-zn	H	h		FmR	OK
42483023890000	269HNTN	15859	16075	6781	6807	6807	1260	0.42	3609	5604	5604	0.823						FmR	OK
42483300160000	269HNTN	13387	13468	5688	5743	5743	1478	0.43	2019	5597	5597	0.975		multi-zn	M	h		FmR	OK
42483300160000	269HNTN	13161	13211	4221	4588	4588	-749	0.35	2203	4496	4496	0.980		multi-zn	H	l			
42483300160000	269HNTN	12975	13025	4955	5046	5046	422	0.39	1377	1377	1377	0.273	tight	multi-zn	L	m			
42483300180000	269HNTN	13765	13986	5958	5718	5958	1432	0.43	3958	3958	3958	0.664		multi-zn	L	h		FmR	OK
42483300180000	269HNTN	13410	13672	4794	5276	5276	279	0.39	3589	3964	3964	0.751		multi-zn	H	l			
42483300190000	269HNTN	13556	13597	5594	5625	5625	1078	0.41	4413	3307	4413	0.785						FmR	OK
42483300200001	269HNTN	15345	15500	6625	7173	7173	2603	0.46	1900	2198	2198	0.306		multi-zn	M	h	YF	FmR	OK
42483300200001	269HNTN	15540	15598	5479	3939	5479	-1138	0.35	1382	1715	1715	0.313		multi-zn	H	l		FmR	OK
42483300200001	269HNTN	15250	15345	6332	6112	6332	949	0.41	1530	1594	1594	0.252	tight	multi-zn	L	m		FmR	OK
42483300240000	269HNTN	15595	15595	6300	6500	6500	1203	0.42					tight	multi-zn		l			
42483300240000	269HNTN	15571	15571	6440	6550	6550	1335	0.42					tight	multi-zn		h			
42483300500000	269HNTN	14990	15060	6506	6506	6506	1712	0.43	2795	2827	2827	0.435						FmR	OK
42483300530000	269HNTN	14170	14450	5929	5929	5929	1162	0.41	5229	5810	5810	0.980						FmR	OK
42483300540000	269HNTN	11996	12096	3579	2442	3579	-1568	0.30	1653	1653	1653	0.462		multi-zn	H	l		FmR	OK
42483300540000	269HNTN	12175	12250	5102	5102	5102	1553	0.42	1543	2295	2295	0.450		multi-zn	L	h			
42483300570000	269HNTN	21037	21195	9874	9824	9874	2221	0.47	6000	5471	6000	0.608					Y	FmR	OK
42483300580000	269HNTN	19550	19834	8862	8830	8862	1976	0.45				0.000	tight				Y	FmR	OK
42483300600000	269HNTN	12258	12302	4535	3792	4535	64	0.37	652	1878	1878	0.414		multi-zn	M	m		FmR	OK
42483300600000	269HNTN	12325	12345	5297	5297	5297	1659	0.43	883	1265	1265	0.239	tight	multi-zn	L	h	YF	FmR	OK
42483300600000	269HNTN	12210	12290	4628	3959	4628	276	0.38	893	1915	1915	0.414		multi-zn	M	m			
42483300600000	269HNTN	11980	12255	220	166	220	-9169	0.02	166	166	166	0.755	suspect	multi-zn	H	l			
42483300900000	269HNTN	16640	16690	7401	7401	7401	1714	0.44	3538	7401	7401	1.000						FmR	OK
42483300910000	269HNTN	15040	15122	6658		6658	1770	0.44	1360	4091	4091	0.614		multi-zn	H	h	YF	FmR	No FSIP
42483300910000	269HNTN	14560	14650	5565	6180	6180	1214	0.42	999	1018	1018	0.165	tight	multi-zn	L	l		FmR	OK
42483300950000	269HNTN	21059	21391	9416	9416	9416	1147	0.44	9416	9416	9416	1.000					YD	FmR	OK
42483301080000	251CMNL	14877	14906	6549	6549	6549	1615	0.44	2783	4792	4792	0.732		multi-zn	H	h	YF	FmR	OK
42483301080000	269HNTNM	14463	14603	5952	6002	6002	742	0.41	1404	1535	1535	0.256	tight	multi-zn	L	l		FmR	OK
42483301200000	251CMNL	14484	14608	6191	6371	6371	1460	0.44	6012	6064	6064	0.952		multi-zn	H	l		FmR	OK
42483301200000	269HNTN	14278	14394	3890	6411	6411	1760	0.45	1640	1640	1640	0.256	tight	multi-zn	L	h			
42483301210000	269HNTN	16235	16345	7101		7101	1392	0.43	5573	6424	6424	0.905						FmR	No FSIP
42483301230000	269HNTN	15000	15250	5847	5852	5852	-167	0.38	1553	2367	2367	0.404						FmR	OK
42483301290000	269HNTN	17519	17765	6867	7976	7976	1685	0.45	6867	7976	7976	1.000		multi-zn	H	h		FmR	OK
42483301290000	269HNTN	16950	17357	5611	6087	6087	-1970	0.35	7981	4816	7981	1.311		multi-zn		l			
42483301330000	269HNTN	18032	18450	5874	5656	5874	-3235	0.32	5225	5060	5225	0.890							
42483301500000	269HNTN	11654	11733	2314	1887	2314	-4048	0.20	819	862	862	0.373		multi-zn	H	l			

API	Long	Lat	Operator	Lease	Well	Field	County	T or Srv	R or Blk	Sec	Elev	ref	Comp dat	TD	Stat	Prod Fm
42483301500000	-100.50793	35.5347	SKELLY OIL	V MURRELL	1	UNNAMED	WHEELER	H&GN	A5	69	2709	KB	19770113	12661	2 GAS	202SMPS
42483301650000	-100.21538	35.36302	HELMERICH & PAY	HALE UNIT	1	WHEELER-PAN	WHEELER	H&GN	A8	30	2327	KB	19780902	15468	D&A-OG	
42483301650000	-100.21538	35.36302	HELMERICH & PAY	HALE UNIT	1	WHEELER-PAN	WHEELER	H&GN	A8	30	2327	KB	19780902	15468	D&A-OG	
42483301820000	-100.37254	35.52242	AMARILLO OIL	BOY SCOUTS AN	1-60	WILDCAT	WHEELER	H&GN	A5	60	2585	KB	19771003	15320	D&A-G	
42483305090000	-100.32724	35.42825	HELMERICH & PAY	MITCHELL UNIT	1	WHEELER-PAN	WHEELER	H&GN	A8	54	2590	GR	19780518	14017	D&A-G	
42483305100000	-100.42966	35.44278	HUDSON OHIO OIL	WATERS	1-34	WILDCAT	WHEELER	H&GN	A9	34	2622	KB	19780524	12935	D&A-G	
42483305170000	-100.23441	35.40268	HELMERICH & PAY	BONNER UNIT	1	WHEELER-PAN	WHEELER	J M	L	13	2534	KB	19780619	15392	D&A-G	
42483305190000	-100.33171	35.45215	NATOMAS NORTH	HUNTER	1	UNNAMED	WHEELER	H&GN	A4	9	2567	GR	19780630	14550	GAS	269HNTN
42483305250000	-100.51555	35.58878	PENNZOIL CO	BAILEY	1	THORNDIKE	WHEELER	H&GN	A5	92	2972	KB	19780814	12746	D&A-G	
42483305250000	-100.51555	35.58878	PENNZOIL CO	BAILEY	1	THORNDIKE	WHEELER	H&GN	A5	92	2972	KB	19780814	12746	D&A-G	
42483305250000	-100.51555	35.58878	PENNZOIL CO	BAILEY	1	THORNDIKE	WHEELER	H&GN	A5	92	2972	KB	19780814	12746	D&A-G	
42483306260000	-100.4743	35.49266	DIAMOND SHAMRO	HARRIE M LEE	1	MOBEETIE	WHEELER	H&GN	A5	34	2690	KB	19791010	13700	D&A-G	
42483306260000	-100.4743	35.49266	DIAMOND SHAMRO	HARRIE M LEE	1	MOBEETIE	WHEELER	H&GN	A5	34	2690	KB	19791010	13700	D&A-G	
42483307030000	-100.31398	35.46263	MONSANTO CO	HUNTER	1	WHEELER-PAN	WHEELER	H&GN	A4	13	2576	KB	19800321	14565	GAS	269HNTN
42483307100000	-100.34238	35.56004	MORAN EXPL	HENDERSON UN	1	GAGEBY CREE	WHEELER	GRIMOL			2629	KB	19800723	17100	GAS	402MRRW
42483308400000	-100.29707	35.40309	PHILLIPS PET	JACO-A	2	WHEELER-PAN	WHEELER	H&GN	A8	49	2650	KB	19810504	13990	D&A-G	
42483350400000	-100.37267	35.56618	PHILLIPS PET	HORN A	1	WILDCAT	WHEELER	H&GN	A5	81	2716	DF	19640909	16855	D&A-OG	
42483600160000	-100.39267	35.5865	PHILLIPS PET	CARWILE /A/	1	UNNAMED	WHEELER	H&GN	A5	99	2760	DF	19640122	17702	GAS	202SMPS
42483600160000	-100.39267	35.5865	PHILLIPS PET	CARWILE /A/	1	UNNAMED	WHEELER	H&GN	A5	99	2760	DF	19640122	17702	GAS	202SMPS
42483600160000	-100.39267	35.5865	PHILLIPS PET	CARWILE /A/	1	UNNAMED	WHEELER	H&GN	A5	99	2760	DF	19640122	17702	GAS	202SMPS
42483600560001	-100.36565	35.57195	HALL BROOKS ET	TREADWELL	1	GAGEBY CREE	WHEELER	H&GN	A5	81	2703	KB	19680325	15541	D&AWOG	
42483600610000	-100.26514	35.48051	STANDARD OIL OF	WHEELER	1	WILDCAT	WHEELER	H&GN	A4	25	2478	KB	19690218	18438	D&A-OG	
42483600610000	-100.26514	35.48051	STANDARD OIL OF	WHEELER	1	WILDCAT	WHEELER	H&GN	A4	25	2478	KB	19690218	18438	D&A-OG	
42483600610000	-100.26514	35.48051	STANDARD OIL OF	WHEELER	1	WILDCAT	WHEELER	H&GN	A4	25	2478	KB	19690218	18438	D&A-OG	

API	DST Fm	DST Top	DST Bas	ISIP	FSIP	highSIP	PSURF	GRAD	IFP	FFP	high FP	(FP/SIP)	Fpstat	Multi-zn	permHL	Gradhl	Use PS	Rec	ResC
42483301500000	269HNTN	11337	11366	4479	4457	4479	975	0.39	846	802	846	0.189	tight	multi-zn	L	h			
42483301650000	269HNTN	14945	15132	5334	6437	6437	1038	0.43	1952	1995	1995	0.310		multi-zn	L	l		FmR	OK
42483301650000	251CMNL	15426	15442	6807	6807	6807	1524	0.44	3927	6701	6701	0.984		multi-zn	H	h	YF	FmR	OK
42483301820000	269HNTN	14855	15094	1757	2454	2454	-7232	0.16	586	558	586	0.239	tight						
42483305090000	269HNTN	13940	14017	5922	5868	5922	1308	0.42	1890	2372	2372	0.401						FmR	OK
42483305100000	251CMNL	12750	12800	5233	5233	5233	1076	0.41	1680	1761	1761	0.337						FmR	OK
42483305170000	269HNTN	15070	15386	3812	3383	3812	-4654	0.25	1615	1641	1641	0.430							
42483305190000	269HNTN	13722	13831	6452	6543	6543	2807	0.47	865		865	0.132	tight						
42483305250000	269HNTN	12574	12746	5144	5144	5144	1288	0.40	3198	4466	4466	0.868		multi-zn	H	h		FmR	OK
42483305250000	269HNTN	12410	12556		2945	2945	-3251	0.23	812	812	812	0.276	tight	multi-zn	M	l			
42483305250000	269HNTN	12432	12524	4528		4528	186	0.36	674	632	674	0.149	tight	multi-zn	L	m			
42483306260000	269HNTN	12086	12455	3857	4946	4946	872	0.40	1622	3823	3823	0.773		multi-zn	H	h			
42483306260000	269HNTN	12160	12220	1360	3621	3621	-1743	0.30	109	165	165	0.046	tight	multi-zn	L	l			
42483307030000	269HNTN	13910	13988	5877	6038	6038	1573	0.43	820	927	927	0.154	tight					FmR	OK
42483307100000	269HNTN	15610	15875	7576	7347	7576	3046	0.48	2681	2717	2717	0.359						FmR	OK
42483308400000	251CMNL	13760	13893	5672	5757	5757	1138	0.41	4970	5672	5672	0.985						FmR	OK
42483350400000	269HNTN	15804	15879	6888	6888	6888	1650	0.43	3627	6460	6460	0.938						FmR	OK
42483600160000	269HNTN	14885	14928	6610	6610	6610	2047	0.44	2590	5164	5164	0.781		multi-zn	M	m	YF	FmR	OK
42483600160000	269HNTN	14938	14978	6476	6420	6476	1709	0.43	2322	5663	5663	0.874		multi-zn	H	m		FmR	OK
42483600160000	269HNTN	15089	15092	6400		6400	1431	0.42		200	200	0.031	tight	multi-zn	L	m			
42483600560001	269HNTN	15435	15470	6046	6020	6046	235	0.39	1785	2282	2282	0.377						FmR	OK
42483600610000	269HNTN	16118	16287	7364	2312	7364	2028	0.45	185	238	238	0.032	tight	multi-zn	L	h	YF	FmR	OK
42483600610000	251CMNL	16475	16525	7296		7296	1643	0.44					tight	multi-zn		m		FmR	No FSIP
42483600610000	269HNTN	15918	16118	317	264	317	-12958	0.02		158	158	0.498	suspect	multi-zn	H	l			

Explanation of DST Well Headers

API = American Petroleum Institute unique well ID number
Long = Longitude, negative for Western Hemisphere
Lat = Latitude, positive for Northern Hemisphere
Operator = Well operator
Well = Well number
Field = Oil and gas field
County = County of well location
T or Srv = Well located by Township (Oklahoma) or Survey (Texas)
R or Blk = Well located by Range (Oklahoma) or Block (Texas)
Sec = Section (Oklahoma or Texas)
Elev = Elevation above sea level
Ref = Reference elevation usually kelly bushing, ground level, or derick floor
Comp dat = Completion date of well
TD = Total depth of well
Stat = current producing or non-producing status
ProdFm = producing formation

DST Fm = Hunton zone tested where: DST Top = Top of DST interval and DST bas = Base of DST interval
ISIP and FSIP = Initial and Final Shut-in Pressure
highSIP = Highest Shut-in pressure (either initial or final)
PSURF = Potentiometric surface or hydraulic head = (highSIP)/0.465) + (elevation - DST base)
GRAD = pressure gradient = (highSIP/DST base)
IFP and FFP = Initial and final flowing pressure from Petroleum Information database
highFP = highest flowing pressure (either Initial or final)
(FP/SIP) = highest flowing pressure / highest shut-in pressure
Fpstat = filter to screen out tests with low pressures and high permeability indexes, if-then statement:
= IF(high FP/SIP>0.3, IF(high SIP < 500, "suspect", ""), "tight")
Multi-zn = multiple zoned DSTs are quickly identified with the following if-then statement:
= IF(API2=API1,"multi-zn", IF(API2=API3, "multi-zn", ""))
permHL = used only for multiple zoned tests to distinquish the highest (H) or lowest (L), FP/SIP ratio
Gradhl = used only for multiple zoned tests to for highest (h) or lowest (l) pressure gradient
UsePS = identify hydraulic heads to be used for contouring (Y=Yes use it), (YD=depleted pressure), (YF=compartment or fault)
Rec = FmR (formation fluid recovery such as gas, oil, or water measured in feet within the drillstem)
ResC = Reservoir condition, determination of presence of ISIP and FSIP and their agreement, related to formation damage.
= If(FSIP = "", "No FSIP", IF(ISIP="","No ISIP", IF(ISIP/FSIP<=0.8,"damaged", IF(ISIP/FSIP>0.8,"OK")))).

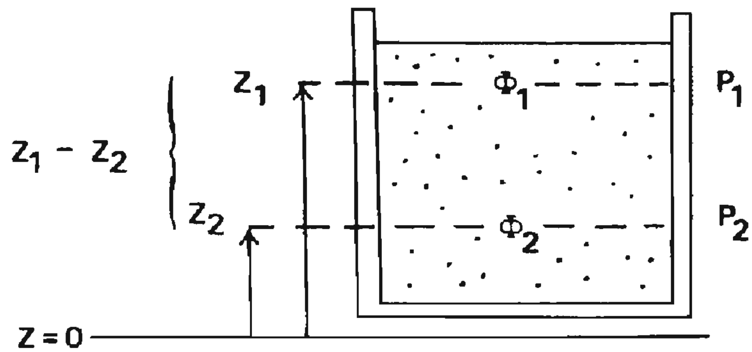
APPENDIX C

HUBBERT'S PROOF THAT FLUID PRESSURE AND POTENTIAL ARE NOT THE SAME

Hubbert's Proof

Fluid potential and pressure are not the same, as illustrated in a personal communication by Dahlberg (1982, p. 135) with M. K. Hubbert.

Consider a container with a static fluid density *D* and with pressures P_1 and P_2 measured at levels Z_1 and Z_2 above a reference datum.



P_2 will exceed P_1 due to the greater weight of overlying water by a factor of the pressure gradient for the fluid *Dg* multiplied by the vertical distance between the two depths.

Equation 1: $P_2 = P_1 + Dg(Z_1 - Z_2)$

The potentials Φ_1 and Φ_2 can be expressed, where *g* is acceleration of gravity, as

Equation 2: $\Phi_1 = gZ_1 + \dfrac{P_1}{D}$

Equation 3: $\Phi_2 = gZ_2 + \dfrac{P_2}{D}$

Substituting *Equation 1* into *Equation 3* gives

$$\Phi_2 = gZ_2 + \frac{P_1}{D} + \frac{Dg(Z_1 - Z_2)}{D}$$

and

$$\Phi_2 = gZ_2 + \frac{P_1}{D} + gZ_1 - gZ_2$$

$\Phi_2 = \dfrac{P_1}{D} + gZ_1$ which is also Φ_1, therefore $\Phi_1 = \Phi_2$ so that

although pressures differ at Z_1 and Z_2, the potential energy is the same at both levels.

PLATES

1, 2, 3, 4, 5, 6,

7, 8, 9,10, 11,

12, 13, 14, 15

16, 17, 18,19

and 20.

PLATE 1
STRATIGRAPHIC CROSS-SECTION A-A' OF THE HUNTON GROUP IN THE ANADARKO BASIN

PAUL BLUBAUGH

PLATE 2

STRATIGRAPHIC CROSS-SECTION B-B' OF THE HUNTON GROUP IN THE ANADARKO BASIN

PAUL BLUBAUGH

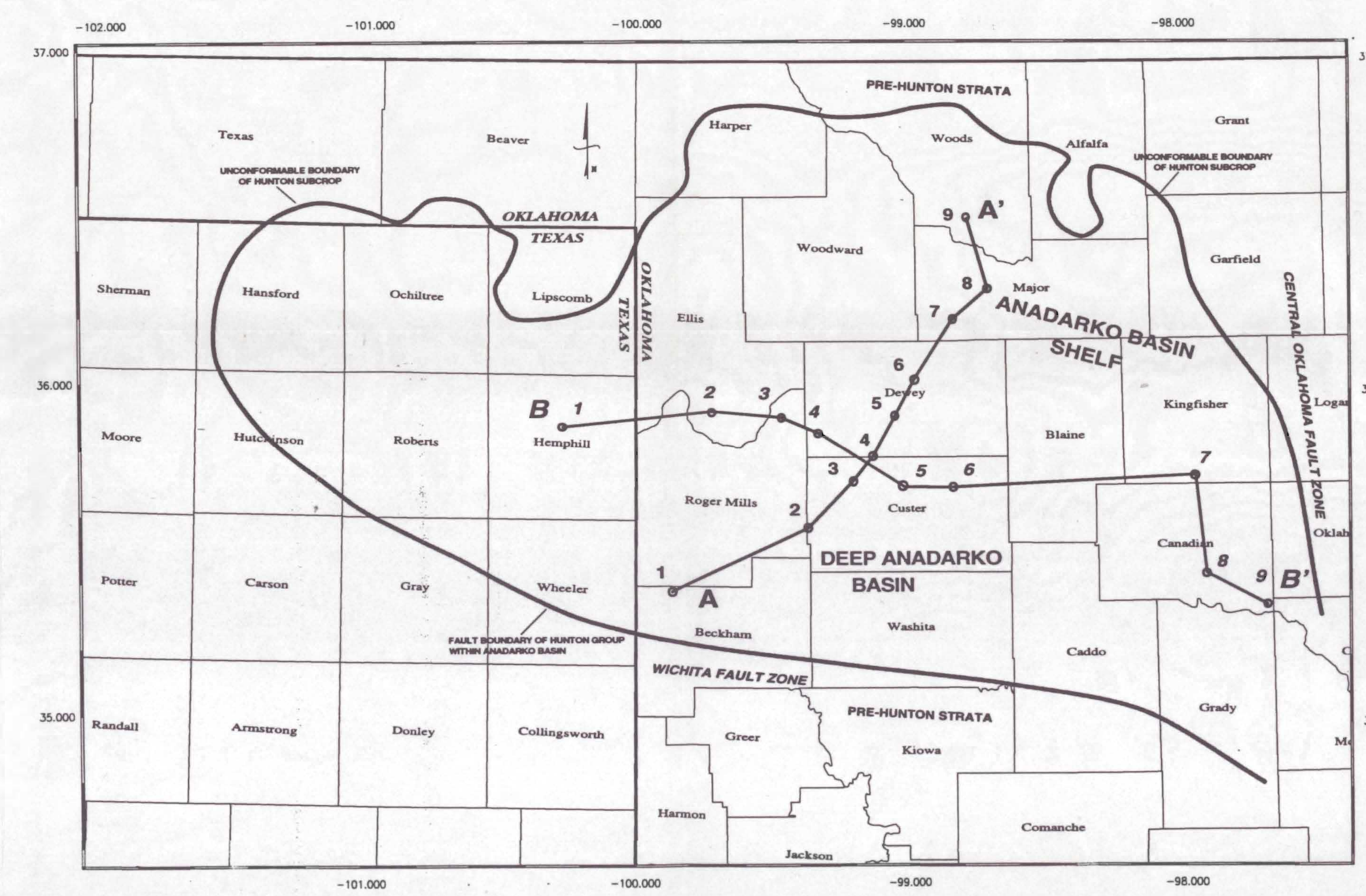


PLATE 3

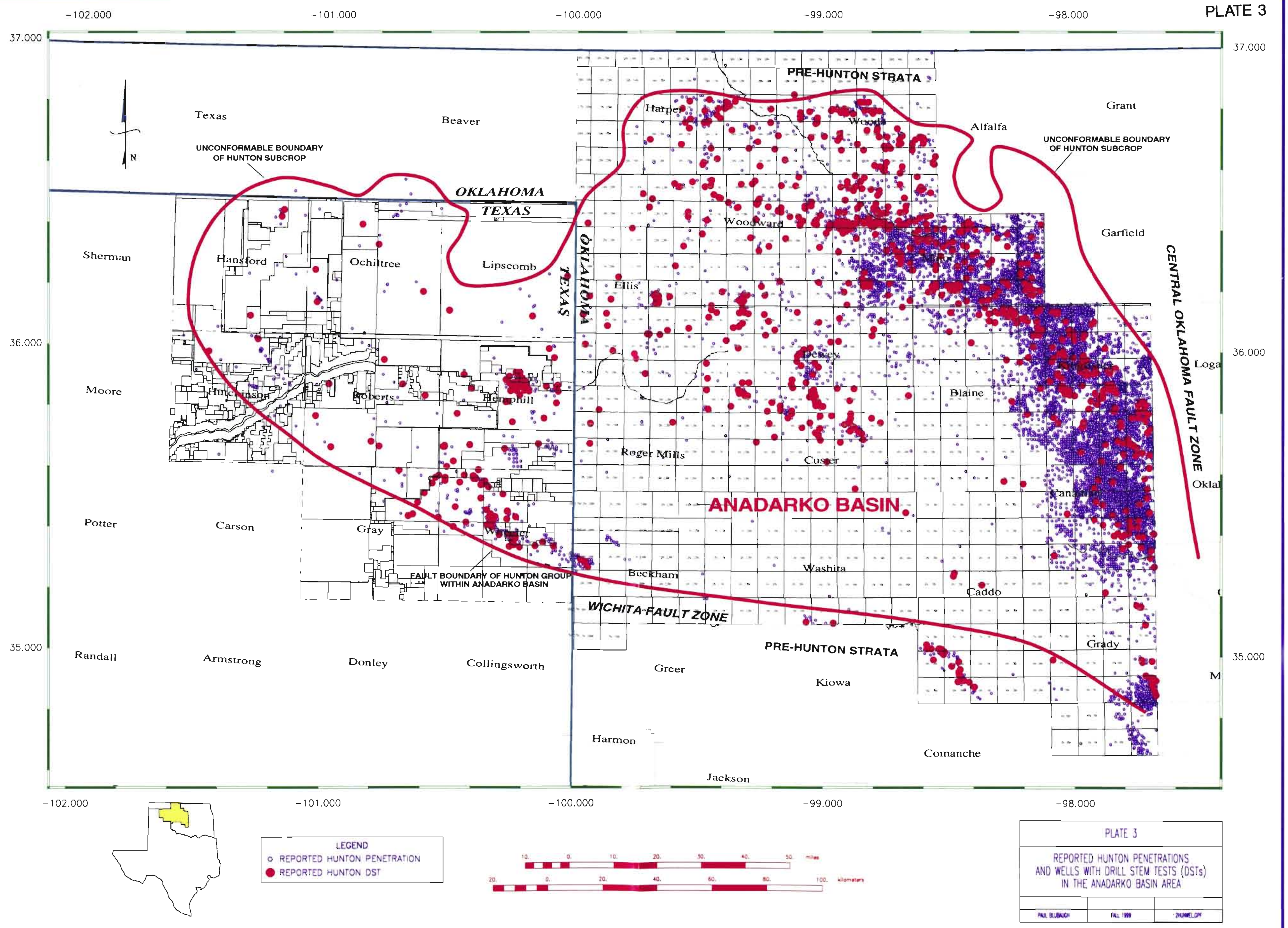


PLATE 3

REPORTED HUNTON PENETRATIONS AND WELLS WITH DRILL STEM TESTS (DSTs) IN THE ANADARKO BASIN AREA

PAUL BLUBAUGH | FALL 1999 | 2HUNWEL.GPF

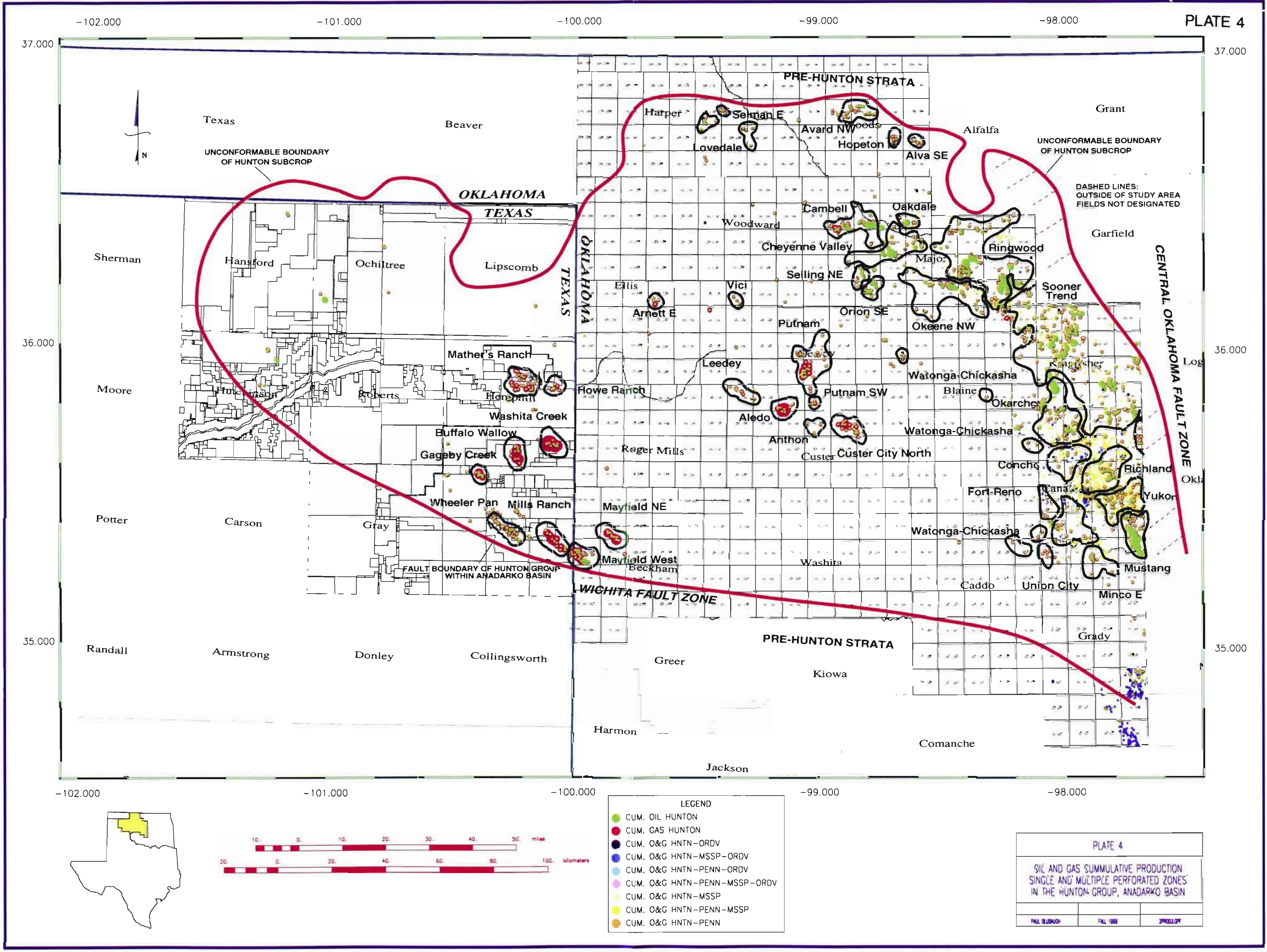


PLATE 4
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
DASHED LINES: OUTSIDE OF STUDY AREA FIELDS NOT DESIGNATED
CENTRAL OKLAHOMA FAULT ZONE
WICHITA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
OKLAHOMA
TEXAS
Texas
Beaver
Harper
Alfalfa
Grant
Garfield
Woodward
Woods
Major
Ellis
Dewey
Blaine
Kingfisher
Logan
Oklahoma
Canadian
Roger Mills
Custer
Caddo
Grady
Washita
Beckham
Greer
Kiowa
Harmon
Jackson
Comanche
Sherman
Hansford
Ochiltree
Lipscomb
Moore
Hutchinson
Roberts
Hemphill
Potter
Carson
Gray
Wheeler
Randall
Armstrong
Donley
Collingsworth
Selman E
Lovedale
Avard NW
Hopeton
Alva SE
Cambell
Oakdale
Cheyenne Valley
Ringwood
Selling NE
Vici
Arnett E
Orion SE
Okeene NW
Sooner Trend
Putnam
Leedey
Watonga-Chickasha
Okarche
Putnam SW
Howe Ranch
Aledo
Anthon
Custer City North
Concho
Richland
Yukon
Fort Reno
Mustang
Union City
Minco E
Mather's Ranch
Washita Creek
Buffalo Wallow
Gageby Creek
Wheeler Pan
Mills Ranch
Mayfield NE
Mayfield West
N
miles
kilometers
LEGEND
CUM. OIL HUNTON
CUM. GAS HUNTON
CUM. O&G HNTN-ORDV
CUM. O&G HNTN-MSSP-ORDV
CUM. O&G HNTN-PENN-ORDV
CUM. O&G HNTN-PENN-MSSP-ORDV
CUM. O&G HNTN-MSSP
CUM. O&G HNTN-PENN-MSSP
CUM. O&G HNTN-PENN
PLATE 4
OIL AND GAS SUMMULATIVE PRODUCTION SINGLE AND MULTIPLE PERFORATED ZONES IN THE HUNTON GROUP, ANADARKO BASIN

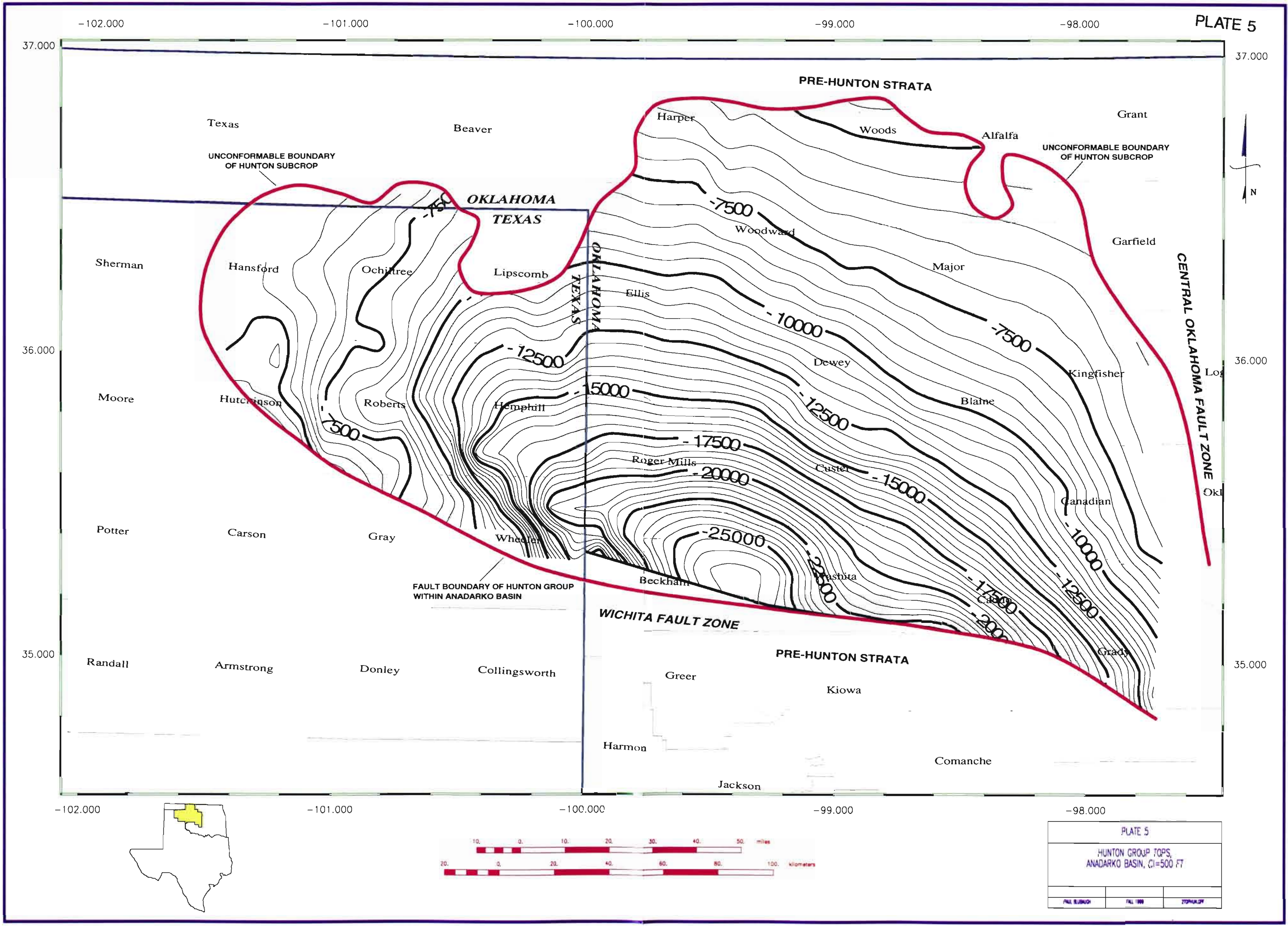


PLATE 5
HUNTON GROUP TOPS, ANADARKO BASIN, CI=500 FT

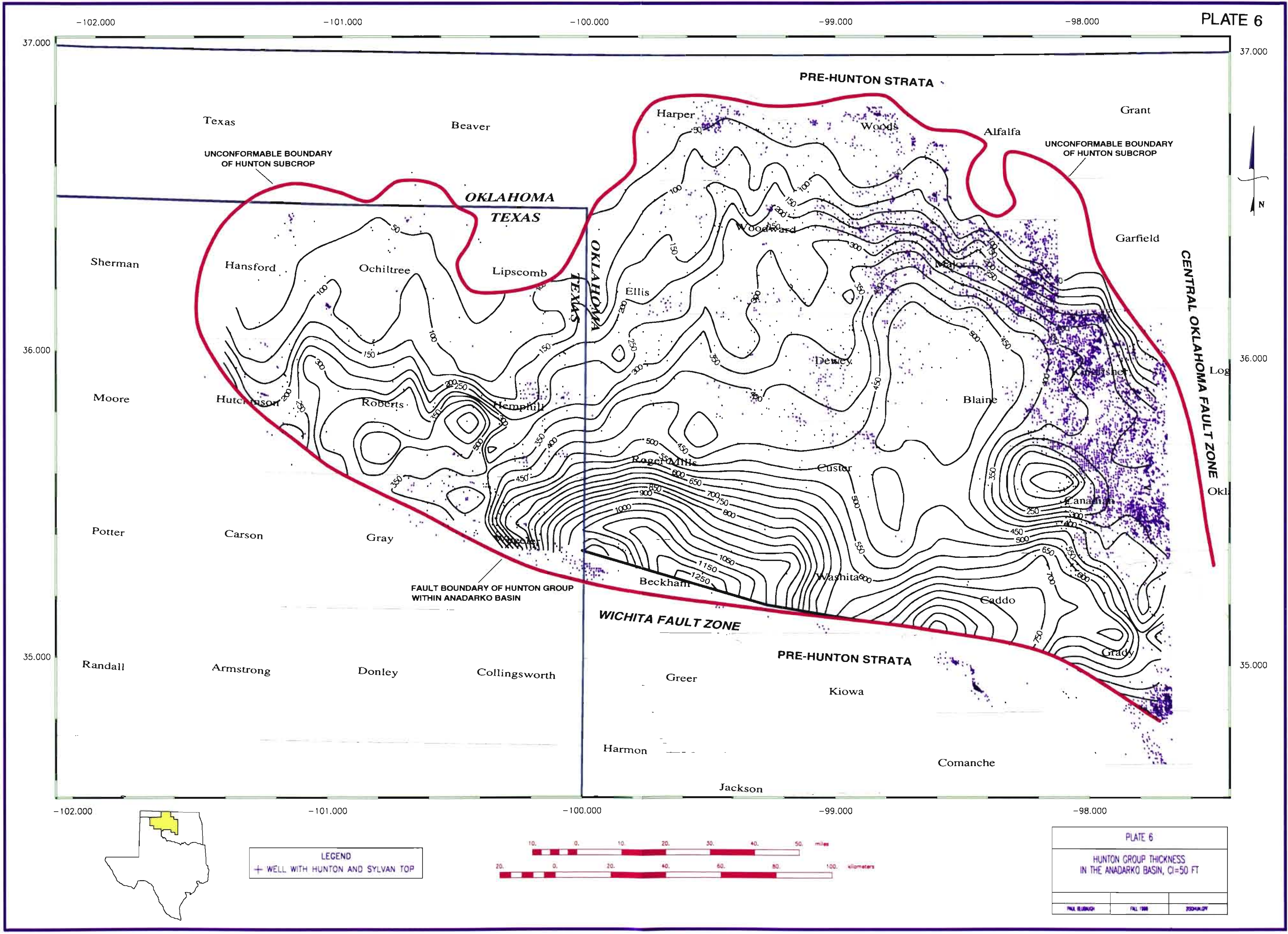


PLATE 6
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
CENTRAL OKLAHOMA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
WICHITA FAULT ZONE
PRE-HUNTON STRATA
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Garfield
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Dewey
Kingfisher
Blaine
Moore
Hutchinson
Roberts
Hemphill
Roger Mills
Custer
Canadian
Potter
Carson
Gray
Wheeler
Beckham
Washita
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Comanche
Jackson
N
LEGEND
+ WELL WITH HUNTON AND SYLVAN TOP
miles
kilometers
PLATE 6
HUNTON GROUP THICKNESS IN THE ANADARKO BASIN, CI=50 FT

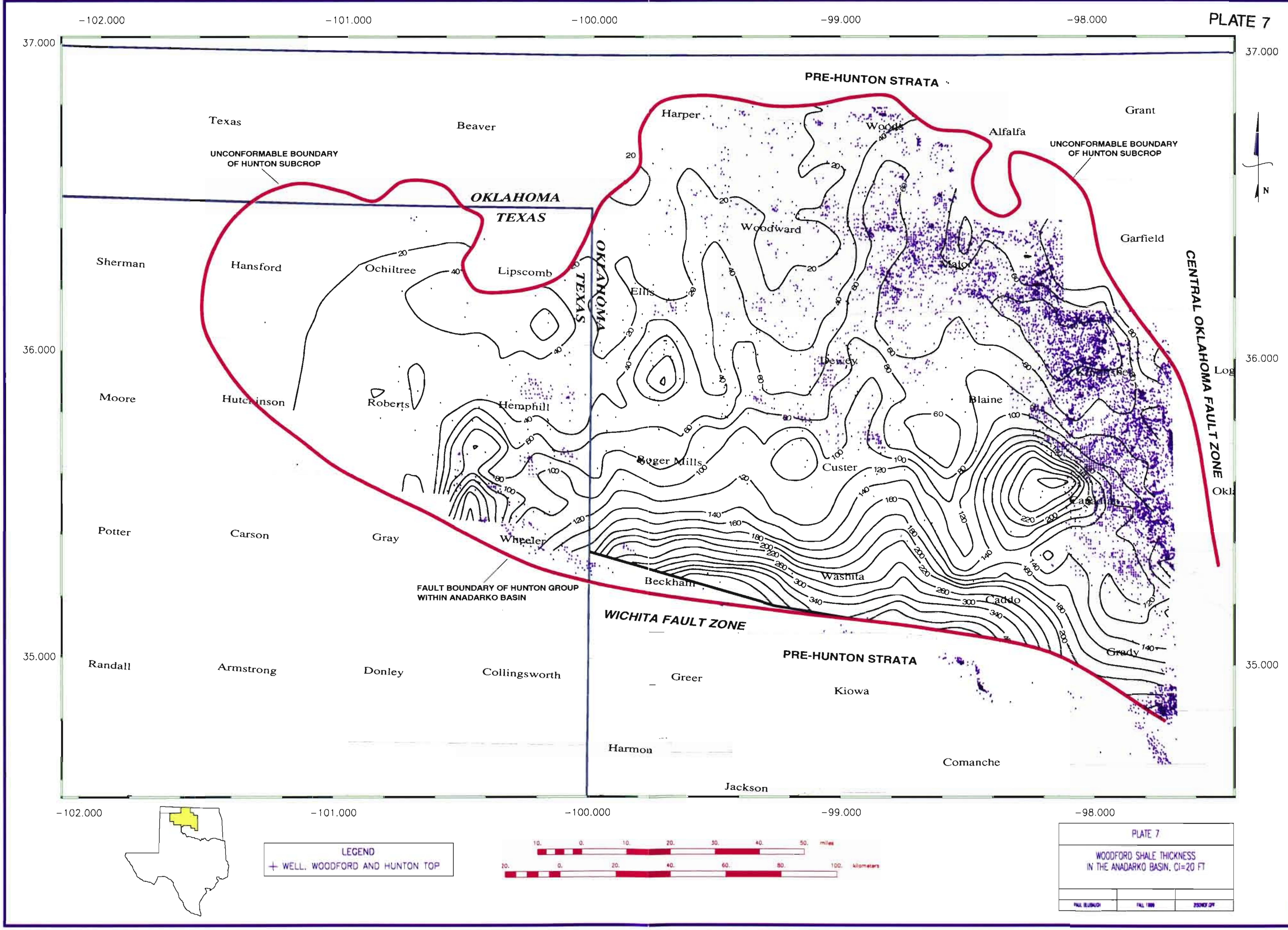


PLATE 7
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
CENTRAL OKLAHOMA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
WICHITA FAULT ZONE
PRE-HUNTON STRATA
OKLAHOMA
TEXAS
OKLAHOMA
TEXAS
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Garfield
Dewey
Kingfisher
Moore
Hutchinson
Roberts
Hemphill
Blaine
Roger Mills
Custer
Canadian
Potter
Carson
Gray
Wheeler
Washita
Beckham
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Comanche
Jackson
N
LEGEND
+ WELL, WOODFORD AND HUNTON TOP
miles
kilometers
PLATE 7
WOODFORD SHALE THICKNESS IN THE ANADARKO BASIN, CI=20 FT

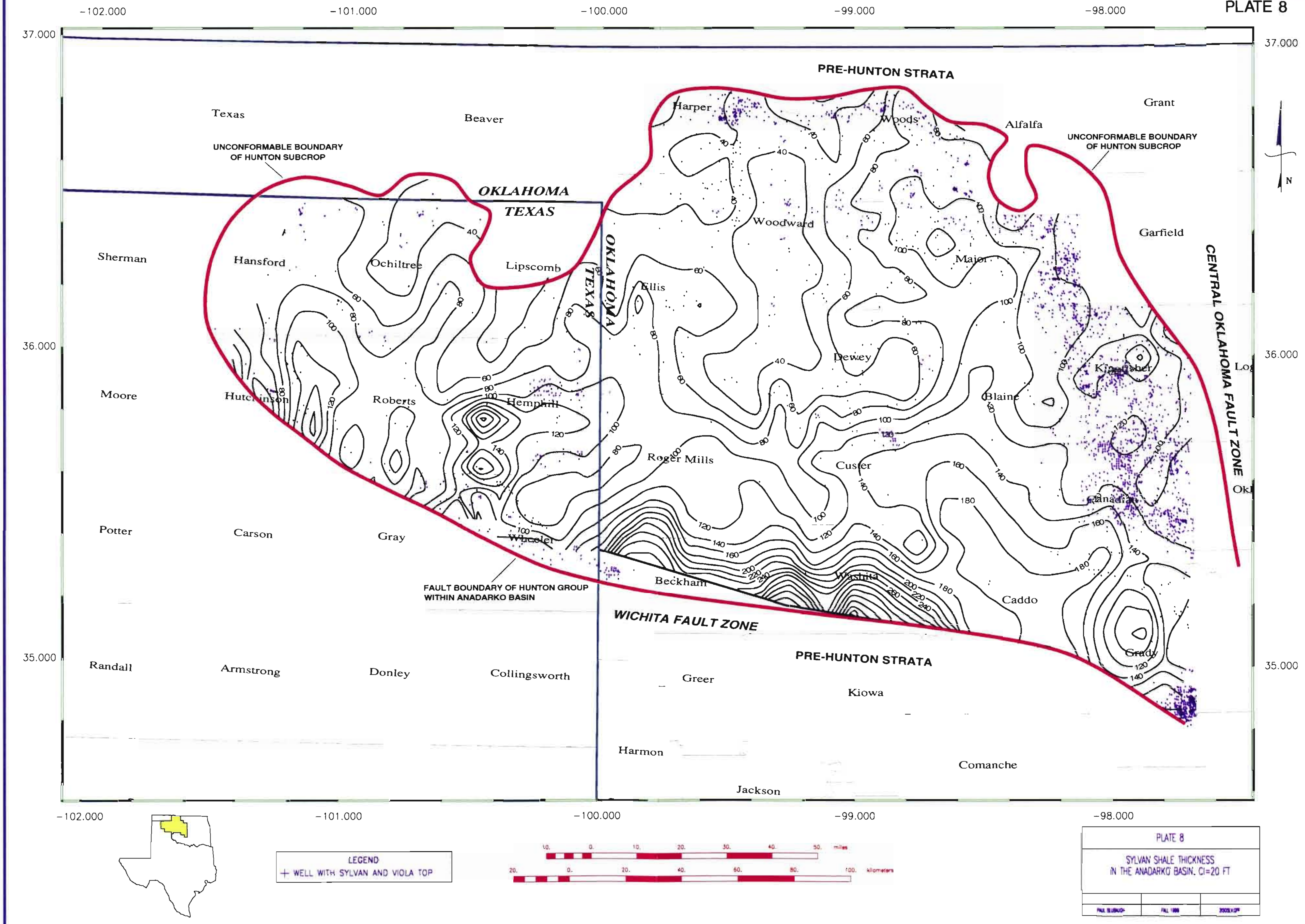


PLATE 8

SYLVAN SHALE THICKNESS IN THE ANADARKO BASIN. CI=20 FT

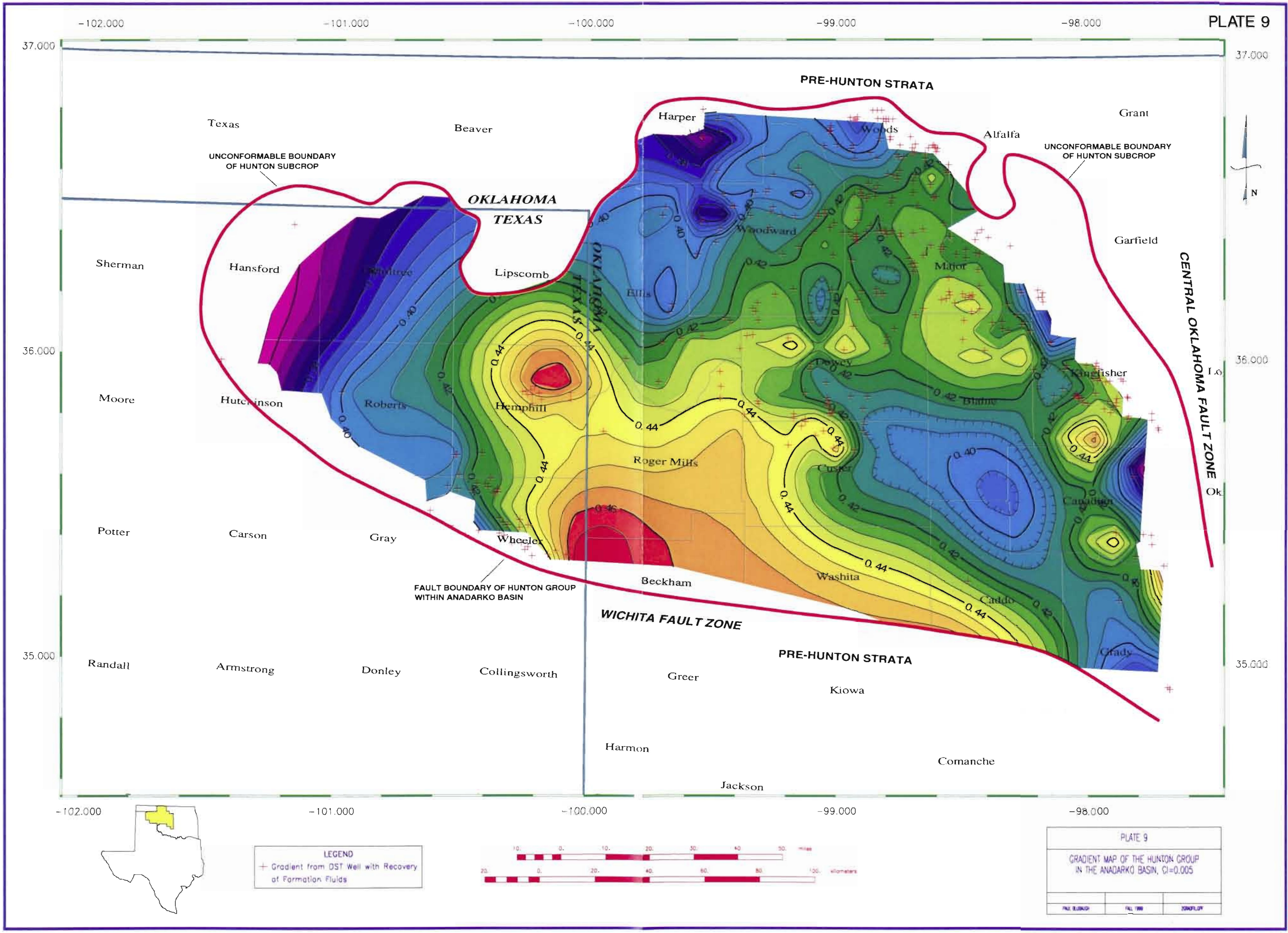


PLATE 9
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
CENTRAL OKLAHOMA FAULT ZONE
WICHITA FAULT ZONE
PRE-HUNTON STRATA
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Sherman
Hansford
Lipscomb
Woodward
Major
Garfield
Ellis
Dewey
Kingfisher
Moore
Hutchinson
Roberts
Hemphill
Blaine
Roger Mills
Custer
Canadian
Potter
Carson
Gray
Wheeler
Beckham
Washita
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Jackson
Comanche
0.40
0.42
0.44
0.46
N
LEGEND
+ Gradient from DST Well with Recovery of Formation Fluids
miles
kilometers
PLATE 9
GRADIENT MAP OF THE HUNTON GROUP IN THE ANADARKO BASIN, CI=0.005

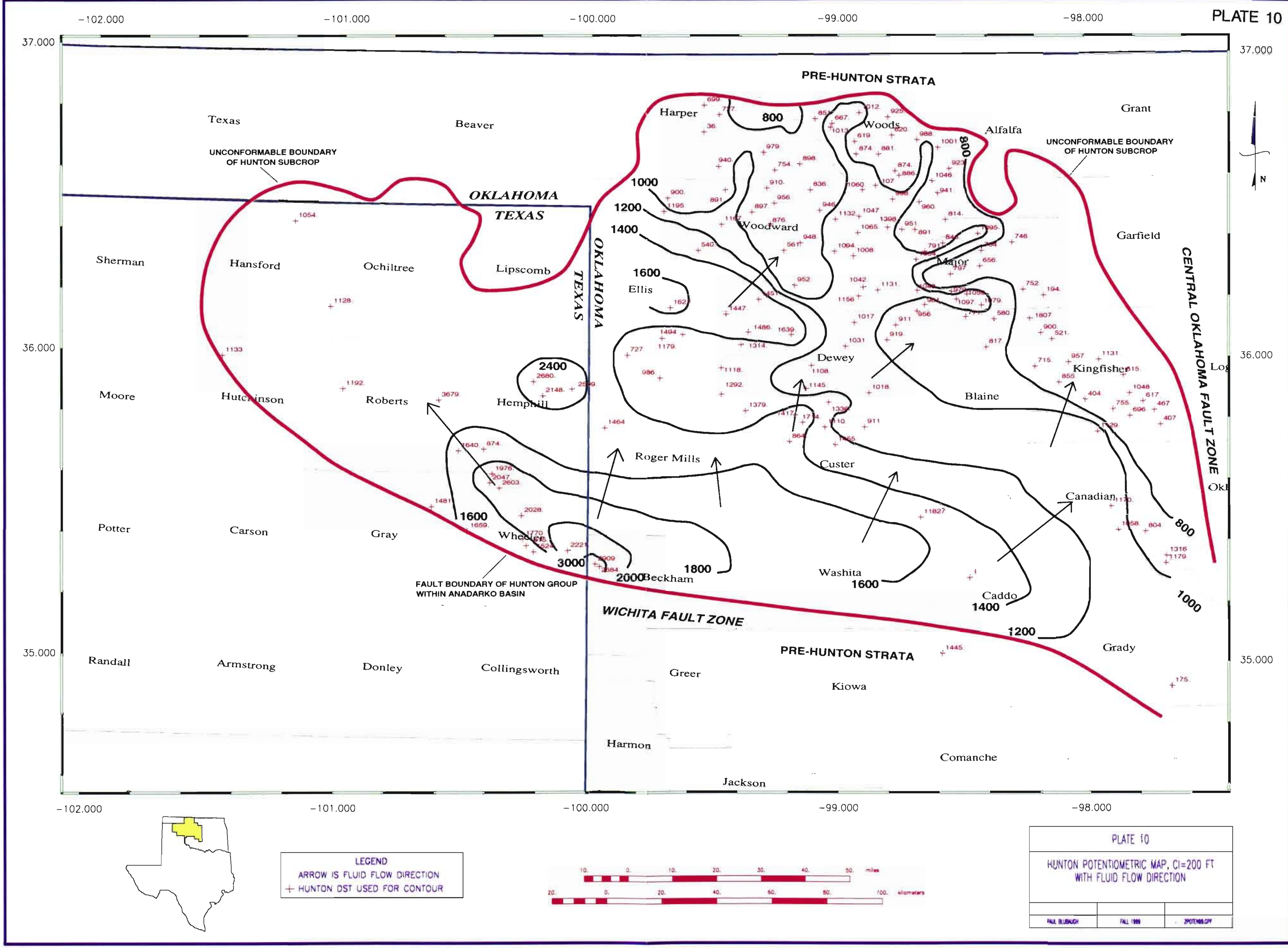


PLATE 10
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
CENTRAL OKLAHOMA FAULT ZONE
WICHITA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Garfield
Dewey
Kingfisher
Moore
Hutchinson
Roberts
Hemphill
Blaine
Roger Mills
Custer
Potter
Carson
Gray
Wheeler
Canadian
Beckham
Washita
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Comanche
Jackson
800
1000
1200
1400
1600
1800
2000
2400
3000
N
LEGEND
ARROW IS FLUID FLOW DIRECTION
+ HUNTON DST USED FOR CONTOUR
miles
kilometers
PLATE 10
HUNTON POTENTIOMETRIC MAP, CI=200 FT WITH FLUID FLOW DIRECTION
PAUL BLUBAUGH
FALL 1999

PLATE 11

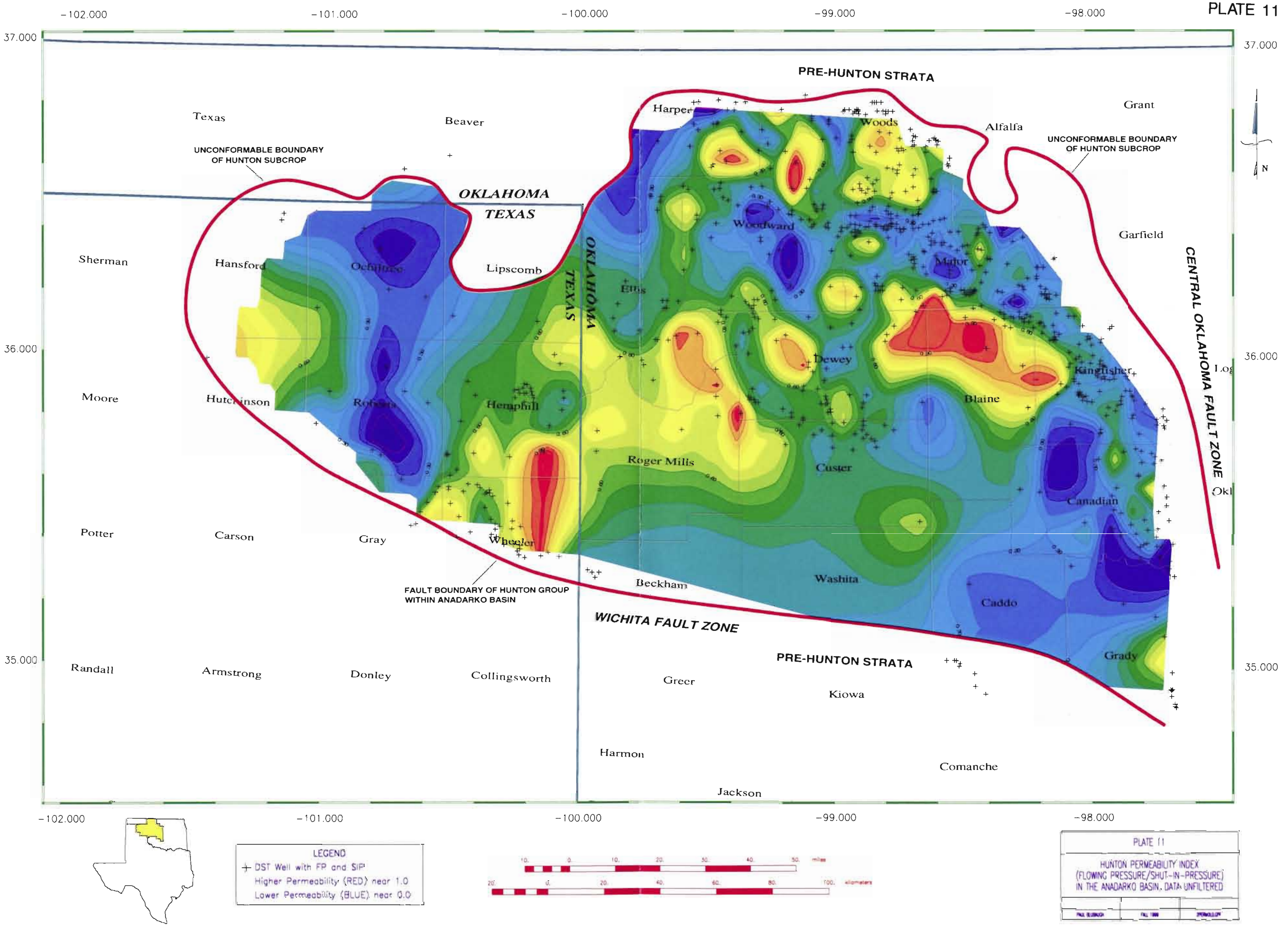


PLATE 11

HUNTON PERMEABILITY INDEX (FLOWING PRESSURE/SHUT-IN-PRESSURE) IN THE ANADARKO BASIN, DATA UNFILTERED

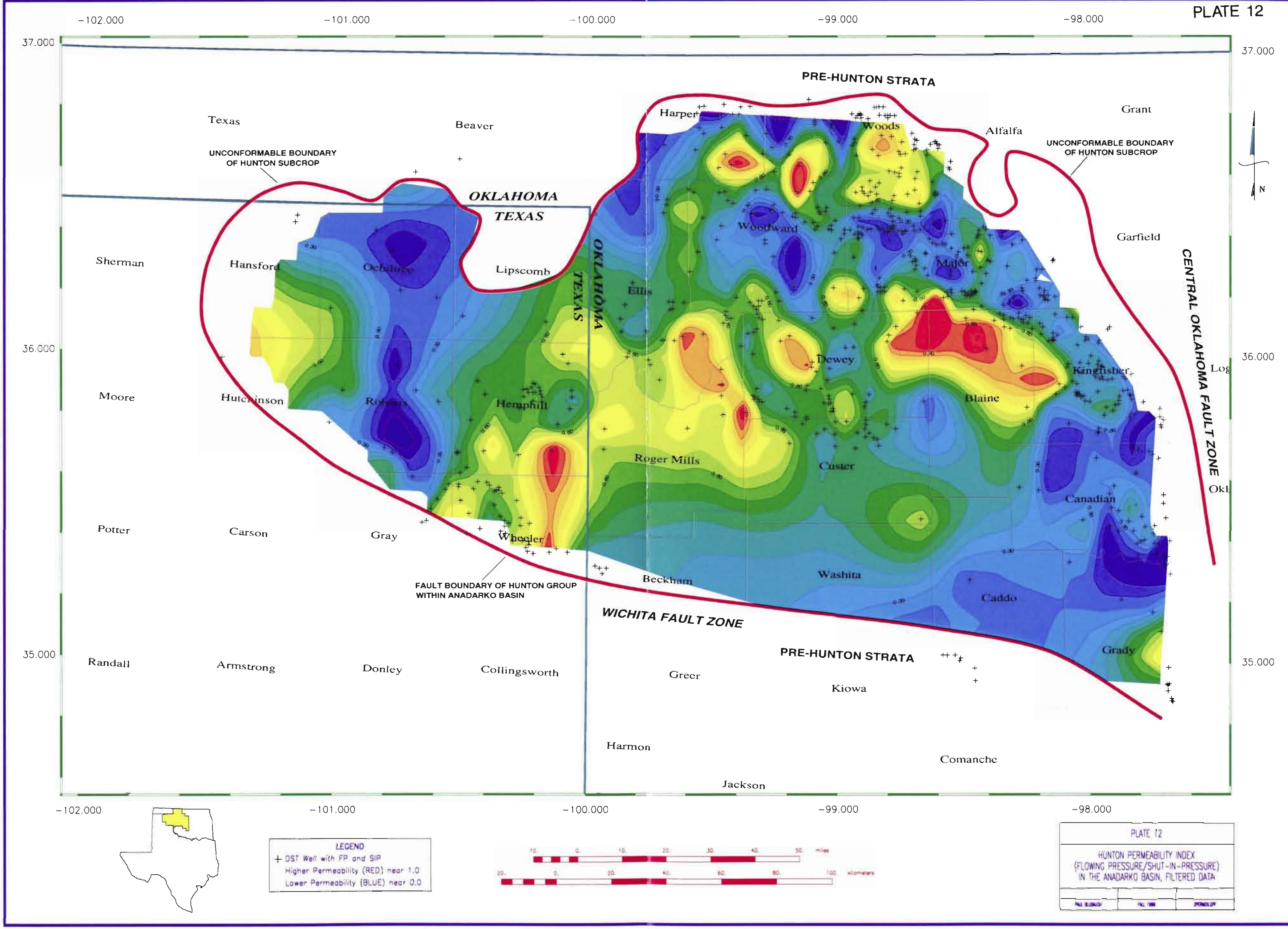


PLATE 12
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
OKLAHOMA
TEXAS
CENTRAL OKLAHOMA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
WICHITA FAULT ZONE
PRE-HUNTON STRATA
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Garfield
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Kingfisher
Dewey
Blaine
Moore
Hutchinson
Roberts
Hemphill
Roger Mills
Custer
Canadian
Potter
Carson
Gray
Wheeler
Beckham
Washita
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Comanche
Jackson
N
LEGEND
+ DST Well with FP and SIP
Higher Permeability (RED) near 1.0
Lower Permeability (BLUE) near 0.0
10. 0. 10. 20. 30. 40. 50. miles
20. 0. 20. 40. 60. 80. 100. kilometers
PLATE 12
HUNTON PERMEABILITY INDEX
(FLOWING PRESSURE/SHUT-IN-PRESSURE)
IN THE ANADARKO BASIN, FILTERED DATA

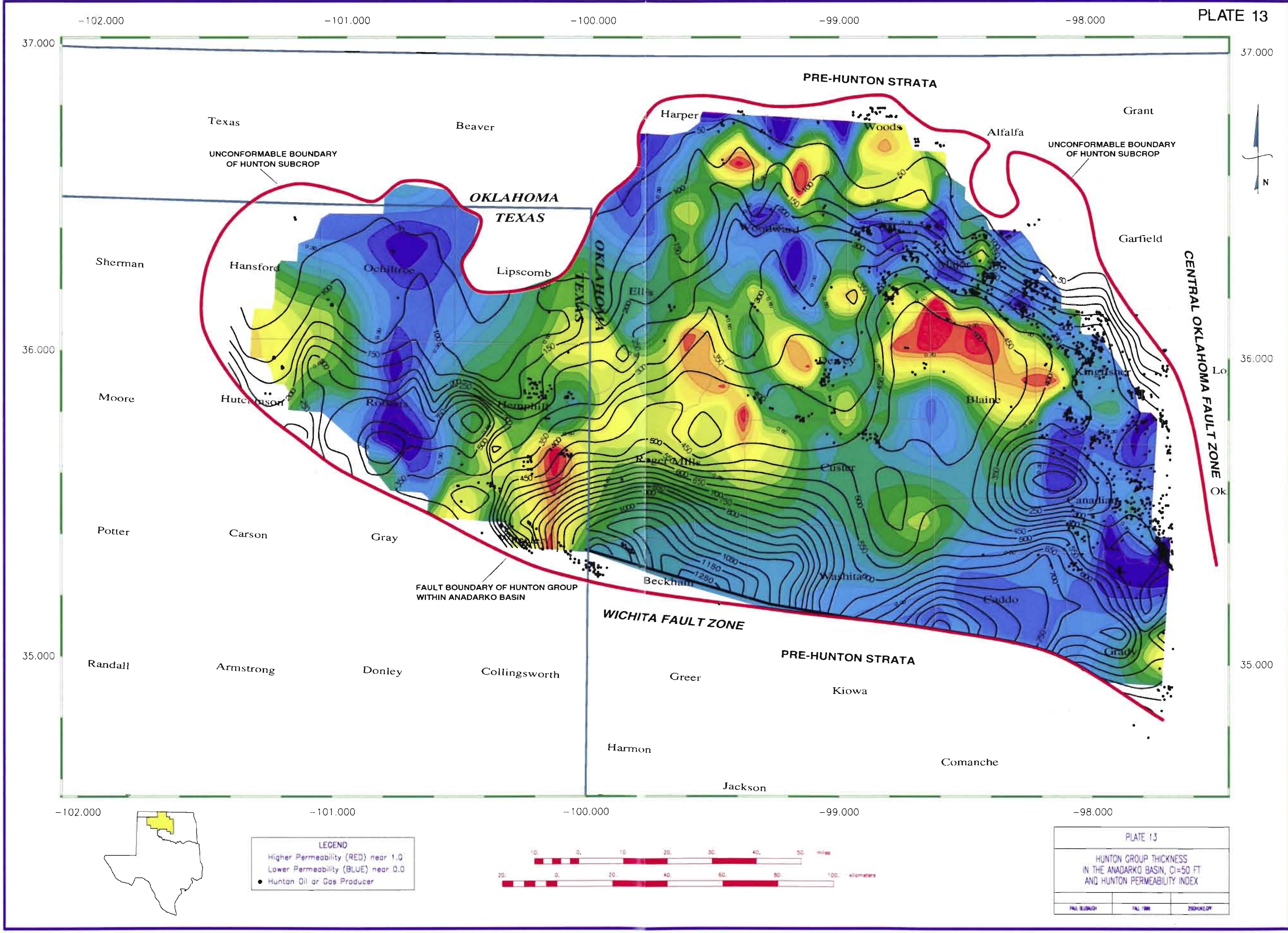


PLATE 13
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
CENTRAL OKLAHOMA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
WICHITA FAULT ZONE
PRE-HUNTON STRATA
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Garfield
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Kingfisher
Moore
Hutchinson
Roberts
Hemphill
Dewey
Blaine
Roger Mills
Custer
Canadian
Potter
Carson
Gray
Wheeler
Beckham
Washita
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Comanche
Jackson
N
LEGEND
Higher Permeability (RED) near 1.0
Lower Permeability (BLUE) near 0.0
Hunton Oil or Gas Producer
miles
kilometers
PLATE 13
HUNTON GROUP THICKNESS IN THE ANADARKO BASIN, CI=50 FT AND HUNTON PERMEABILITY INDEX

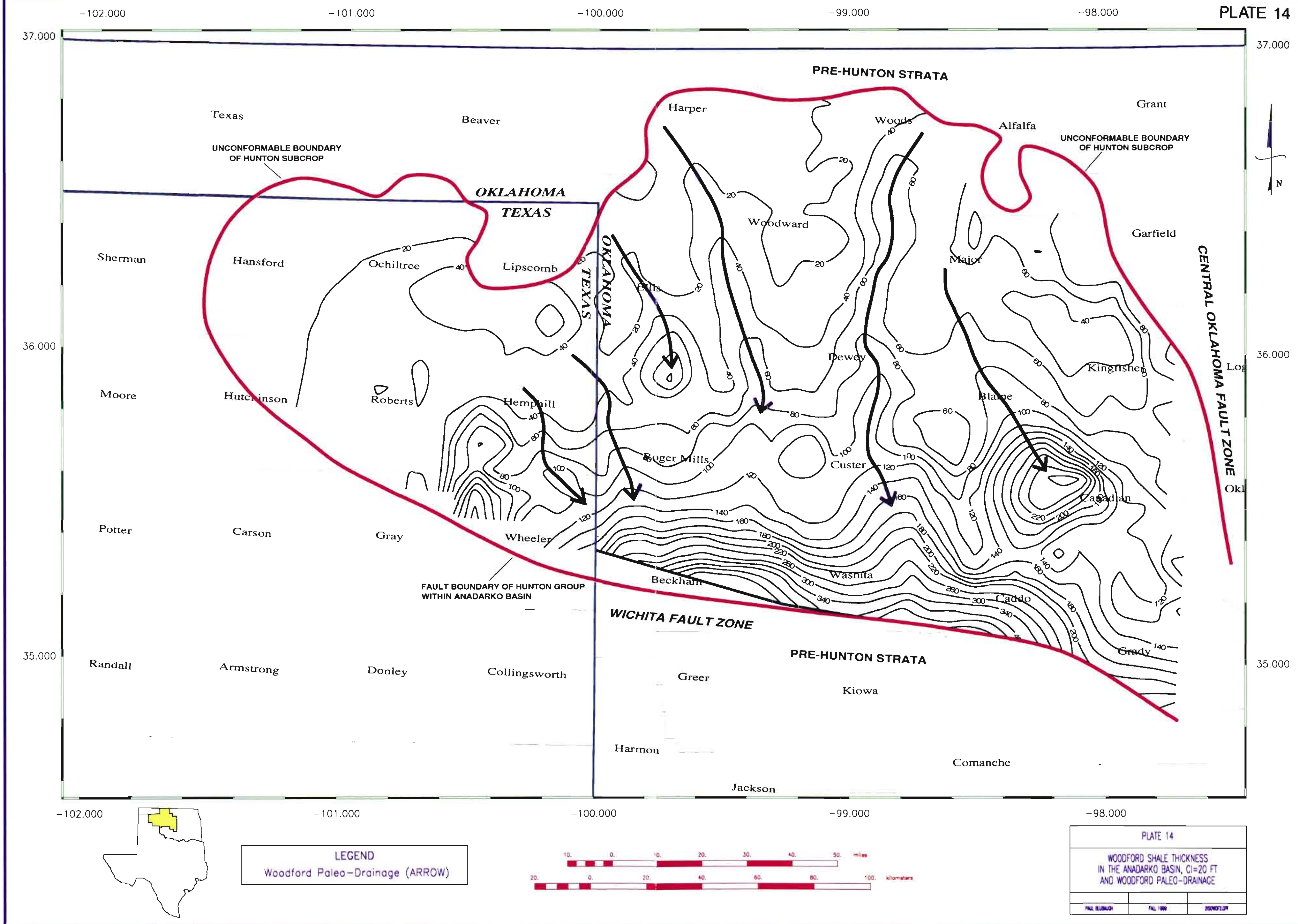
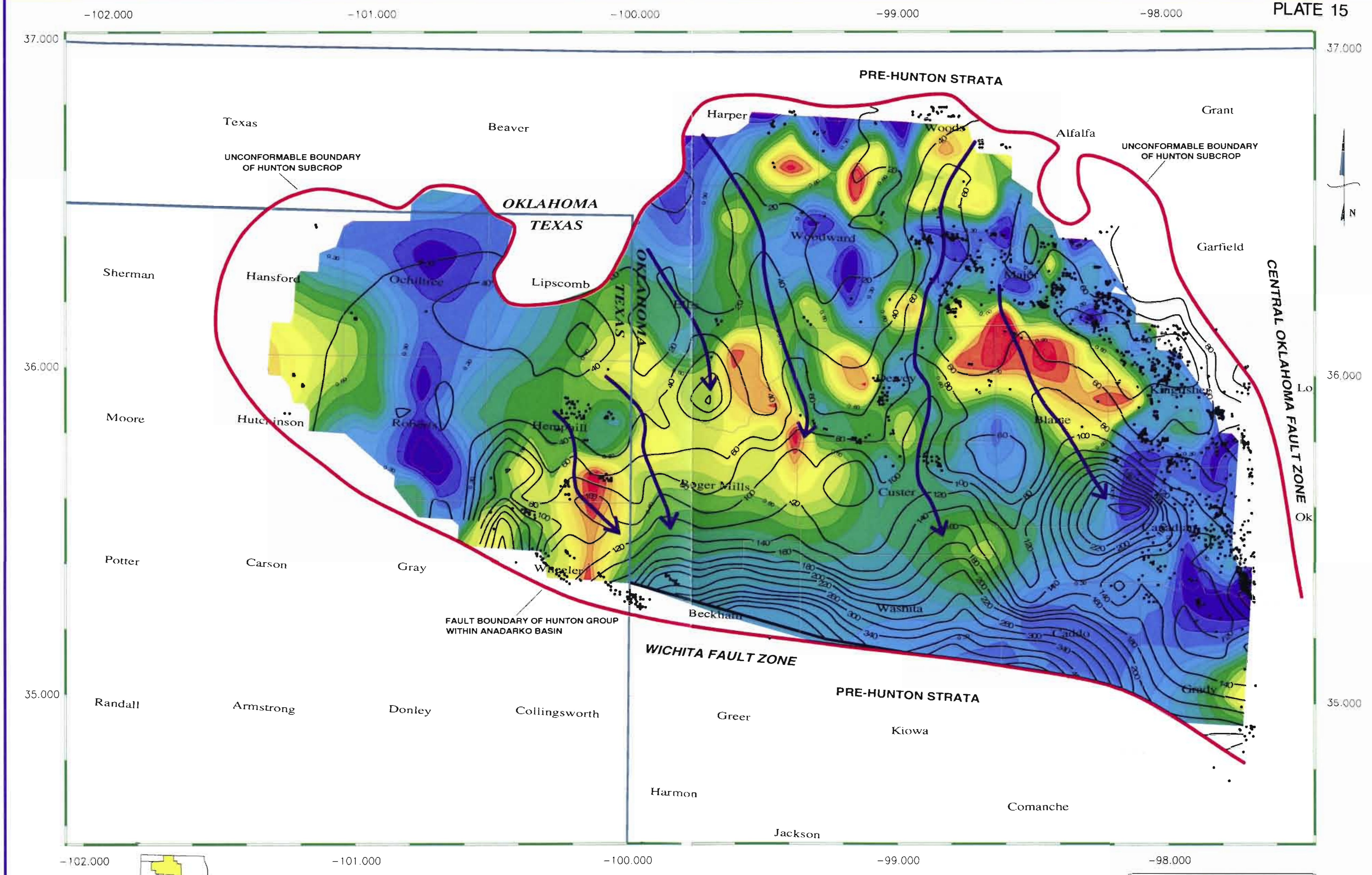


PLATE 14

WOODFORD SHALE THICKNESS IN THE ANADARKO BASIN, CI=20 FT AND WOODFORD PALEO-DRAINAGE

PLATE 15



LEGEND
Higher Permeability (RED) near 1.0
Lower Permeability (BLUE) near 0.0
• Hunton Oil or Gas Producer
Paleo-Drainage of Woodford, ARROW

10. 0. 10. 20. 30. 40. 50. miles
20. 0. 20. 40. 60. 80. 100. kilometers

PLATE 15

WOODFORD SHALE PALEO-DRAINAGE IN THE ANADARKO BASIN, CI=20 FT AND HUNTON PERMEABILITY INDEX

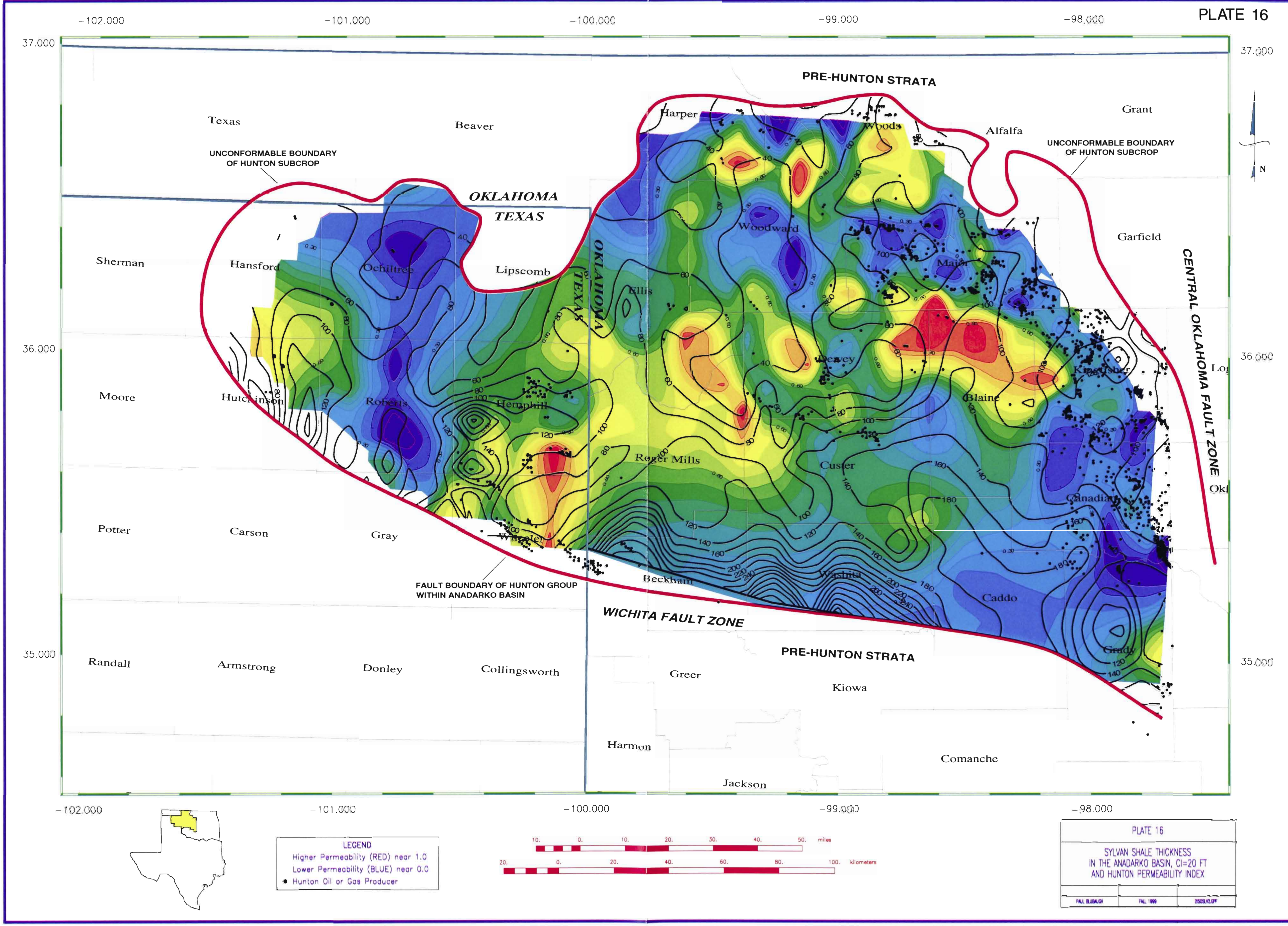


PLATE 16
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
CENTRAL OKLAHOMA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
WICHITA FAULT ZONE
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Garfield
Moore
Hutchinson
Roberts
Hemphill
Roger Mills
Dewey
Blaine
Kingfisher
Custer
Canadian
Potter
Carson
Gray
Wheeler
Beckham
Washita
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Jackson
Comanche
LEGEND
Higher Permeability (RED) near 1.0
Lower Permeability (BLUE) near 0.0
Hunton Oil or Gas Producer
miles
kilometers
PLATE 16
SYLVAN SHALE THICKNESS IN THE ANADARKO BASIN, CI=20 FT AND HUNTON PERMEABILITY INDEX
PAUL BLUBAUGH
FALL 1999

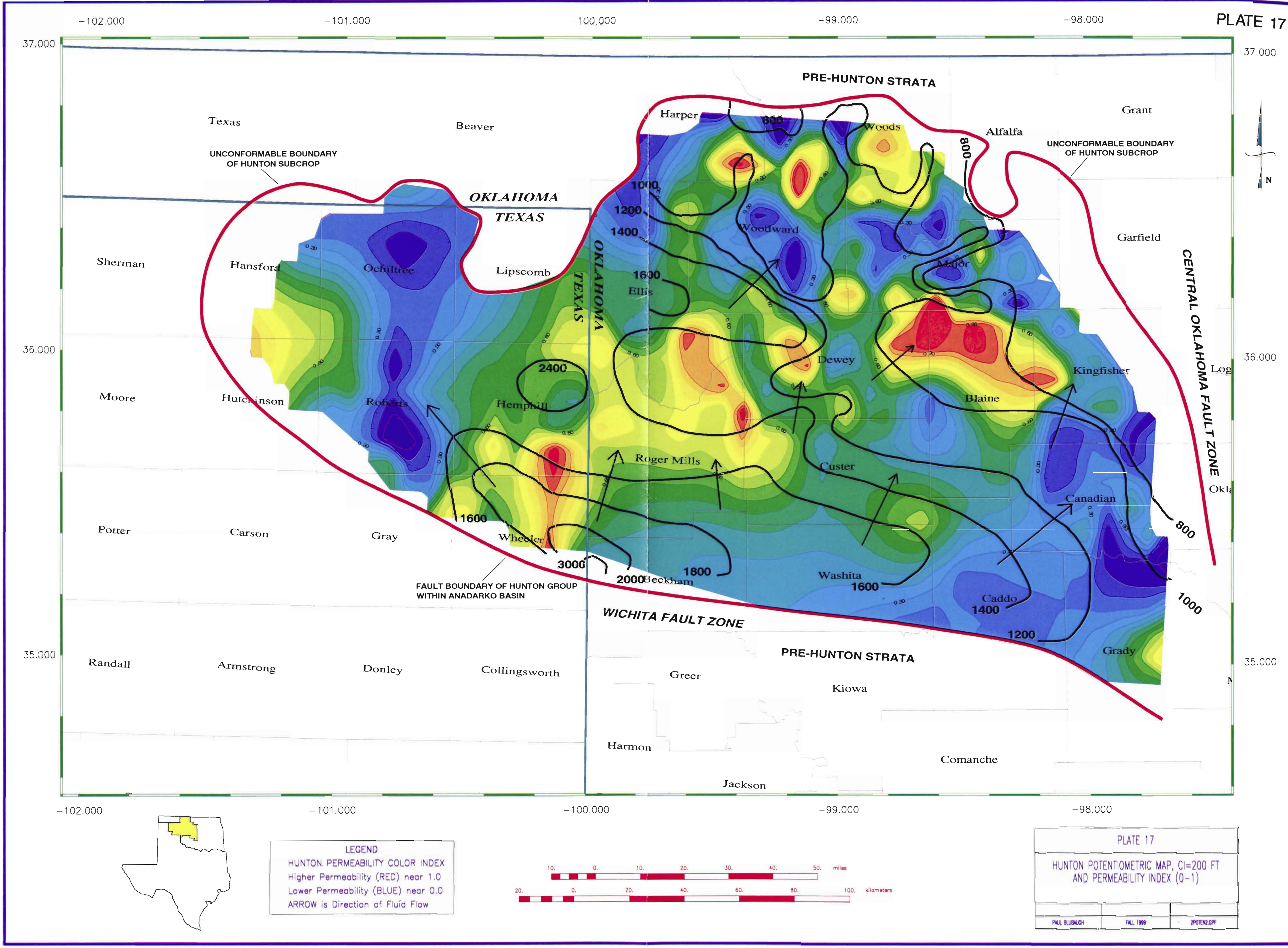


PLATE 17
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
OKLAHOMA
TEXAS
CENTRAL OKLAHOMA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
WICHITA FAULT ZONE
PRE-HUNTON STRATA
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Garfield
Moore
Hutchinson
Roberts
Hemphill
Dewey
Blaine
Kingfisher
Roger Mills
Custer
Potter
Carson
Gray
Wheeler
Beckham
Washita
Caddo
Canadian
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Comanche
Jackson
800
1000
1200
1400
1600
1800
2000
2400
3000
N
LEGEND
HUNTON PERMEABILITY COLOR INDEX
Higher Permeability (RED) near 1.0
Lower Permeability (BLUE) near 0.0
ARROW is Direction of Fluid Flow
10. 0. 10. 20. 30. 40. 50. miles
20. 0. 20. 40. 60. 80. 100. kilometers
PLATE 17
HUNTON POTENTIOMETRIC MAP, CI=200 FT AND PERMEABILITY INDEX (0-1)
PAUL BLUBAUGH
FALL 1999
2POTEN2.GPF

PLATE 18

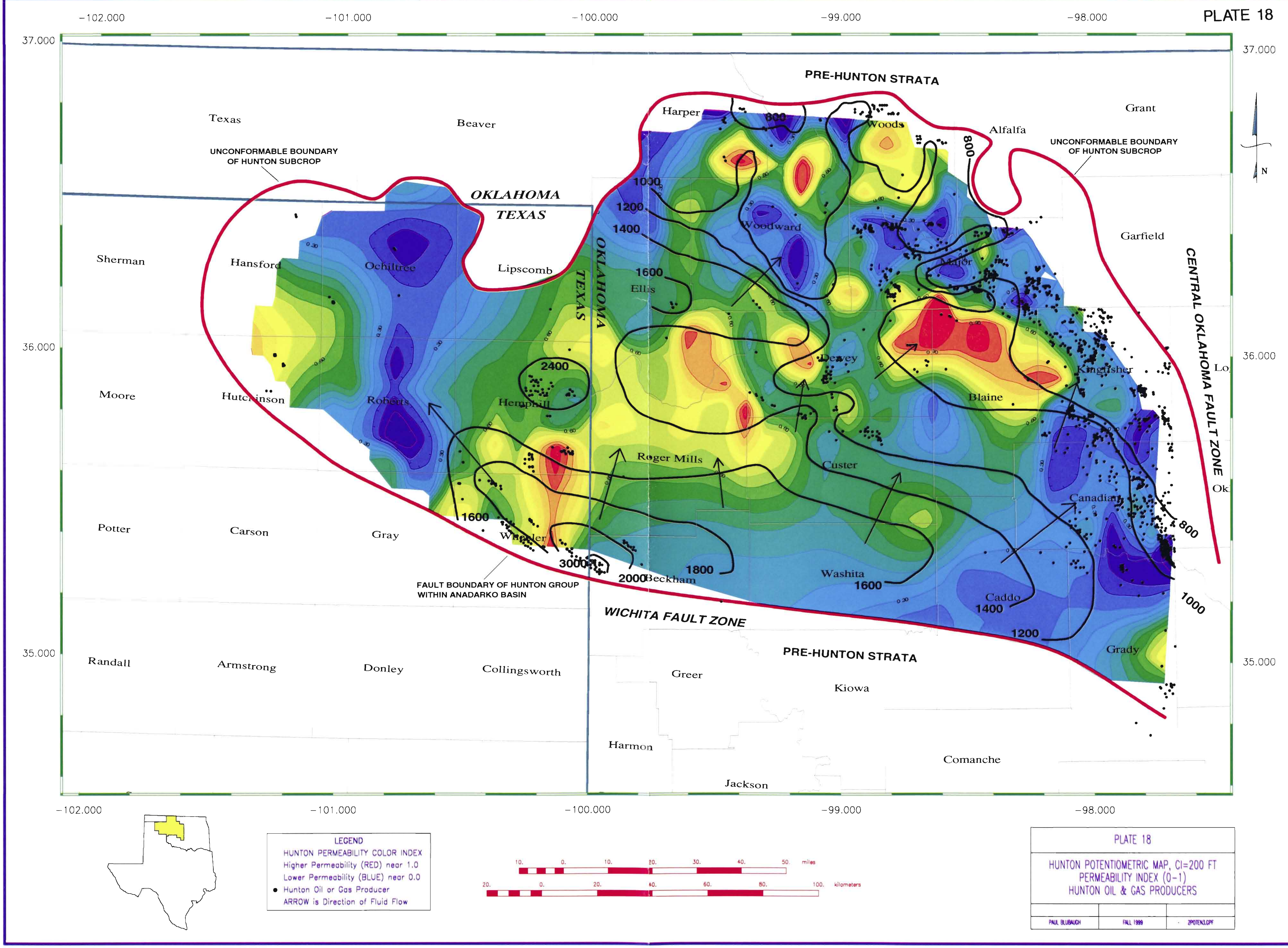


PLATE 18

HUNTON POTENTIOMETRIC MAP, CI=200 FT
PERMEABILITY INDEX (0-1)
HUNTON OIL & GAS PRODUCERS

PAUL BLUBAUGH | FALL 1999 | 2POTEN3.GPF

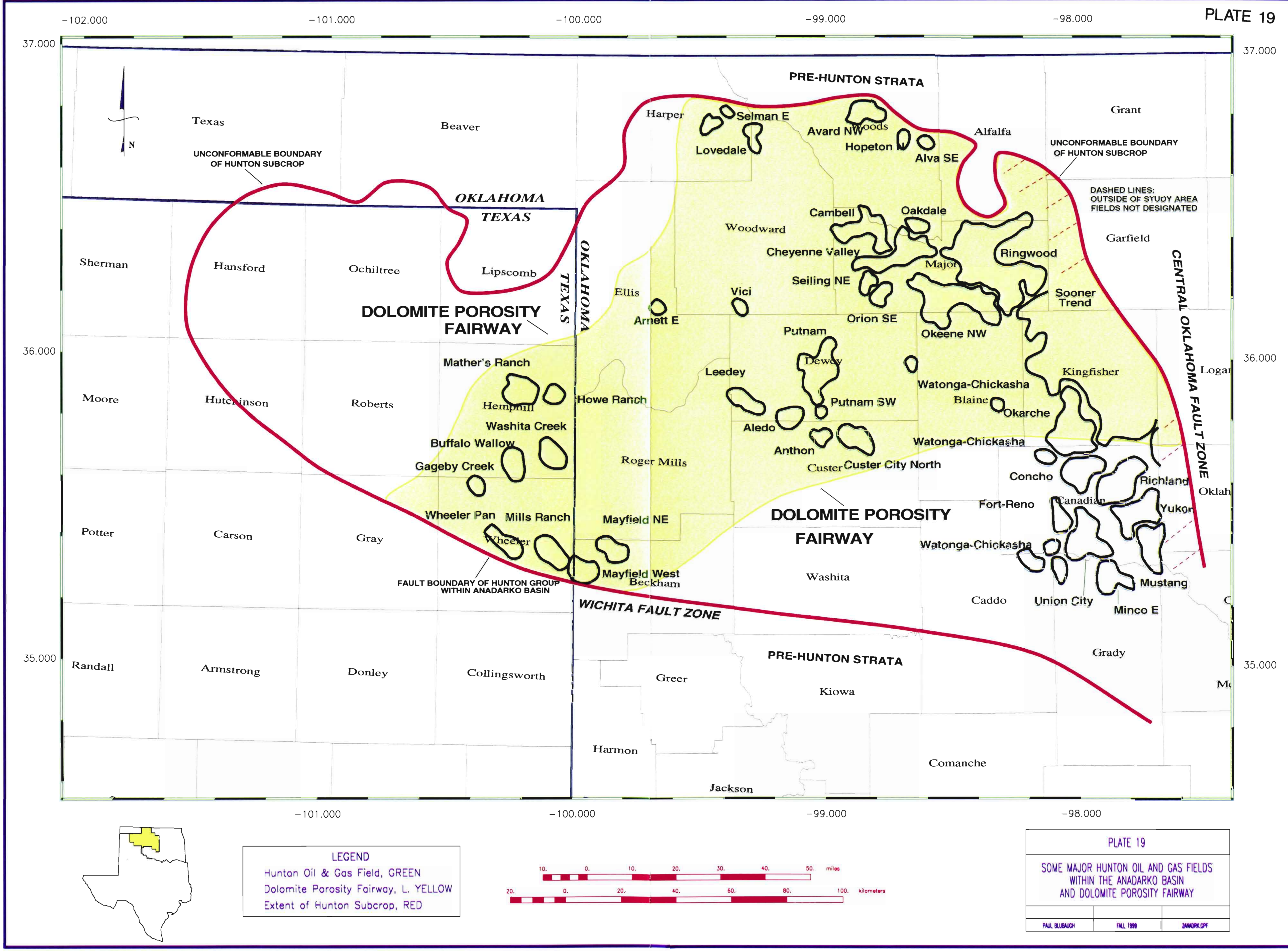


PLATE 19
-102.000
-101.000
-100.000
-99.000
-98.000
37.000
36.000
35.000
PRE-HUNTON STRATA
UNCONFORMABLE BOUNDARY OF HUNTON SUBCROP
OKLAHOMA
TEXAS
DOLOMITE POROSITY FAIRWAY
DASHED LINES: OUTSIDE OF STUDY AREA FIELDS NOT DESIGNATED
CENTRAL OKLAHOMA FAULT ZONE
FAULT BOUNDARY OF HUNTON GROUP WITHIN ANADARKO BASIN
WICHITA FAULT ZONE
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Sherman
Hansford
Ochiltree
Lipscomb
Ellis
Woodward
Major
Garfield
Moore
Hutchinson
Roberts
Hemphill
Roger Mills
Dewey
Blaine
Kingfisher
Logan
Potter
Carson
Gray
Wheeler
Custer
Canadian
Oklahoma
Beckham
Washita
Caddo
Grady
Randall
Armstrong
Donley
Collingsworth
Greer
Kiowa
Harmon
Jackson
Comanche
Selman E
Lovedale
Avard NW
Hopeton N
Alva SE
Cambell
Oakdale
Cheyenne Valley
Ringwood
Seiling NE
Vici
Arnett E
Sooner Trend
Orion SE
Putnam
Okeene NW
Mather's Ranch
Leedey
Watonga-Chickasha
Howe Ranch
Putnam SW
Okarche
Washita Creek
Aledo
Buffalo Wallow
Anthon
Gageby Creek
Custer City North
Concho
Richland
Fort-Reno
Yukon
Wheeler Pan
Mills Ranch
Mayfield NE
Mayfield West
Mustang
Union City
Minco E
LEGEND
Hunton Oil & Gas Field, GREEN
Dolomite Porosity Fairway, L. YELLOW
Extent of Hunton Subcrop, RED
10. 0. 10. 20. 30. 40. 50. miles
20. 0. 20. 40. 60. 80. 100. kilometers
PLATE 19
SOME MAJOR HUNTON OIL AND GAS FIELDS WITHIN THE ANADARKO BASIN AND DOLOMITE POROSITY FAIRWAY
PAUL BLUBAUGH
FALL 1999
ANADRK.GPF

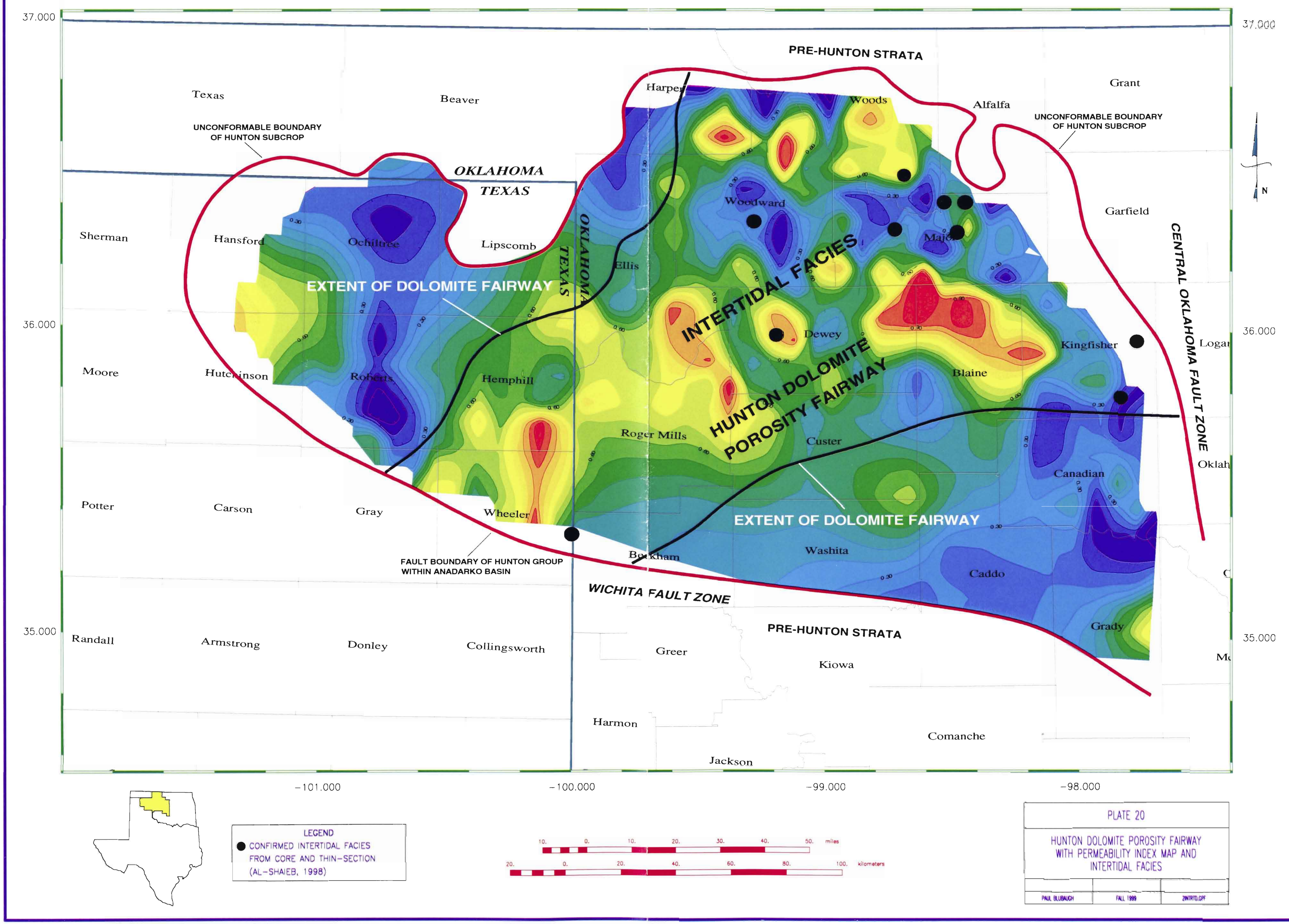


PLATE 20

HUNTON DOLOMITE POROSITY FAIRWAY WITH PERMEABILITY INDEX MAP AND INTERTIDAL FACIES

VITA

Paul Eugene Blubaugh Jr.

Candidate for the Degree of

Master of Science

Thesis: HYDRODYNAMICS OF THE HUNTON GROUP IN THE ANADARKO BASIN, OKLAHOMA AND TEXAS PANHANDLE

Major Field: Geology

Biographical:

Born in Houston, Texas, on November 18, 1966, the son of Mr. and Mrs. Paul Eugene Blubaugh Sr. Father graduated from OSU in 1957, died at age 39.

Education:

Graduated from St. Thomas High School in Houston, Texas in May 1985; studied Engineering Science for two years at St. Mary's University in San Antonio, Texas; received Bachelor of Arts in Geology from University of Texas, Austin, Texas in December 1990. Completed the requirements for the Master of Science degree with a major in Geology at Oklahoma State University in December 1999.

Experience:

Previously, worked as a groundwater hydrologist for four years writing technical reports to help characterize groundwater contamination. Used numerical modeling software to predict groundwater flow. Worked as a teaching assistant for two years at Oklahoma State University teaching introductory geology courses. Worked as a research assistant for two years at Oklahoma State University studying compartmentalized reservoirs and abnormally pressured reservoirs. Completed a hydrogeologic database for Devon Energy Company as part of thesis research.