

Legend	
	State Boundary
	County Boundary
	Major Roads
	City/Town Center
	Artesia Fairway

RESEARCH PARTNERSHIP TO SECURE ENERGY FOR AMERICA
 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
 RPSEA Subcontract No. 08123-19

Artesia Fairway



FIGURE
 5.1

North

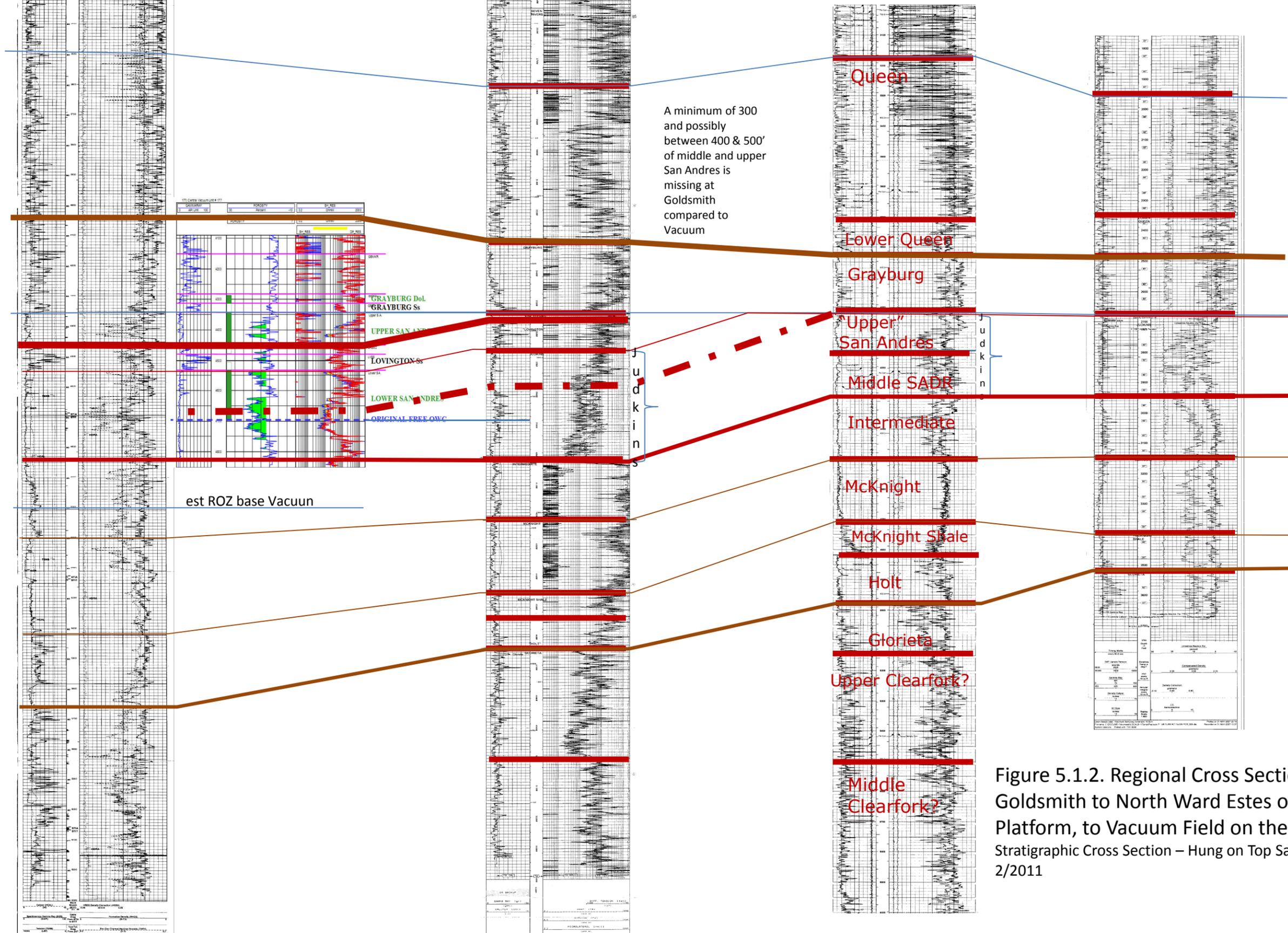
South

VACUUM FIELD,
Lea Co., NM

NORTH WARD ESTES FIELD,
Ward County, TX

GOLDSMITH FIELD,
Ector County, TX

SAND HILLS FIELD, Crane
County, TX



A minimum of 300 and possibly between 400 & 500' of middle and upper San Andres is missing at Goldsmith compared to Vacuum

Queen

Lower Queen

Grayburg

'Upper' San Andres

Middle SADR

Intermediate

McKnight

McKnight Shale

Holt

Glorieta

Upper Clearfork?

Middle Clearfork?

est ROZ base Vacuum

Figure 5.1.2. Regional Cross Section from Sand Hills to Goldsmith to North Ward Estes on the Central Basin Platform, to Vacuum Field on the Northwest Shelf. Stratigraphic Cross Section – Hung on Top San Andres. 2/2011

FIGURE 5.2.1: FLOW CHART FOR LOCATING PRODUCED WATER ANALYSES

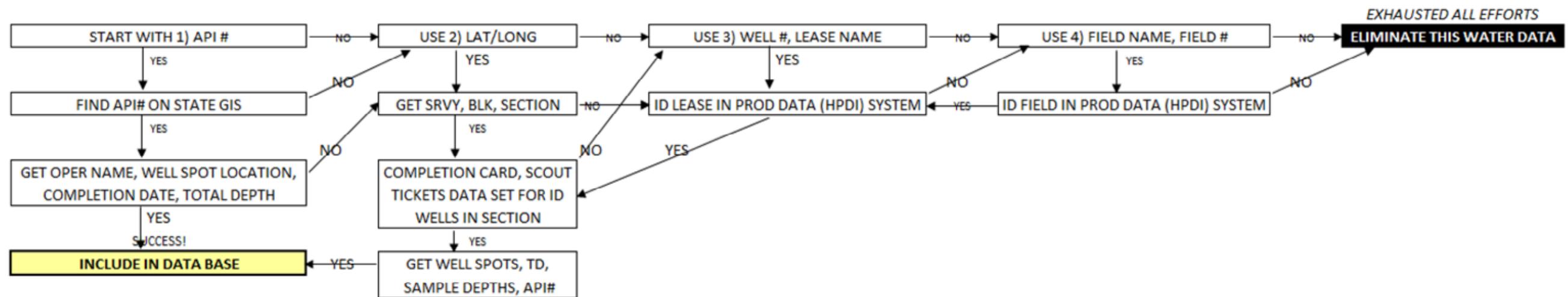
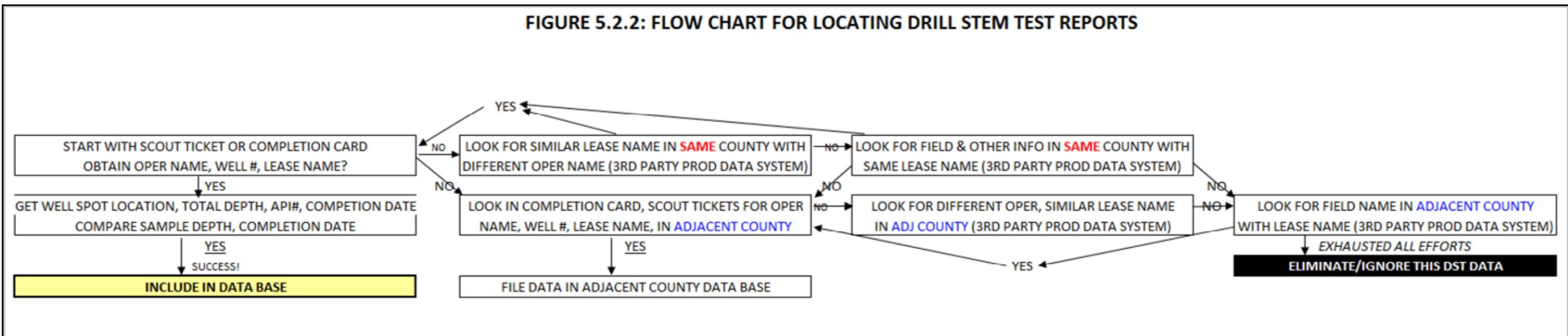
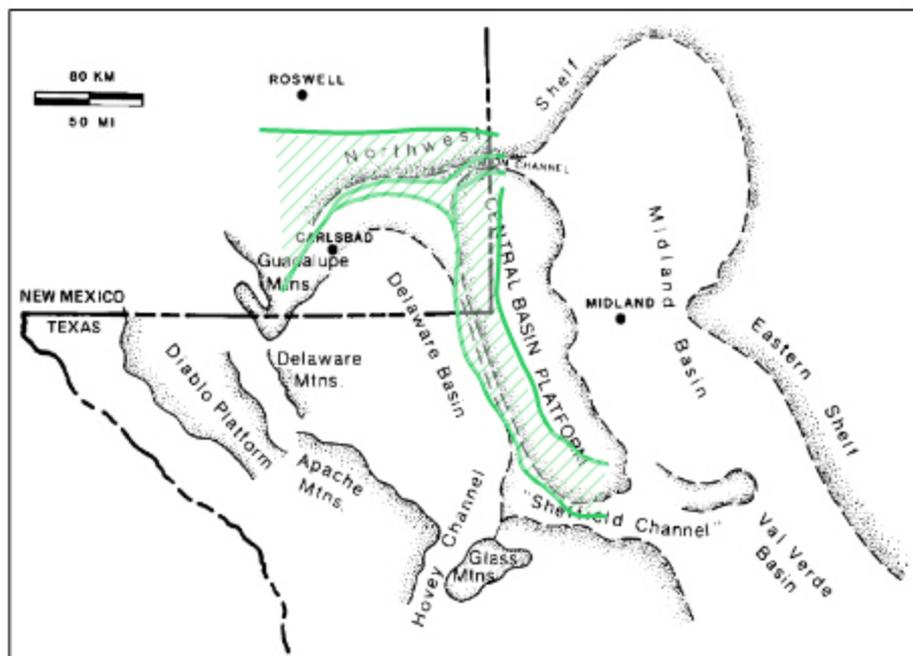


FIGURE 5.2.2: FLOW CHART FOR LOCATING DRILL STEM TEST REPORTS





Source: Ward et al 1986

LEGEND

 Artesia Fairway

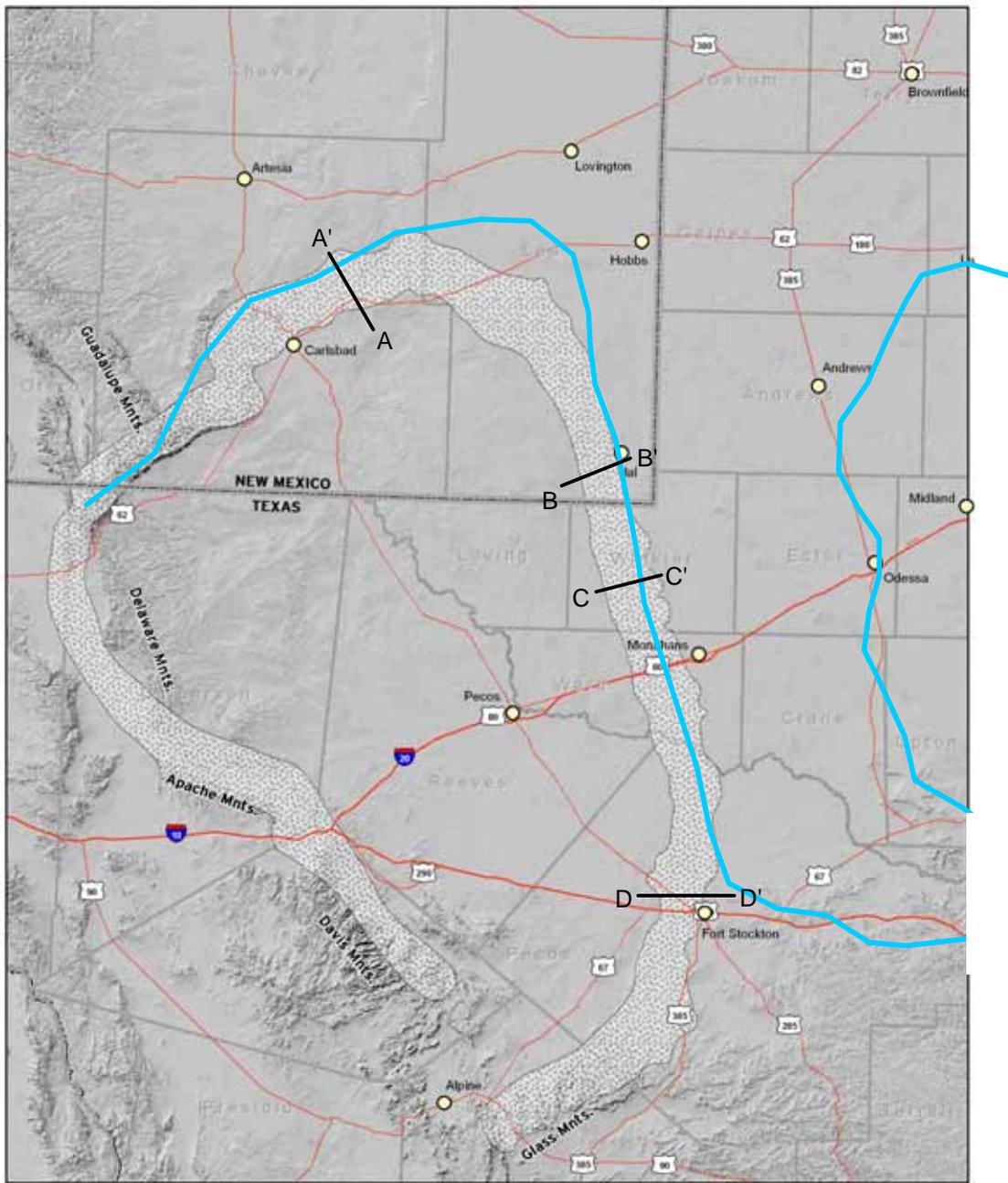
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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN

RPSEA Subcontract No. 00123-10

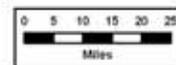
Study Area Map - Permian Basin



FIGURE
 7.1



- Legend**
- State Boundary
 - County Boundary
 - Capitan Reef Complex
 - City/Town Center
 - Major Roads
 - San Andres Formation Outline
 - Geologic Cross-Section Line



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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN

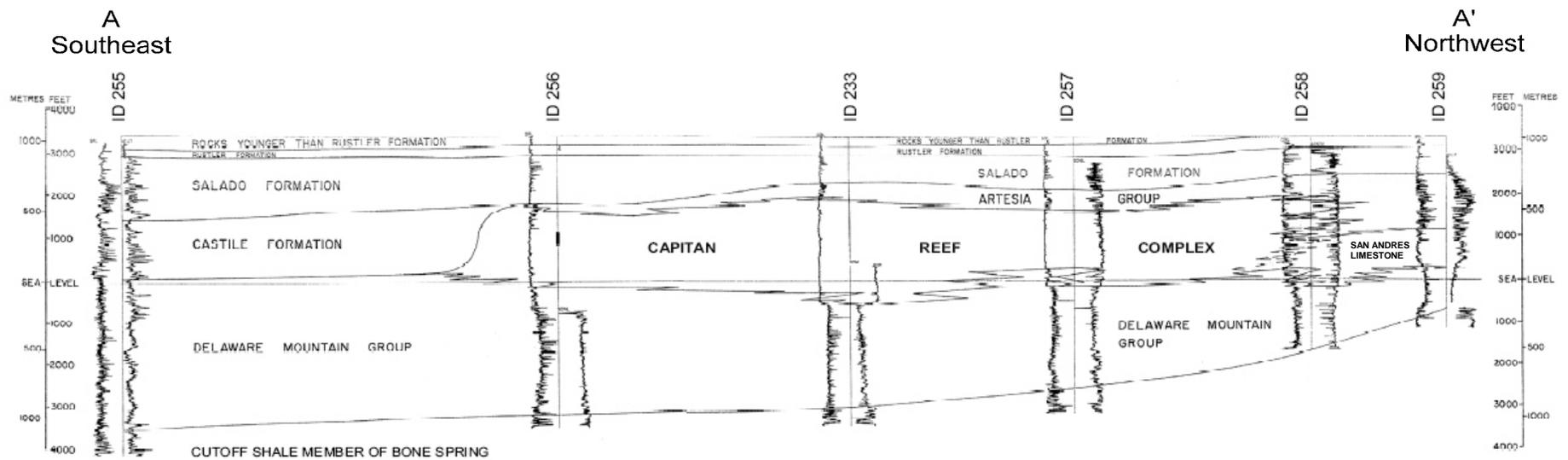
RPSEA Subcontract No. 08123-19

Study Area Map Showing Location of the
 Capitan Reef Complex and the San Andres Formation



FIGURE

7.3



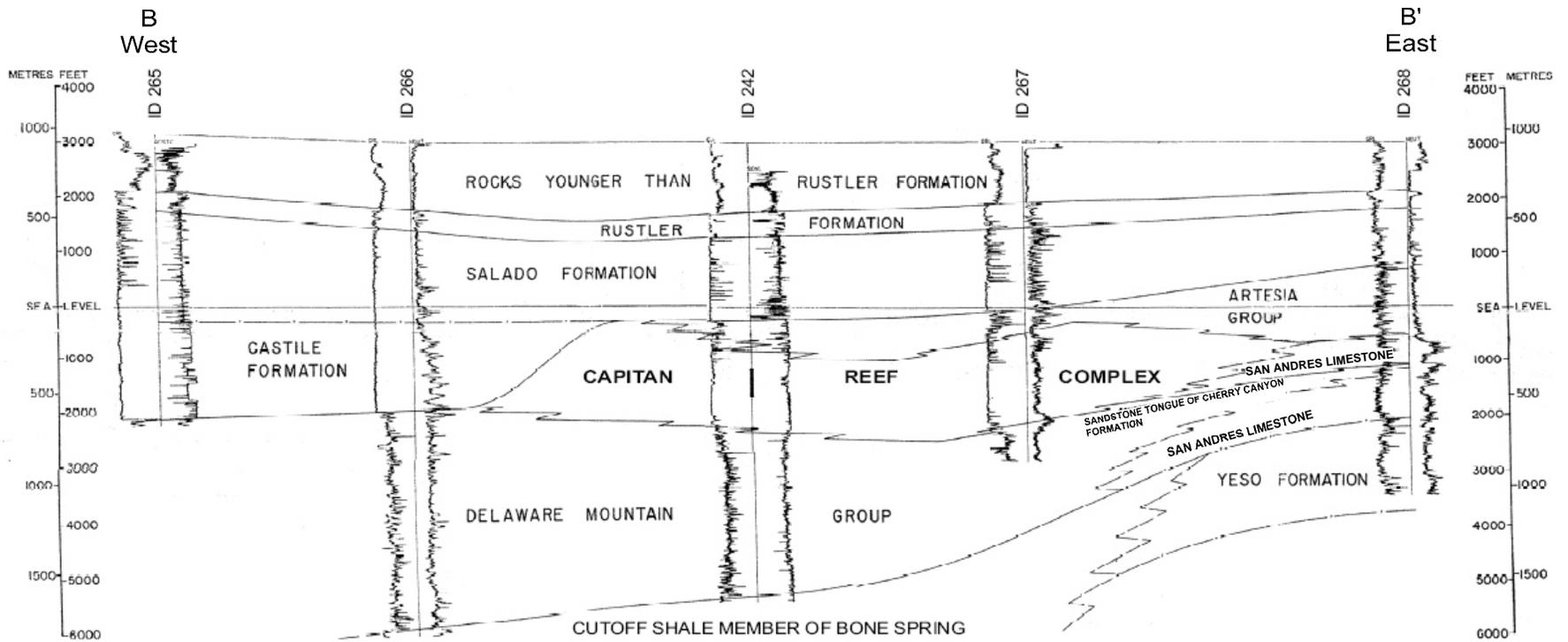
Source: Hiss 1975

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Geologic Cross Section A-A', Southeast to Northwest
 Eddy County



FIGURE
 7.4



Source: Hiss 1975

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN

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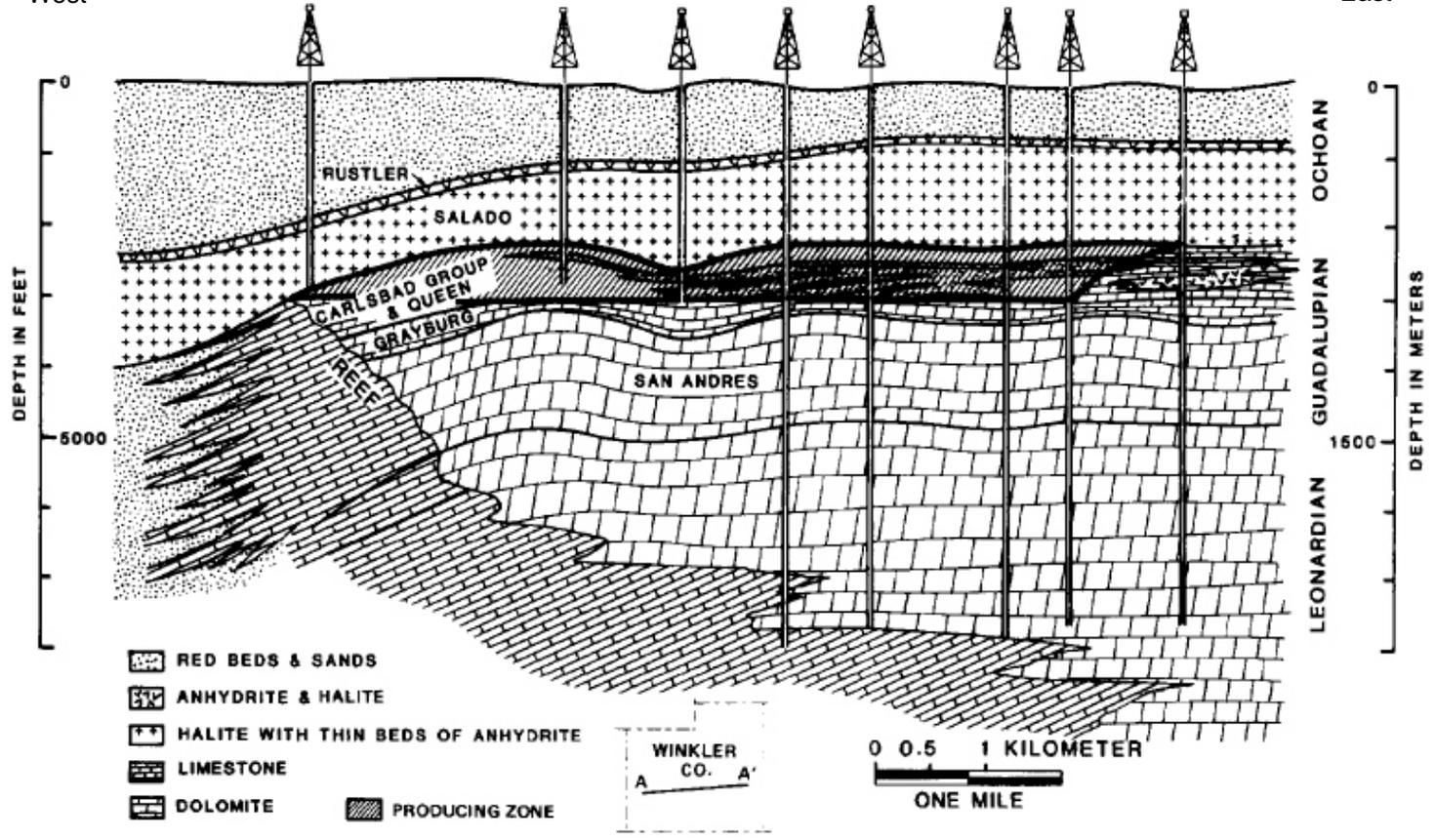
Geologic Cross Section B-B', West to East
 Lea County



FIGURE
 7.5

C
West

C'
East



Source: Ward et al 1986

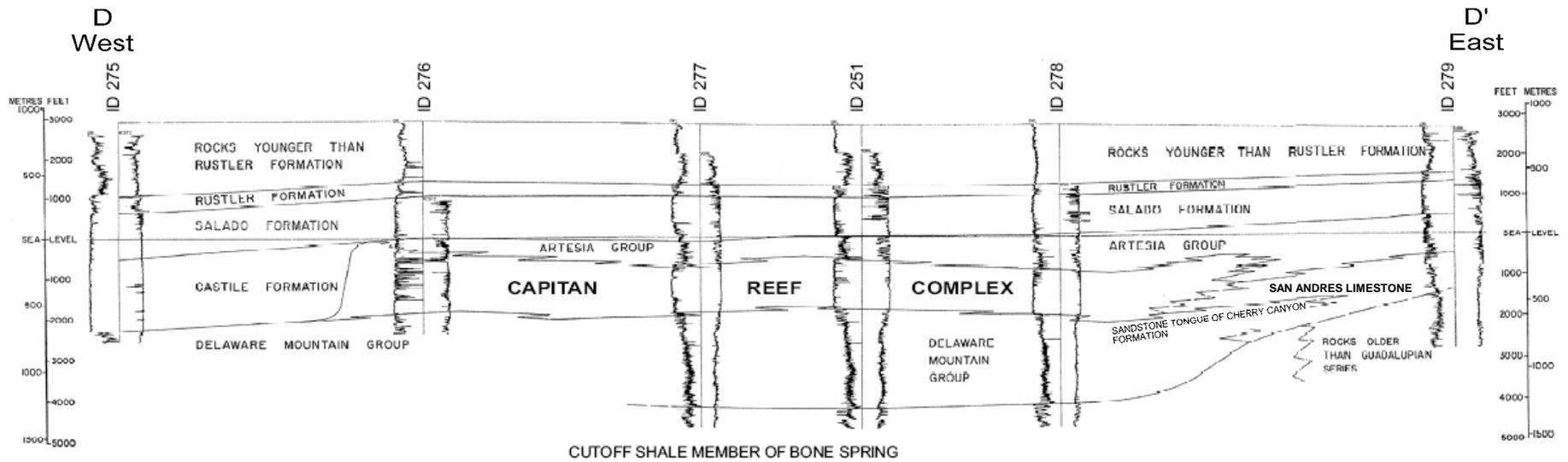
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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Geologic Cross Section C-C', West to East
 Winkler County

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FIGURE
 7.6



Source: Hiss 1975

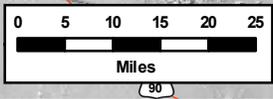
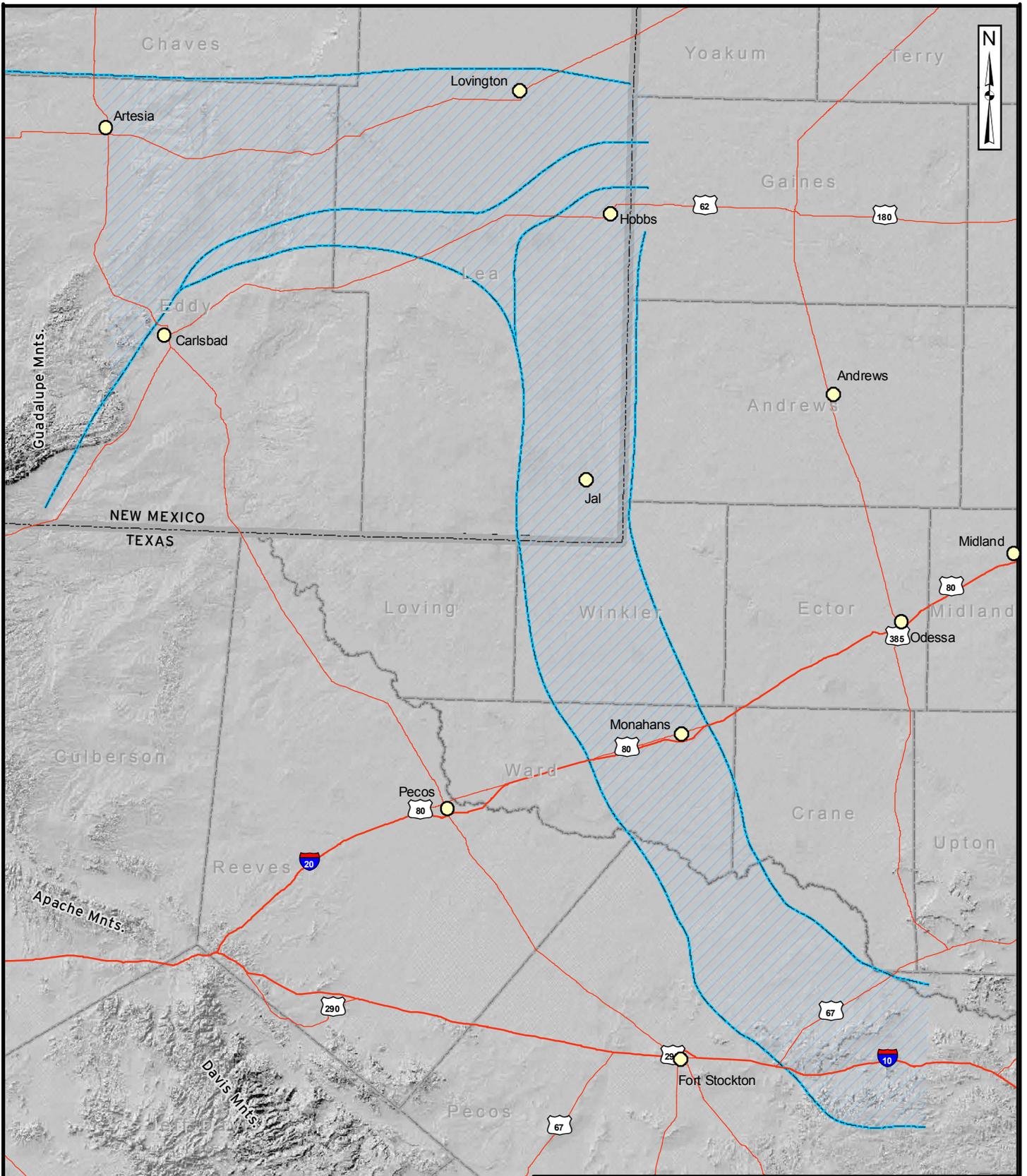
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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN

RPSEA Subcontract No. 08123-19

Geologic Cross Section D-D', West to East
 Pecos County



FIGURE
 7.7



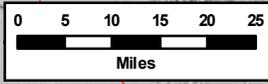
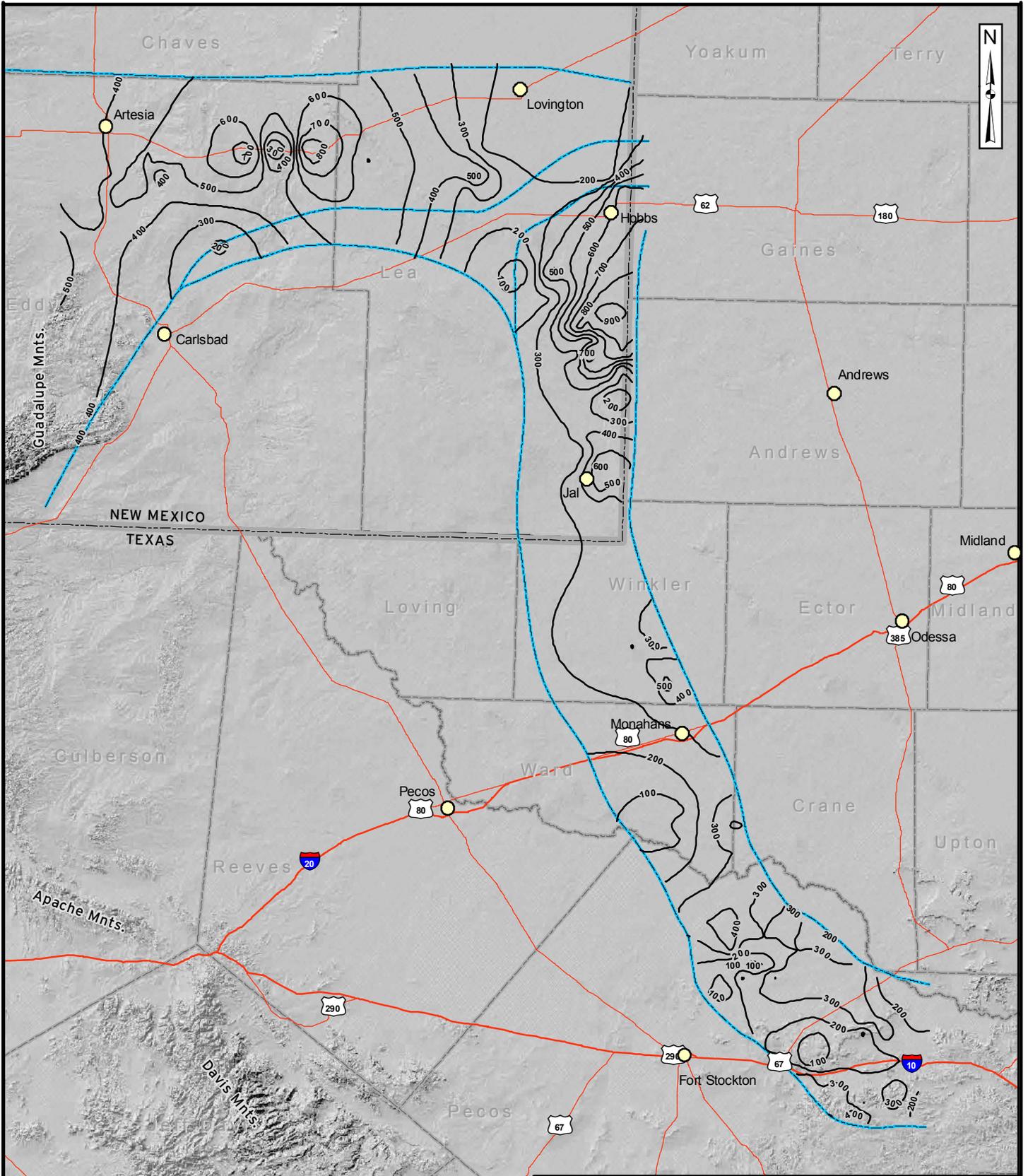
Legend

State Boundary	City/Town Center
County Boundary	Artesia Fairway
Major Roads	

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Study Area Map Showing the Artesia Fairway

FIGURE
7.8

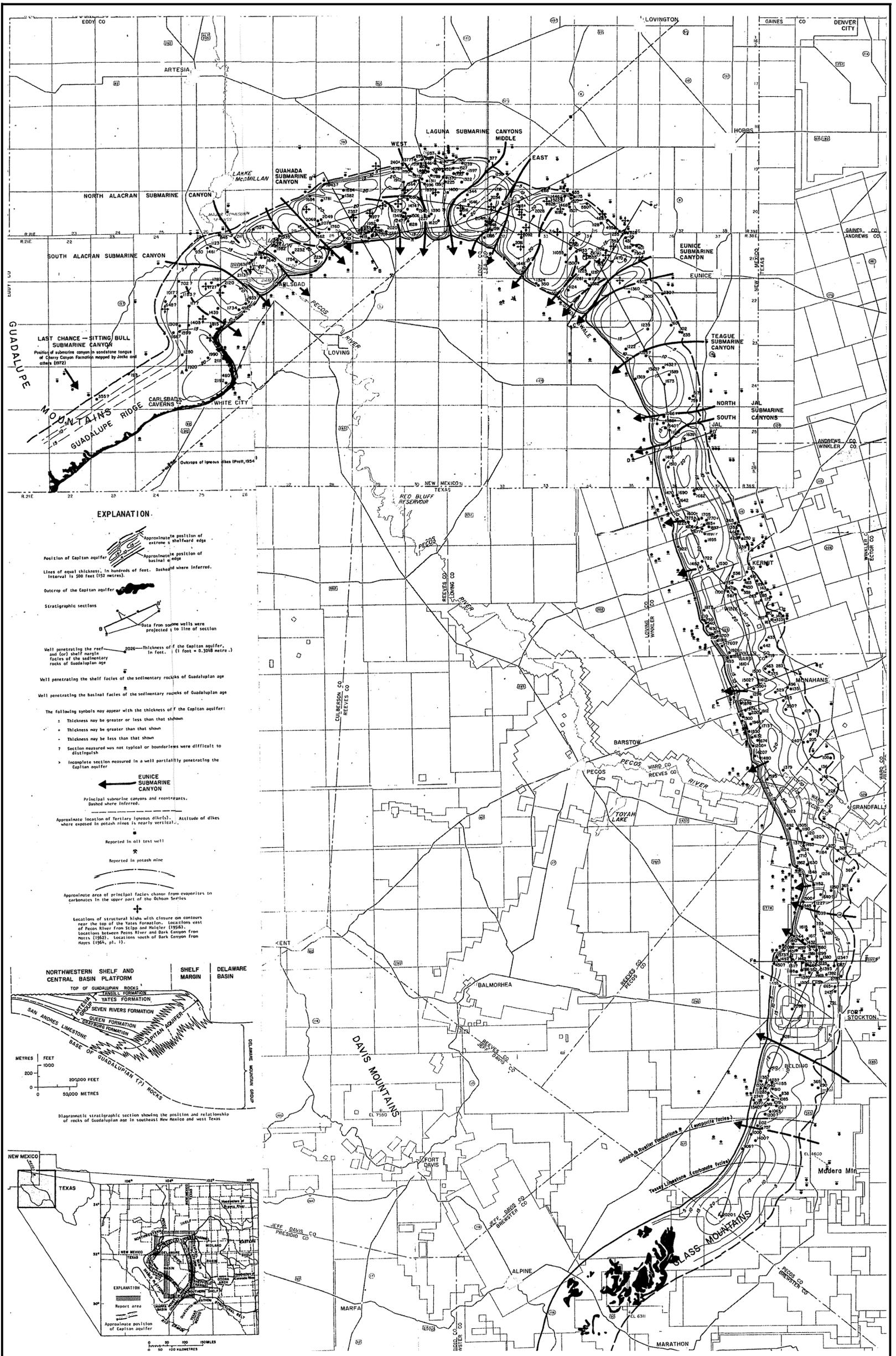


Legend	
	State Boundary
	County Boundary
	Major Roads
	City/Town Center
	Artesia Fairway
	Isopach Contour

RESEARCH PARTNERSHIP TO SECURE ENERGY FOR AMERICA
 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Isopach Map
 Porosity Zone of the San Andres Formation

		<p>FIGURE 7.10</p>
--	--	------------------------



EXPLANATION.

Approximate position of extreme shelfward edge of Capitan aquifer

Approximate position of basal edge of Capitan aquifer

Lines of equal thickness, in hundreds of feet. Dashed where inferred. Interval is 500 feet (152 metres).

Outcrop of the Capitan aquifer

Stratigraphic sections

Data from some wells were projected to line of section

Well penetrating the reef and shelf facies of the sedimentary rocks of Guadalupe age

Well penetrating the shelf facies of the sedimentary rocks of Guadalupe age

Well penetrating the basal facies of the sedimentary rocks of Guadalupe age

The following symbols may appear with the thickness of the Capitan aquifer:

- Thickness may be greater or less than that shown
- Thickness may be greater than that shown
- Thickness may be less than that shown
- Section measured was not typical or boundaries were difficult to distinguish
- Incomplete section measured in a well partially penetrating the Capitan aquifer

EUNICE SUBMARINE CANYON

Principal submarine canyons and reentrants. Dashed where inferred.

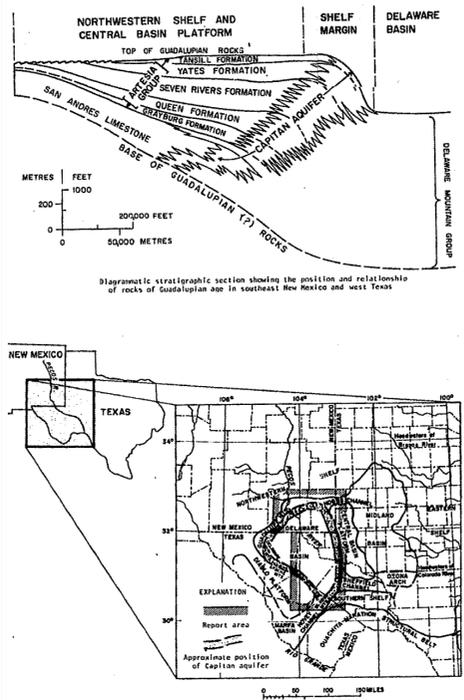
Approximate location of Tertiary igneous dikes. Attitude of dikes where exposed in potash mines is nearly vertical.

Reported in oil test well

Reported in potash mine

Approximate area of principal facies change from evaporites to carbonates in the upper part of the Ochoan Series

Locations of structural highs with closure on contours near the top of the Yates Formation. Locations east of Pecos River from Skip and Halper (1958). Locations between Pecos River and Dark Canyon from Hays (1952). Locations south of Dark Canyon from Hays (1954, p. 1).



Notes:
 1. Adapted from Hiss (1975)

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COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN

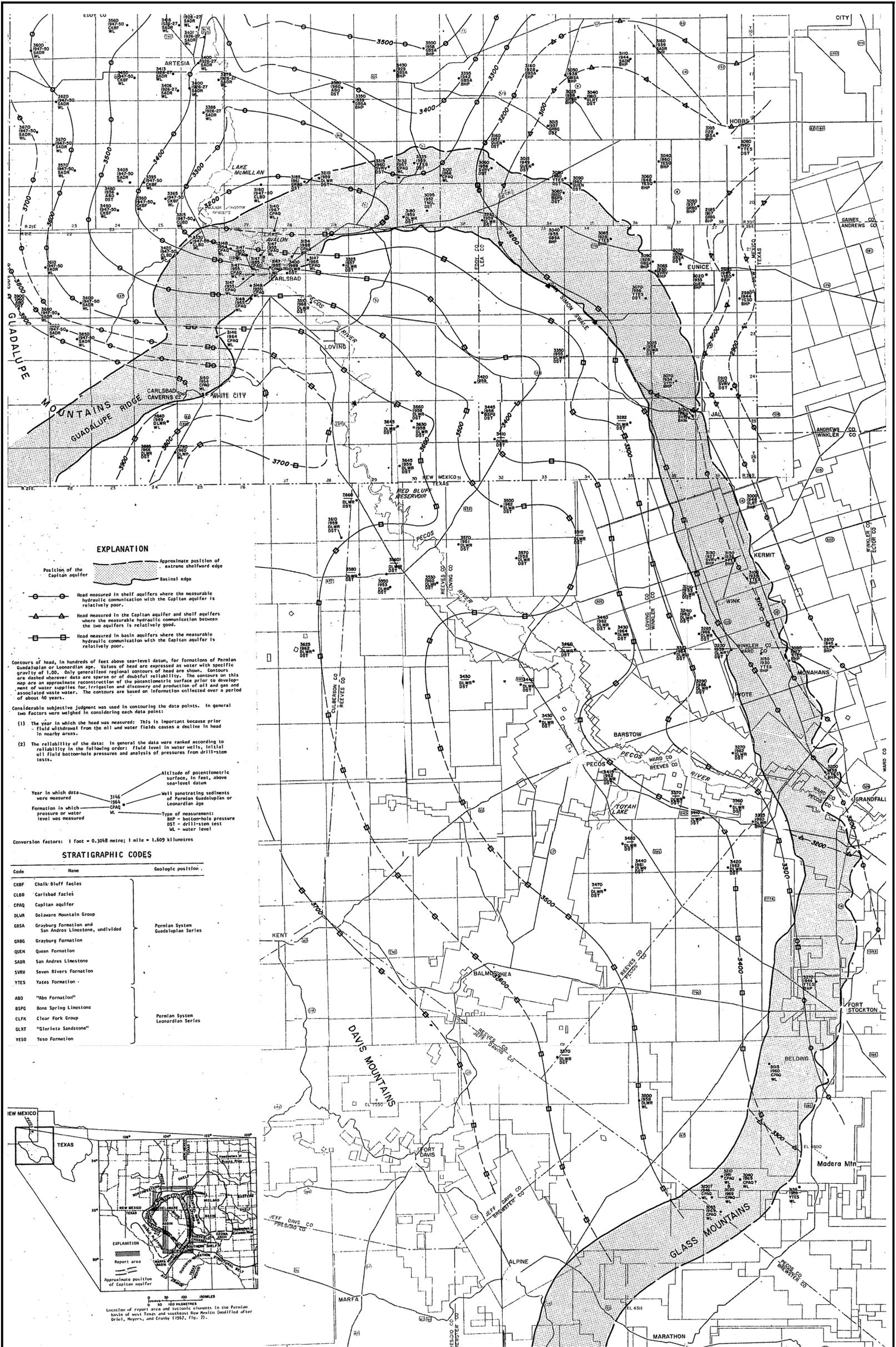
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Submarine Canyons within the Capitan Reef Complex

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FIGURE 7.13



EXPLANATION

- Approximate position of extreme shelfward edge of basal edge
- Head measured in shelf aquifers where the measurable hydraulic communication with the Capitan aquifer is relatively poor.
- Head measured in the Capitan aquifer and shelf aquifers where the measurable hydraulic communication between the two aquifers is relatively good.
- Head measured in basin aquifers where the measurable hydraulic communication with the Capitan aquifer is relatively poor.

Contours of head, in hundreds of feet above sea-level datum, for formations of Permian Guadalupean or Leonardian age. Values of head are expressed as water with specific gravity of 1.00. Only generalized regional contours of head are shown. Contours are dashed wherever data are sparse or of doubtful reliability. The contours on this map are an approximate reconstruction of the potentiometric surface prior to development of water supplies for irrigation and discovery and production of oil and gas and associated waste water. The contours are based on information collected over a period of about 40 years.

Considerable subjective judgment was used in contouring the data points. In general two factors were weighed in considering each data point:

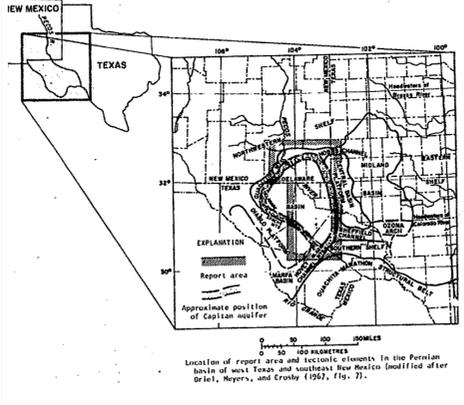
- (1) The year in which the head was measured: This is important because prior fluid withdrawal from the oil and water fields causes a decline in head in nearby areas.
- (2) The reliability of the data: In general the data were ranked according to reliability in the following order: fluid level in water wells, initial oil field bottom-hole pressures and analysis of pressures from drill-stem tests.

- Altitude of potentiometric surface, in feet, above sea-level datum
- Year in which data were measured
- Formation in which pressure or water level was measured
- Well penetrating sediments of Permian Guadalupean or Leonardian age
- Type of measurement: BHP - bottom-hole pressure; DST - drill-stem test; WL - water level

Conversion factors: 1 foot = 0.3048 metre; 1 mile = 1.609 kilometres

STRATIGRAPHIC CODES

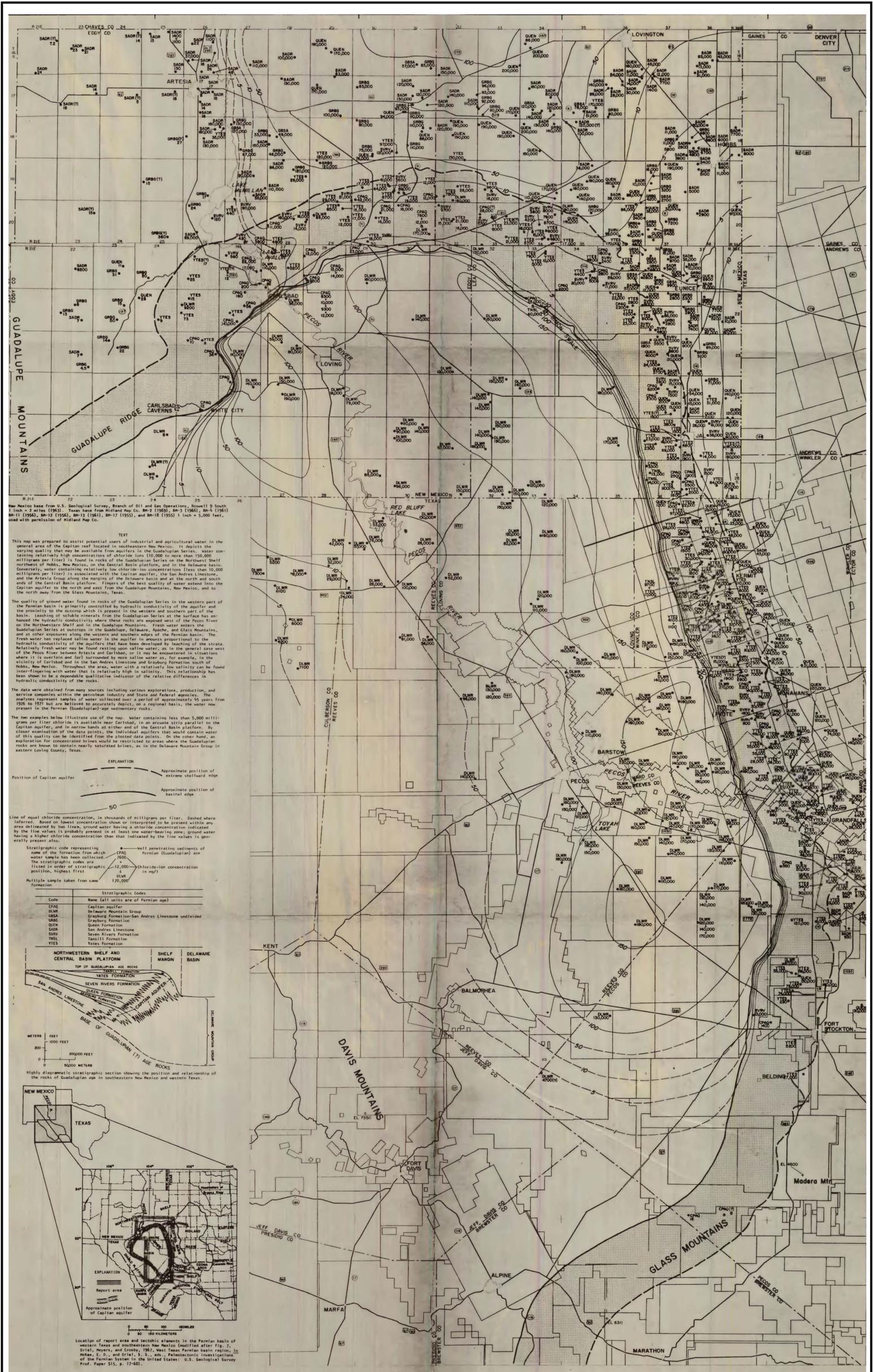
Code	Name	Geologic position
CKBF	Chalk Bluff facies	
CLBR	Carlisle facies	
CPAQ	Capitan aquifer	
DLNR	Delaware Mountain Group	
GRSA	Grayburg Formation and San Andres Limestone, undivided	Permian System Guadalupean Series
GRBG	Grayburg Formation	
QUEN	Queen Formation	
SADR	San Andres Limestone	
SVRV	Seven Rivers Formation	
YTES	Yates Formation	
ABO	"Abo Formation"	
BSPG	Bone Spring Limestone	Permian System Leonardian Series
CLFR	Clear Fork Group	
CLRT	"Glorieta Sandstone"	
YESO	Yeso Formation	



Notes:
1. Adapted from Hiss (1975)

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
 RPSEA Subcontract No. 08123-19
 Pre-Development Potentiometric Surface Map of the
 Guadalupean Formations of the Delaware Basin

FIGURE
7.14



New Mexico base from U.S. Geological Survey, Branch of Oil and Gas Operations, Rowell 9 South 1 inch = 2 miles (1963). Texas base from Midland Map Co. Map 2 (1960), Map 3 (1961), Map 4 (1961), Map 5 (1961), Map 6 (1961), Map 7 (1961), Map 8 (1961), Map 9 (1961), Map 10 (1961), Map 11 (1961), Map 12 (1961), Map 13 (1961), Map 14 (1961), Map 15 (1961), Map 16 (1961), Map 17 (1961), Map 18 (1961) 1 inch = 5,000 feet, used with permission of Midland Map Co.

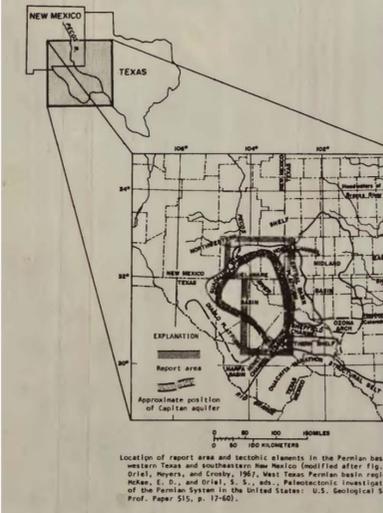
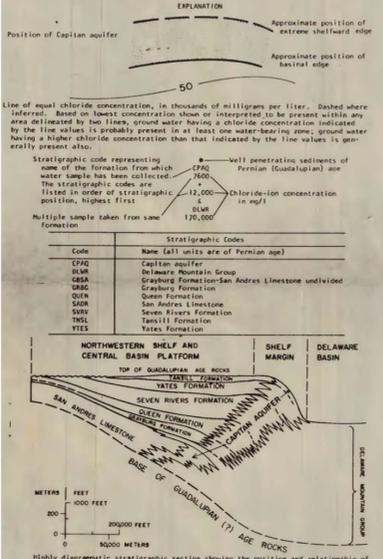
TEXT

This map was prepared to assist potential users of industrial and agricultural water in the general area of the Capitan reef located in southeastern New Mexico. It depicts the varying quality that may be available from aquifers in the Guadalupian Series. Water containing relatively high concentrations of chloride ions (10,000 to more than 100,000 milligrams per liter) is found in rocks of the Guadalupian Series on the Northwestern Shelf northwestern New Mexico, on the Central Basin platform, and in the Delaware Basin. Conversely, water containing relatively low chloride-ion concentrations (less than 10,000 milligrams per liter) is associated with the Capitan aquifer, the San Andres Limestone, and the Artesia Group along the margins of the Delaware basin and at the north and south ends of the Central Basin platform. Fringes of the best quality water extend into the Capitan aquifer to the north and east from the Guadalupe Mountains, New Mexico, and to the north-west from the Glass Mountains, Texas.

The quality of ground water found in rocks of the Guadalupian Series in the western part of the Permian basin is primarily controlled by hydraulic conductivity of the aquifer and the proximity to the outcrop which is present in the western and eastern part of the basin. Leaching of soluble minerals from the Guadalupian Series at the surface has enhanced the hydraulic conductivity where these rocks are exposed west of the Pecos River on the Northwestern Shelf and in the Guadalupe Mountains. Fresh water enters the Guadalupian Series at outcrops in the Guadalupe, Delaware, Apache, and Glass Mountains, and at other exposures along the western and southern edges of the Permian basin. The fresh water has replaced saline water in the aquifer in amounts proportional to the hydraulic conductivity of the aquifers that have been developed by leaching of the strata. Relatively fresh water may be found resting upon saline water, as in the general case west of the Pecos River between Artesia and Carlsbad, or it may be encountered in situations where it is overlain and (or) surrounded by more saline water, for example, in the vicinity of Carlsbad and in the San Andres Limestone and Grayburg Formation south of Hobbs, New Mexico. Throughout the area, water with a relatively low salinity can be found interfingering with water that is relatively high in salinity. This relationship has been shown to be a dependable qualitative indicator of the relative differences in hydraulic conductivity of the rocks.

The data were obtained from many sources including various explorations, production, and service companies within the petroleum industry and State and Federal agencies. The analyses represent samples of water collected over a period of approximately 50 years from 1928 to 1977 but are believed to accurately depict, on a regional basis, the water now present in the Permian (Guadalupian) age sedimentary rocks.

The two examples below illustrate use of the map. Water containing less than 5,000 milligrams per liter chloride is available near Carlsbad, in an arcuate strip parallel to the Capitan aquifer, and in narrow bands at either end of the Central Basin platform. By closer examination of the data points, the individual aquifers that would contain water of this quality can be identified from the plotted data points. On the other hand, exploration for concentrated brines would be restricted to areas where the Guadalupian rocks are known to contain nearly saturated brines, as in the Delaware Mountain Group in eastern Loving County, Texas.



Notes:
1. Adapted from Hiss (1974)

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COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES
DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN

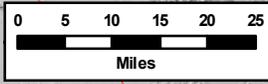
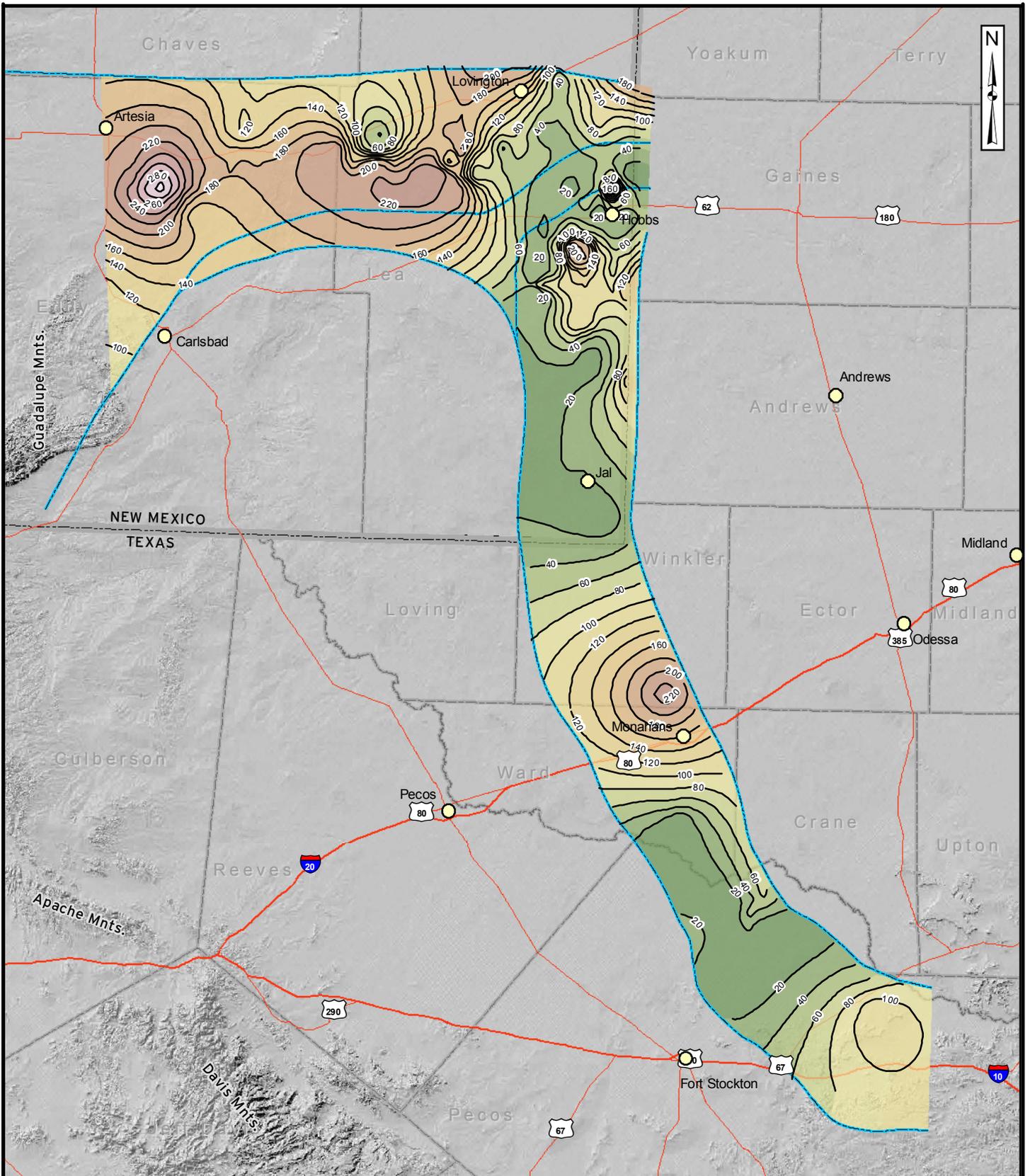
RPSEA Subcontract No. 08123-19

Chloride Ion Concentrations of the Guadalupian Formations of the Delaware Basin

FIGURE 7.15

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Legend

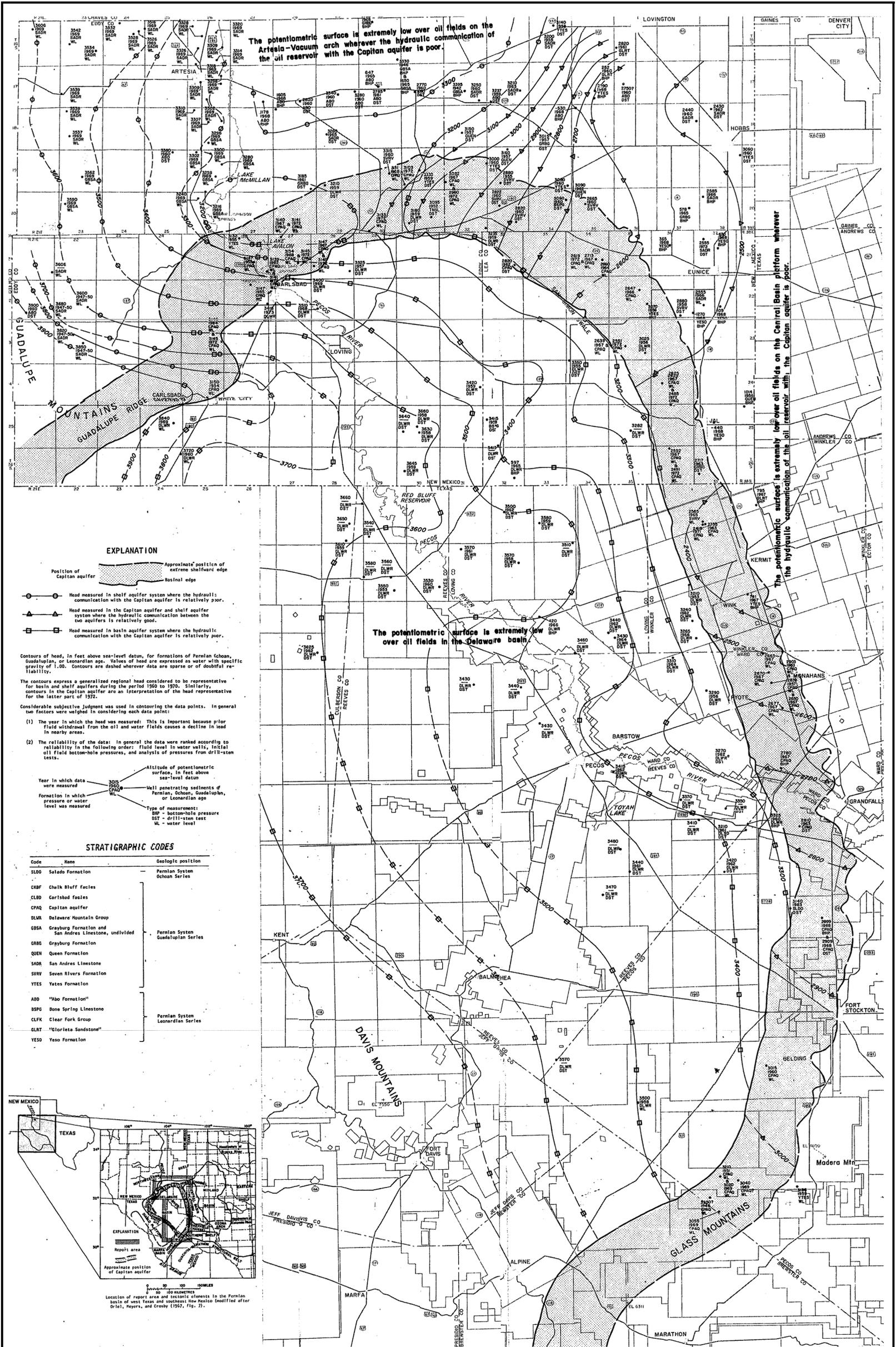
State Boundary	City/Town Center
County Boundary	Artesia Fairway
Major Roads	TDS Contour

TDS contour labels are in thousands of mg/L total dissolved solids

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
 RPSEA Subcontract No. 08123-19

TDS Concentrations Within the Artesia Fairway
 of the San Andres Formation

<p>Research Partnership to Secure Energy for America</p>		<p>FIGURE 7.16</p>
--	--	------------------------



The potentiometric surface is extremely low over oil fields on the Artesia-Vacuum arch where the hydraulic communication of the oil reservoir with the Capitan aquifer is poor.

The potentiometric surface is extremely low over oil fields on the Central Basin platform where the hydraulic communication of the oil reservoir with the Capitan aquifer is poor.

The potentiometric surface is extremely low over all fields in the Delaware basin.

EXPLANATION

Approximate position of extreme shelfward edge of Capitan aquifer

Head measured in shelf aquifer system where the hydraulic communication with the Capitan aquifer is relatively poor.

Head measured in the Capitan aquifer and shelf aquifer system where the hydraulic communication between the two aquifers is relatively good.

Head measured in basin aquifer system where the hydraulic communication with the Capitan aquifer is relatively poor.

Contours of head, in feet above sea-level datum, for formations of Permian (Ochoan, Guadalupian, or Leonardian) age. Values of head are expressed as water with specific gravity of 1.00. Contours are dashed wherever data are sparse or of doubtful reliability.

The contours express a generalized regional head considered to be representative for basin and shelf aquifers during the period 1960 to 1970. Similarly, contours in the Capitan aquifer are an interpretation of the head representative for the latter part of 1972.

Considerable subjective judgment was used in contouring the data points. In general two factors were weighed in considering each data point:

- (1) The year in which the head was measured: This is important because prior fluid withdrawal from the oil and water fields causes a decline in head in nearby areas.
- (2) The reliability of the data: In general the data were ranked according to reliability in the following order: fluid level in water wells, initial oil field bottom-hole pressures, and analysis of pressures from drill-stem tests.

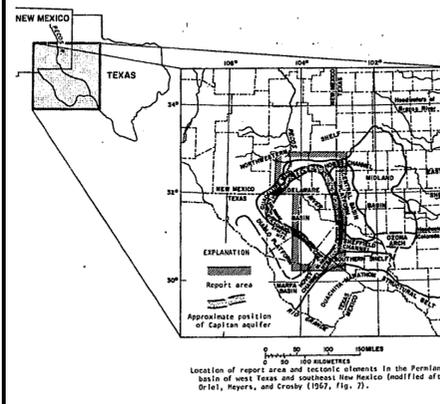
Year in which data were measured: 3000, 2000, 1000, 0, 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 11000, 12000, 13000, 14000, 15000, 16000, 17000, 18000, 19000, 20000, 21000, 22000, 23000, 24000, 25000, 26000, 27000, 28000, 29000, 30000, 31000, 32000, 33000, 34000, 35000, 36000, 37000, 38000, 39000, 40000, 41000, 42000, 43000, 44000, 45000, 46000, 47000, 48000, 49000, 50000, 51000, 52000, 53000, 54000, 55000, 56000, 57000, 58000, 59000, 60000, 61000, 62000, 63000, 64000, 65000, 66000, 67000, 68000, 69000, 70000, 71000, 72000, 73000, 74000, 75000, 76000, 77000, 78000, 79000, 80000, 81000, 82000, 83000, 84000, 85000, 86000, 87000, 88000, 89000, 90000, 91000, 92000, 93000, 94000, 95000, 96000, 97000, 98000, 99000, 100000.

Well penetrating sediments of Permian, Ochoan, Guadalupian, or Leonardian age.

Type of measurement: BHP - bottom-hole pressure, DST - drill-stem test, WL - water level.

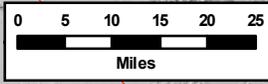
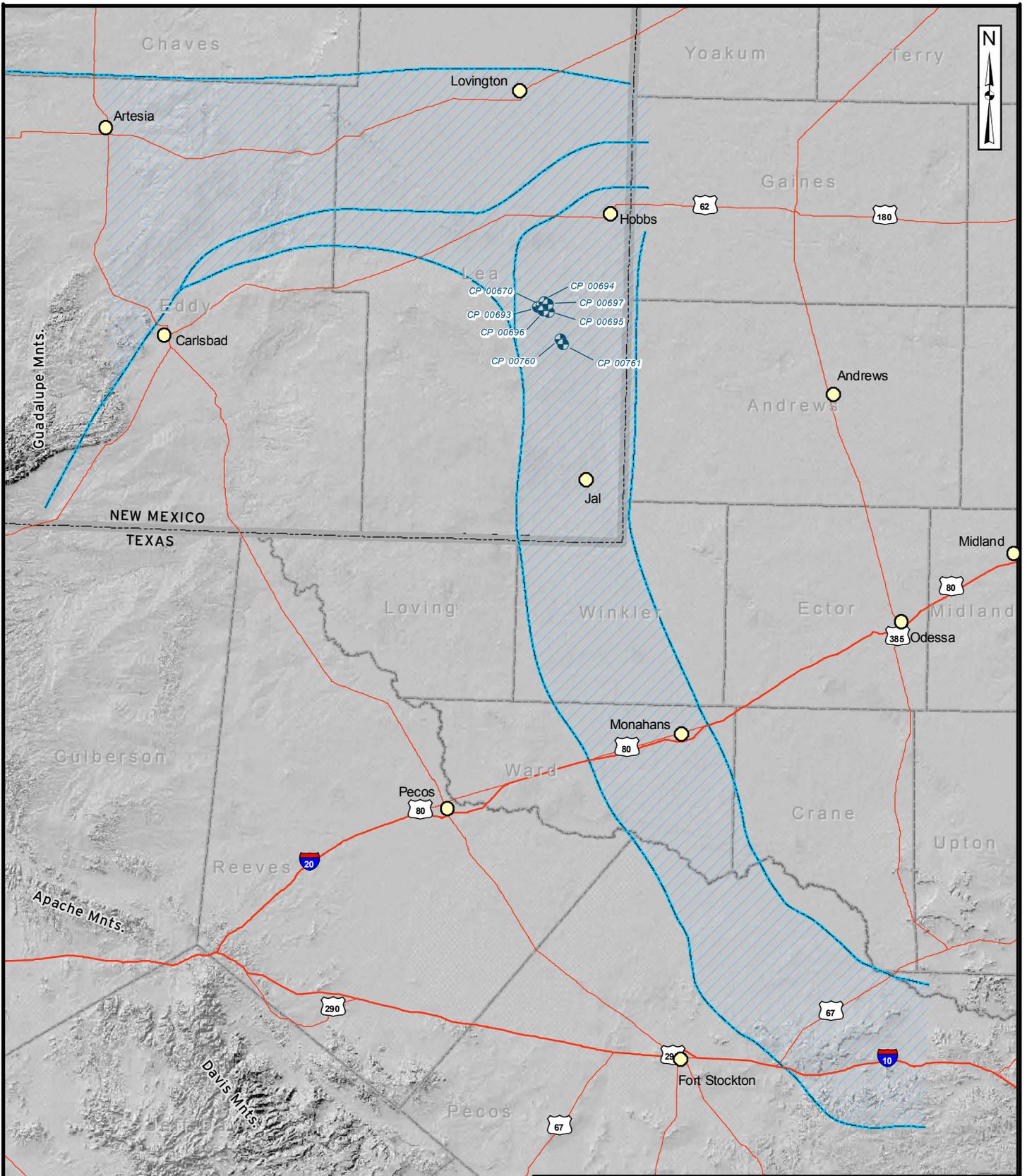
STRATIGRAPHIC CODES

Code	Name	Geologic position
S100	Salado Formation	Permian System Ochoan Series
CBF	Chalk Bluff facies	
CLB	Carlsbad facies	
CPAQ	Capitan aquifer	
DLR	Delaware Mountain Group	
GBSA	Grayburg Formation and San Andres Limestone, undivided	Permian System Guadalupian Series
GARB	Grayburg Formation	
QEN	Queen Formation	
SADR	San Andres Limestone	
SVR	Seven Rivers Formation	
YTES	Yates Formation	
ABO	"Abo Formation"	
BSPG	Bone Spring Limestone	Permian System Leonardian Series
CLFK	Clear Fork Group	
GLAT	"Glorieta Sandstone"	
YESO	Yeso Formation	



Notes:
1. Adapted from Hiss (1975)

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
 RPSEA Subcontract No. 08123-19
 Post-Development Potentiometric Surface Map of the
 Guadalupian Formations of the Delaware Basin
 RPSEA
 Research Partnership to Secure Energy for America
 ARCADIS
 FIGURE 7.17



Legend

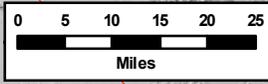
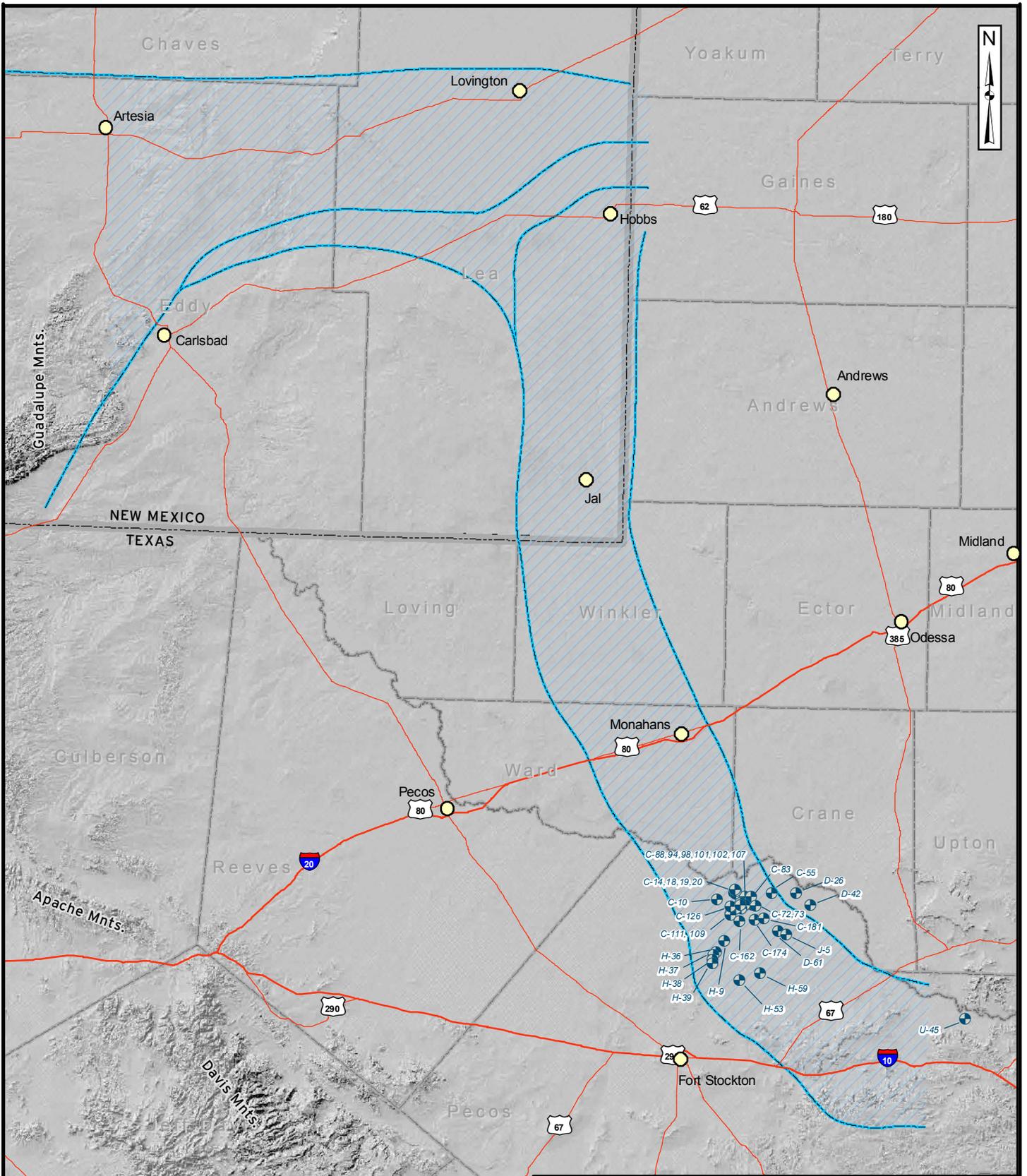
- State Boundary
- County Boundary
- Major Roads
- City/Town Center
- Artesia Fairway
- Supply Well
- Well I.D. CP 00761

Note: Well locations and IDs from New Mexico Office of the State Engineer WATERS Database

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
 RPSEA Subcontract No. 08123-19

San Andres Water Flood Supply Wells
 in Southeastern Lea County

FIGURE
7.20



Legend

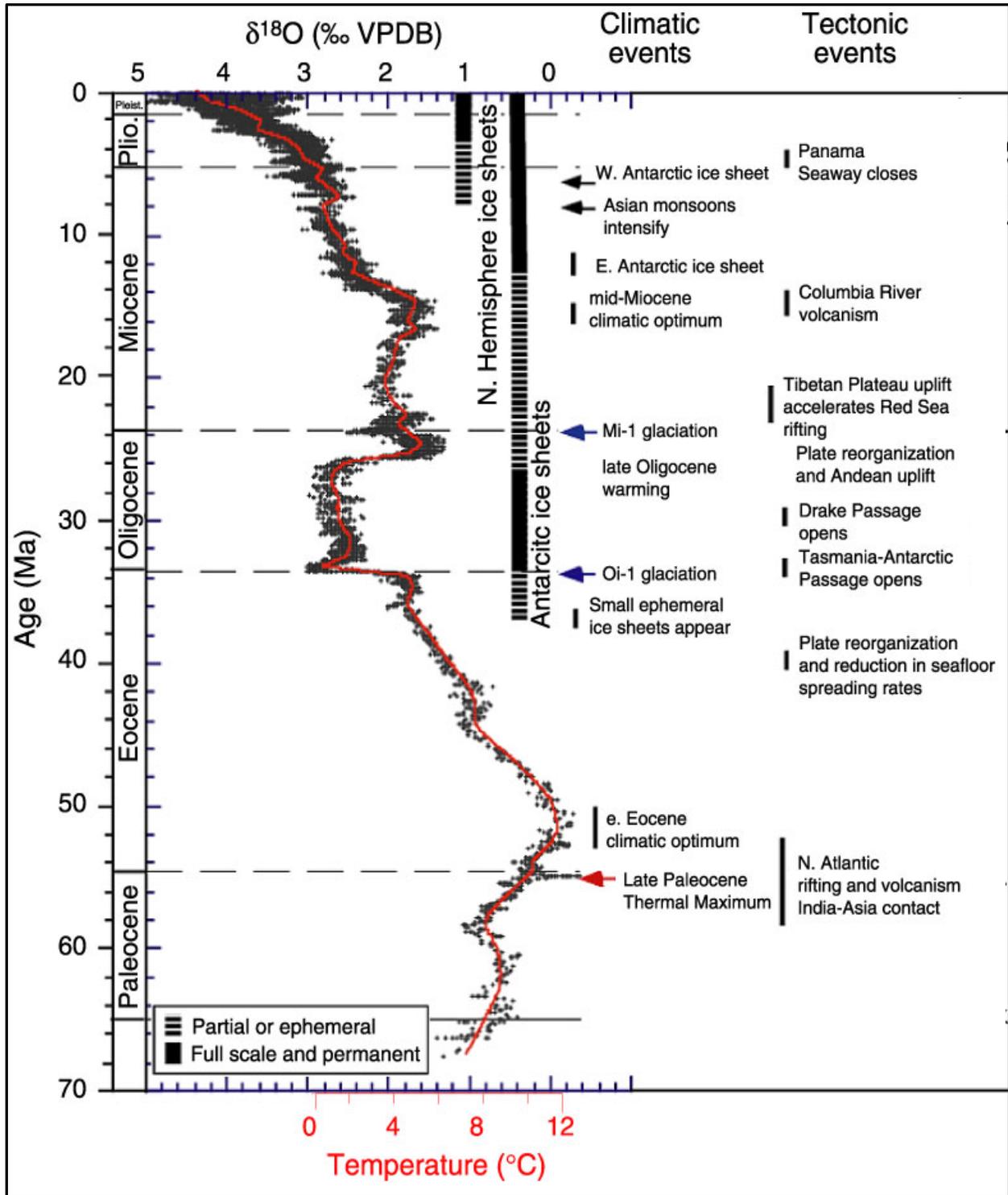
State Boundary	City/Town Center
County Boundary	Artesia Fairway
Major Roads	Supply Well
	Well I.D.

Note: Well locations and IDs from Armstrong and McMillion (1961)

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
 RPSEA Subcontract No. 08123-19

**San Andres Supply Wells
 Northern Pecos County**

		FIGURE 7.21
--	--	-----------------------



Notes:

1. Adapted From Zachos et al., (2001).

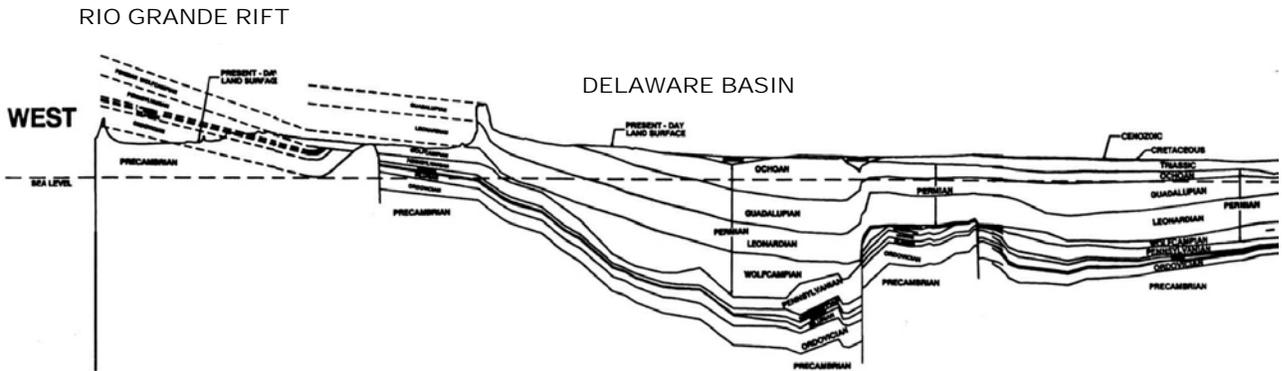
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Summary of Global Paleo-Temperatures

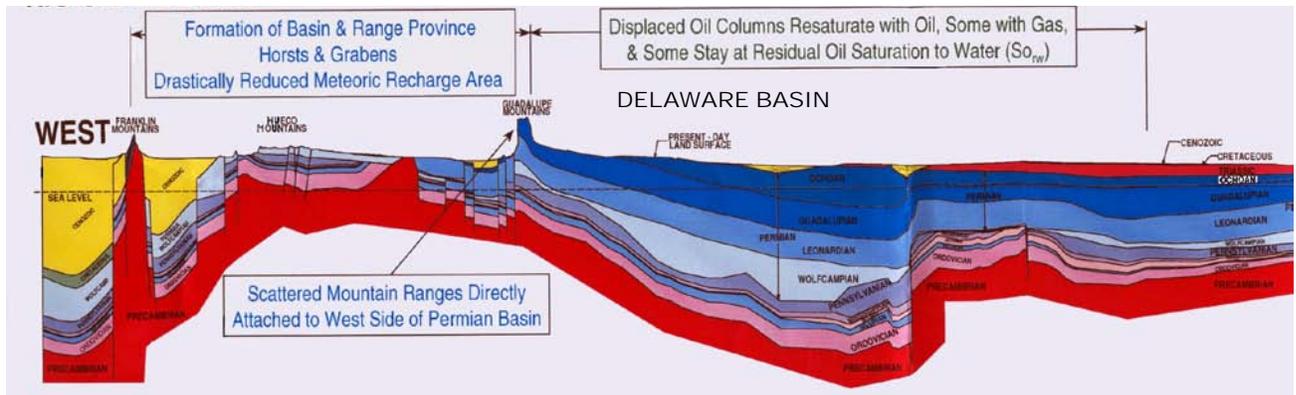


FIGURE

7.22



BROAD UPLIFT AROUND THE RIO GRANDE RIFT IN THE LATE OLILOCENE AND EARLY MIOCENE CAUSED EASTWARD TILTING OF THE DELAWARE BASIN AND INDUCED HYDRODYNAMIC FLOW. THE UNBROKEN GUADALUPIAN LANDMASS ON THE EAST FLANK OF THE RIFT PROVIDED A LARGE METEORIC RECHARGE AREA



RAPID EXTENSION OF THE RIO GRANDE RIFT IN MIDDLE TO LATE MIOCENE CAUSES FORMATION OF HORSTS AND GRABENS RESULTING IN DISCONNECTION OF GUADALUPIAN FORMATIONS TO THE WEST OF THE DELAWARE BASIN AND REDUCTION OF THE METEORIC RECHARGE AREA

Notes:

1. Adapted from Lindsay (2001).

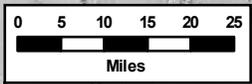
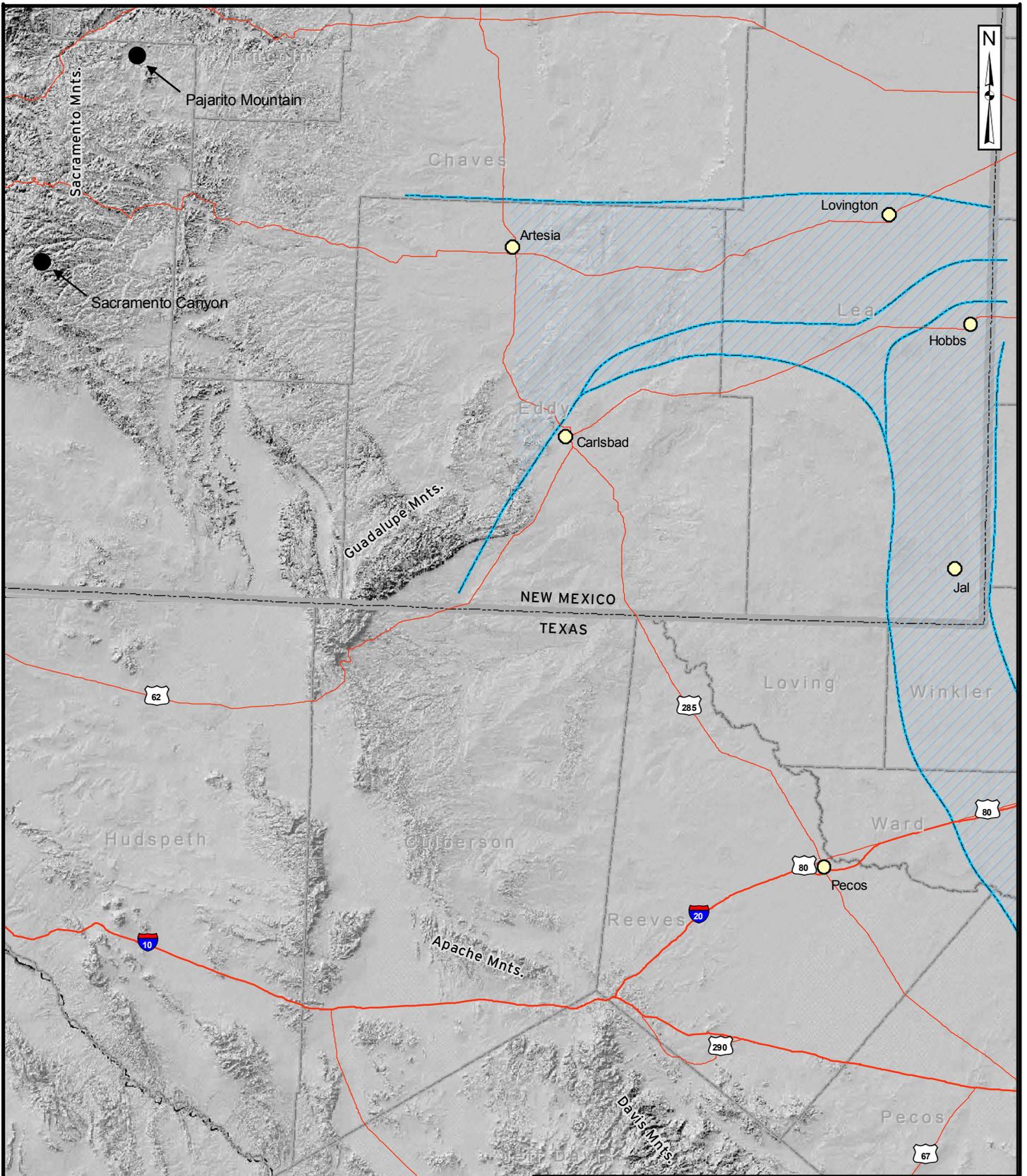
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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Progression of Tectonic Changes in the Delaware Basin



FIGURE

7.23

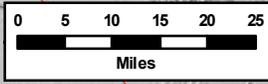
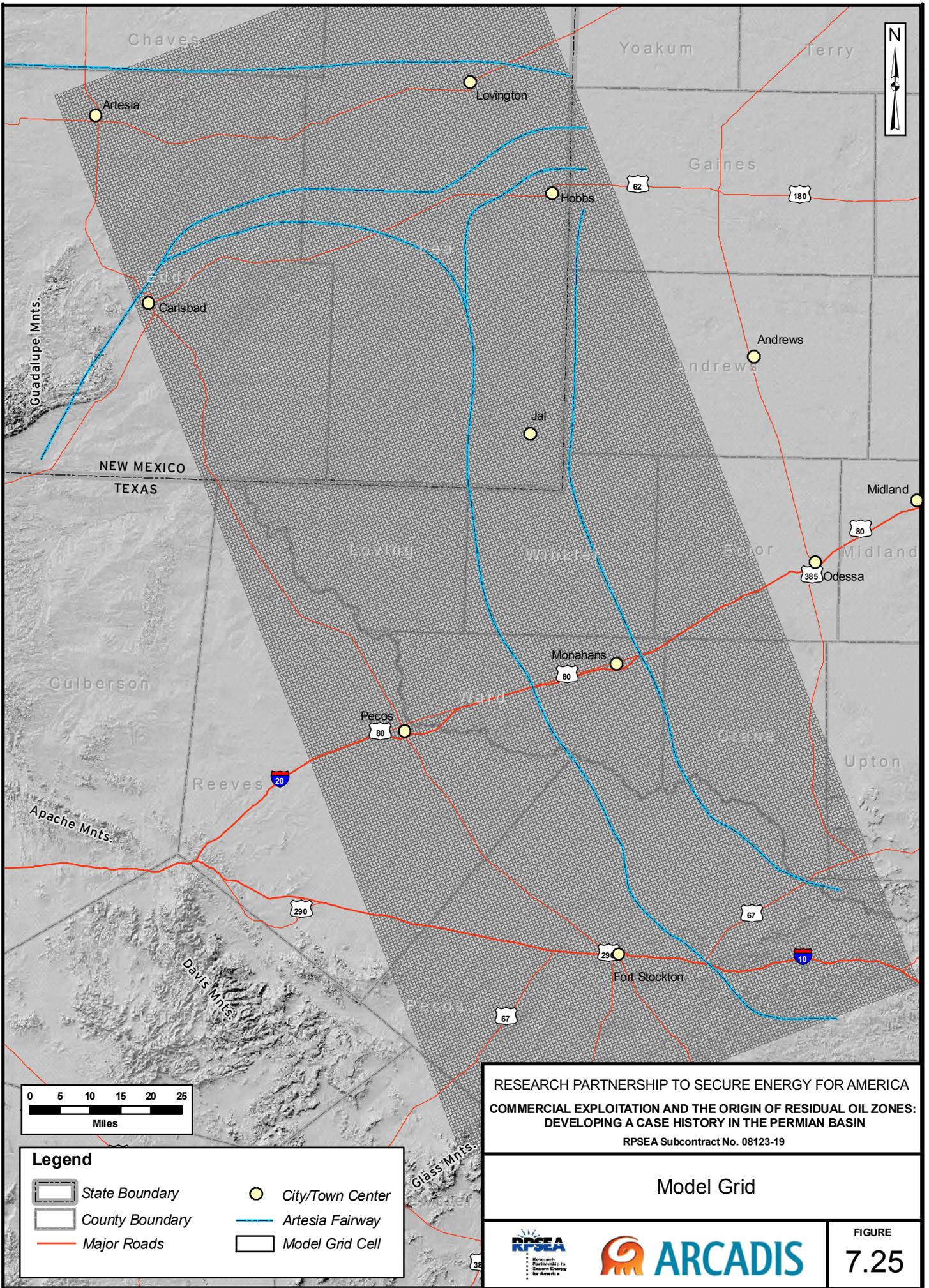


Legend	
	State Boundary
	County Boundary
	Major Roads
	City/Town Center
	Artesia Fairway
	San Andres Points

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San Andres Formation Stratigraphic High Points
 in the Sacramento Mountains

		<p>FIGURE 7.24</p>
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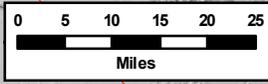
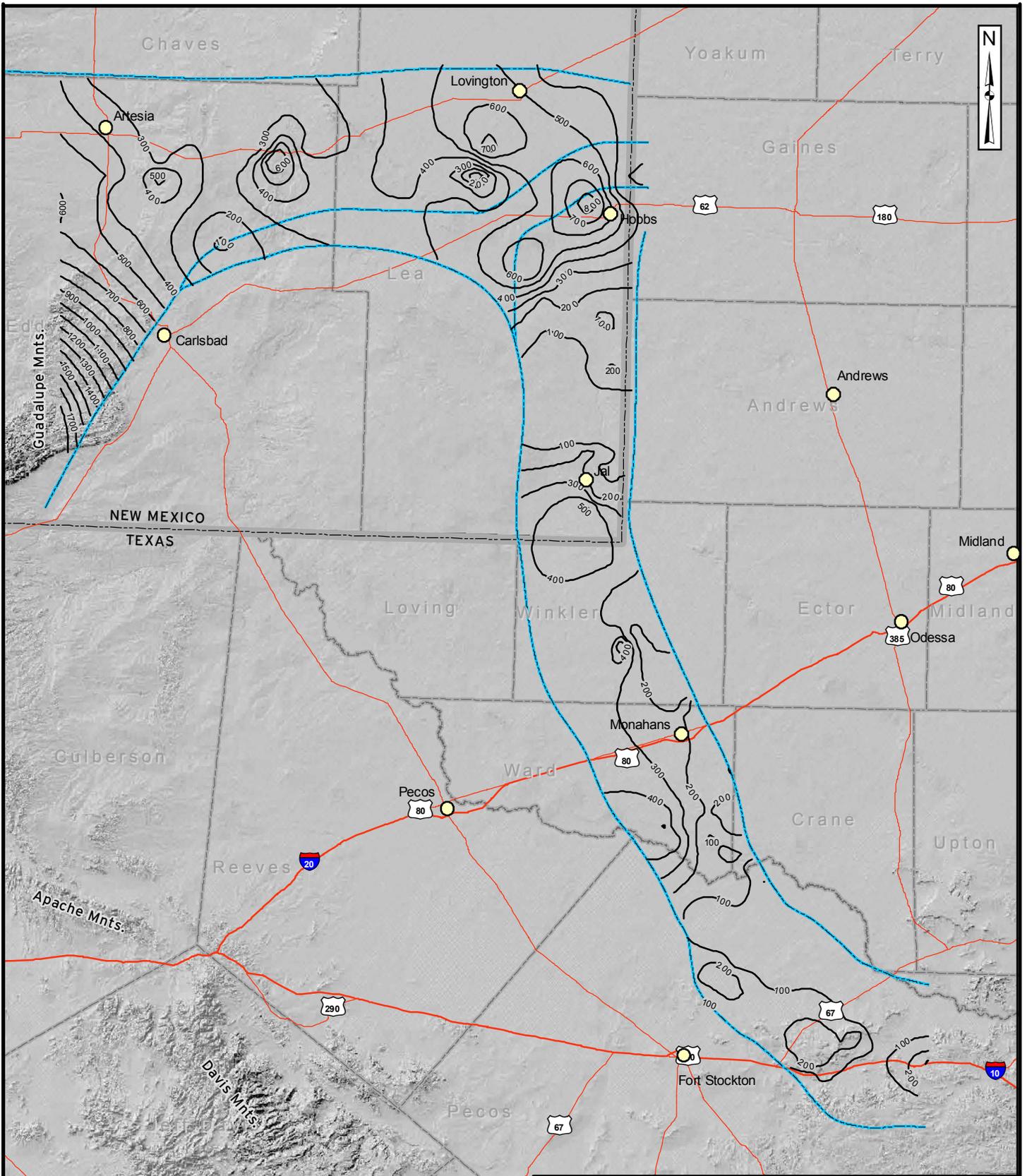
Legend

State Boundary	City/Town Center
County Boundary	Artesia Fairway
Major Roads	Model Grid Cell

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Model Grid

		<p>FIGURE 7.25</p>
--	--	------------------------

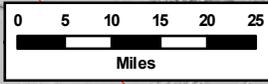
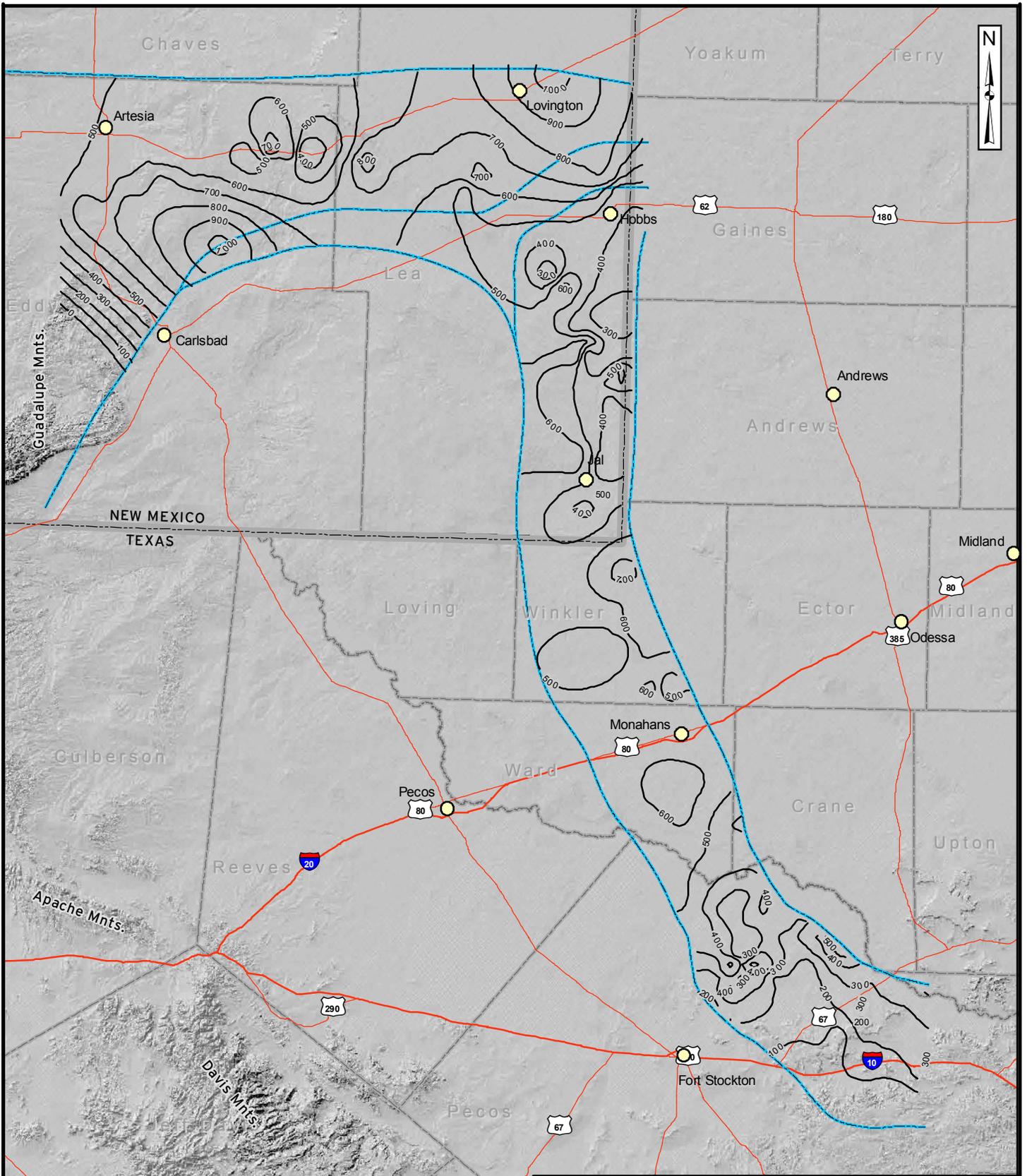


Legend	
	State Boundary
	County Boundary
	Major Roads
	City/Town Center
	Artesia Fairway
	Isopach Contour

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Isopach Map
Upper San Andres Formation

		<p>FIGURE 7.26</p>
--	--	------------------------



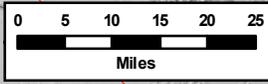
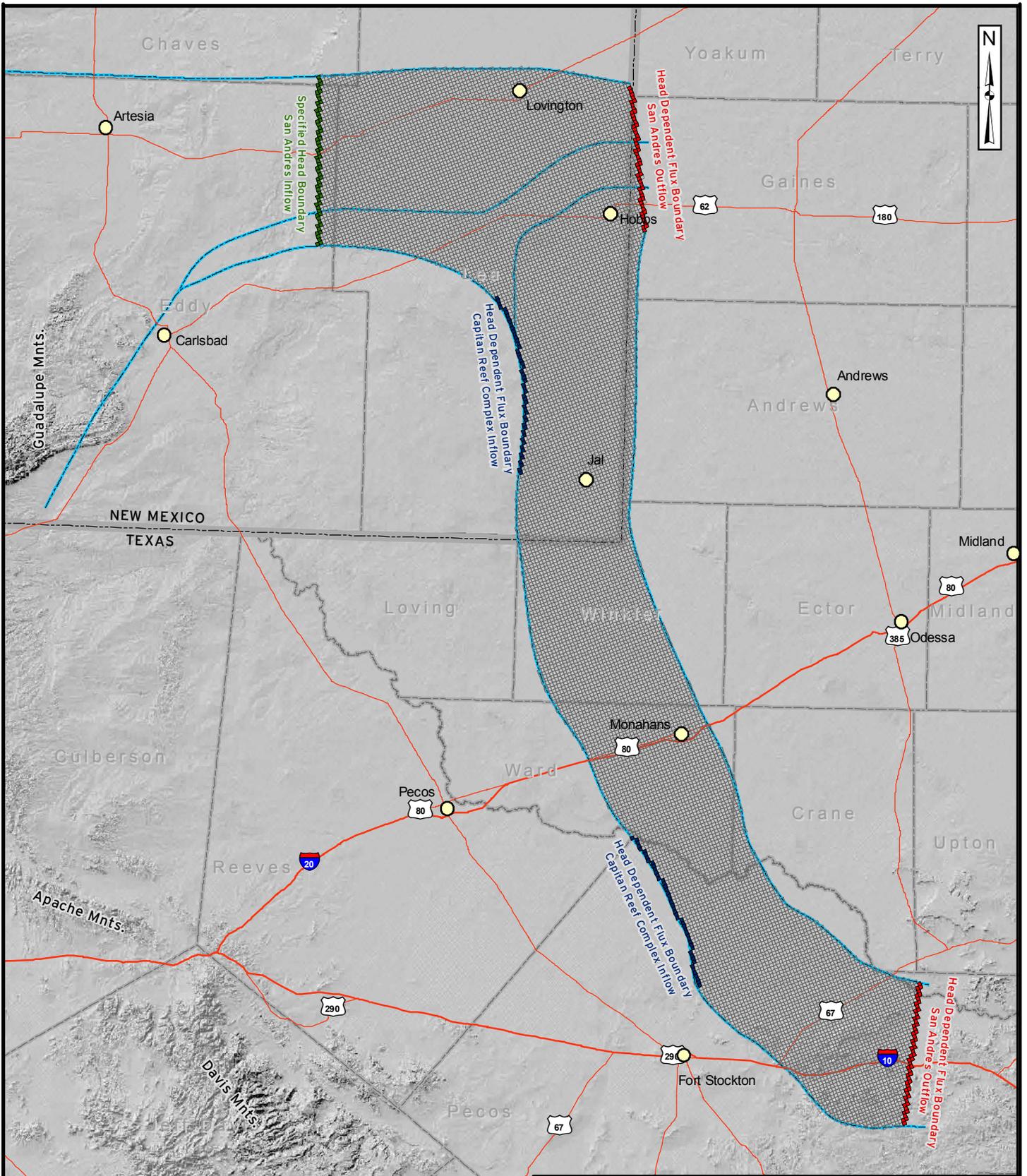
Legend

State Boundary	City/Town Center
County Boundary	Artesia Fairway
Major Roads	Isopach Contour

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Isopach Map
Lower San Andres Formation

		<p>FIGURE 7.27</p>
--	--	------------------------

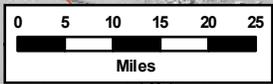
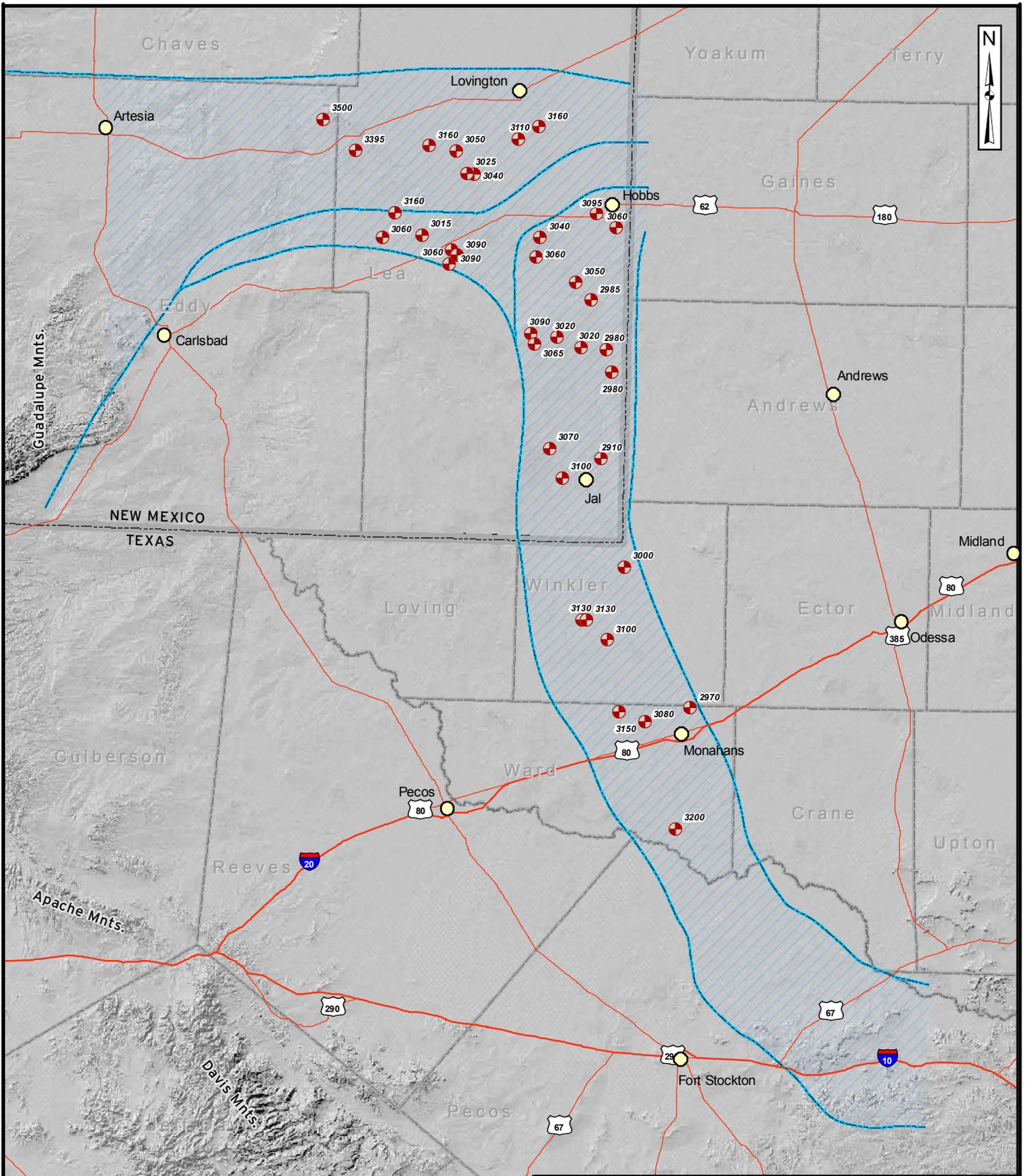


Legend	
	State Boundary
	County Boundary
	Major Roads
	City/Town Center
	Artesia Fairway
	Active Model Cell
	Boundary Cell

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Model Boundaries

FIGURE 7.28	



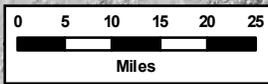
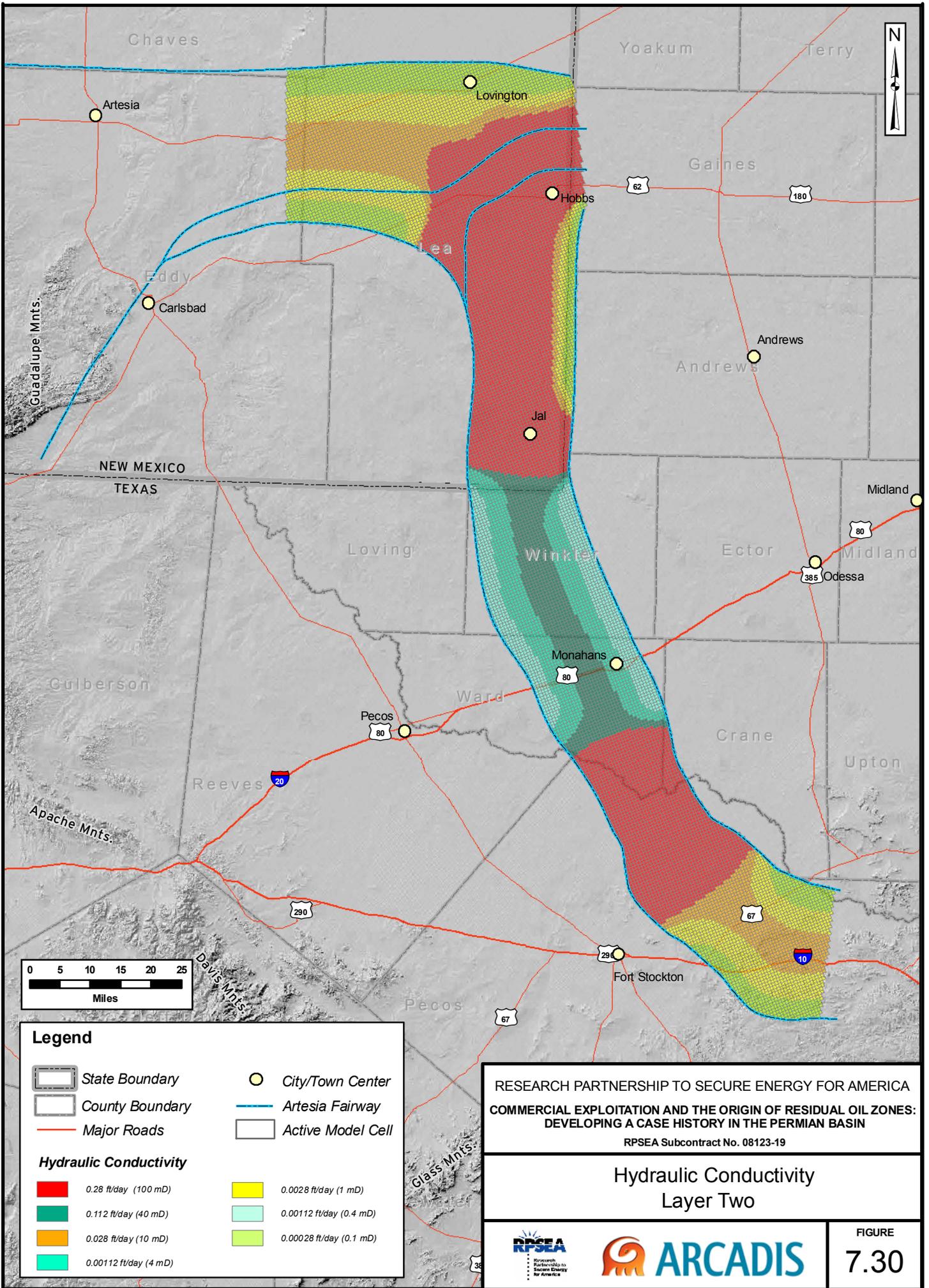
Legend

State Boundary	City/Town Center
County Boundary	Artesia Fairway
Major Roads	Pre-Development Head

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Pre-Development Heads used for Calibration

		<p>FIGURE 7.29</p>
--	--	------------------------



Legend

	State Boundary		City/Town Center
	County Boundary		Artesia Fairway
	Major Roads		Active Model Cell

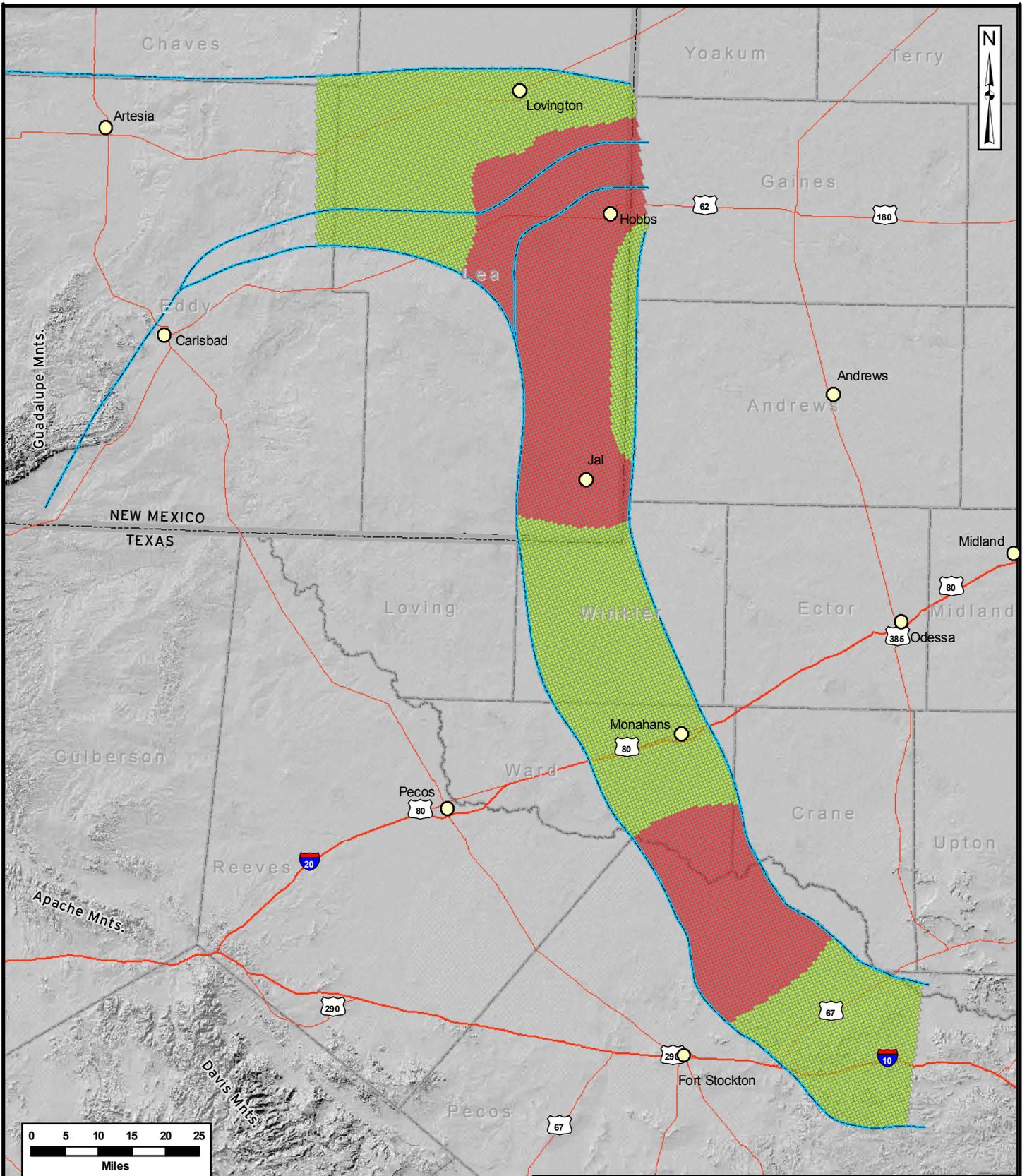
Hydraulic Conductivity

	0.28 ft/day (100 mD)		0.0028 ft/day (1 mD)
	0.112 ft/day (40 mD)		0.00112 ft/day (0.4 mD)
	0.028 ft/day (10 mD)		0.00028 ft/day (0.1 mD)
	0.00112 ft/day (4 mD)		

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Hydraulic Conductivity
 Layer Two

		FIGURE 7.30
--	--	----------------



Legend

State Boundary	City/Town Center
County Boundary	Artesia Fairway
Major Roads	Active Model Cell

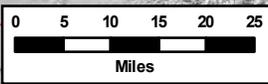
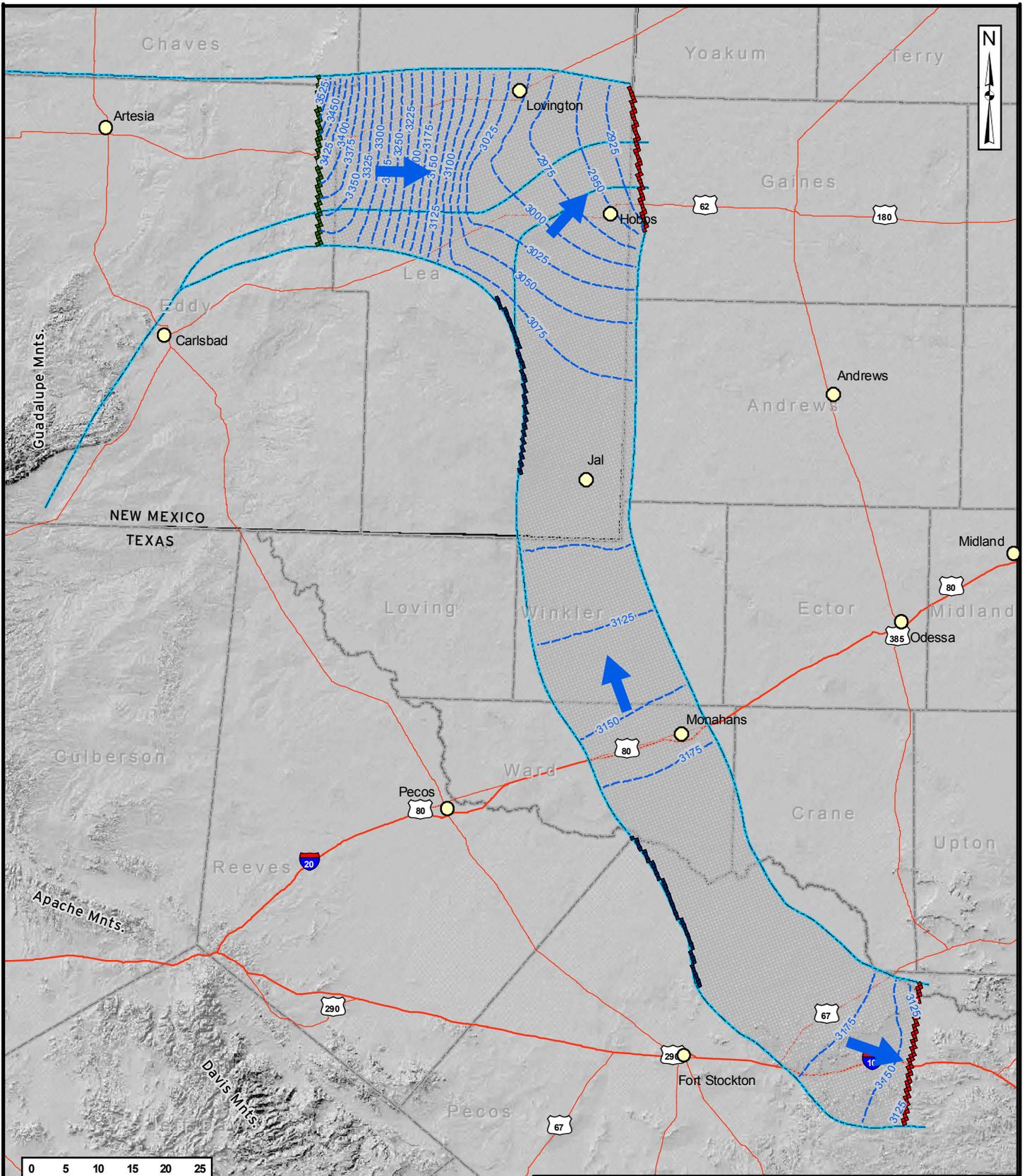
Hydraulic Conductivity

0.28 ft/day (100 mD)	0.00028 ft/day (0.1 mD)
----------------------	-------------------------

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Hydraulic Conductivity
 Layers One and Three

<p>Research Partnership to Secure Energy for America</p>		<p>FIGURE 7.31</p>
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Legend

State Boundary	Artesia Fairway
County Boundary	Active Model Cell
Major Roads	Boundary Cell
City/Town Center	Simulated Head Contour

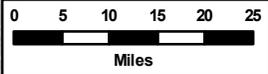
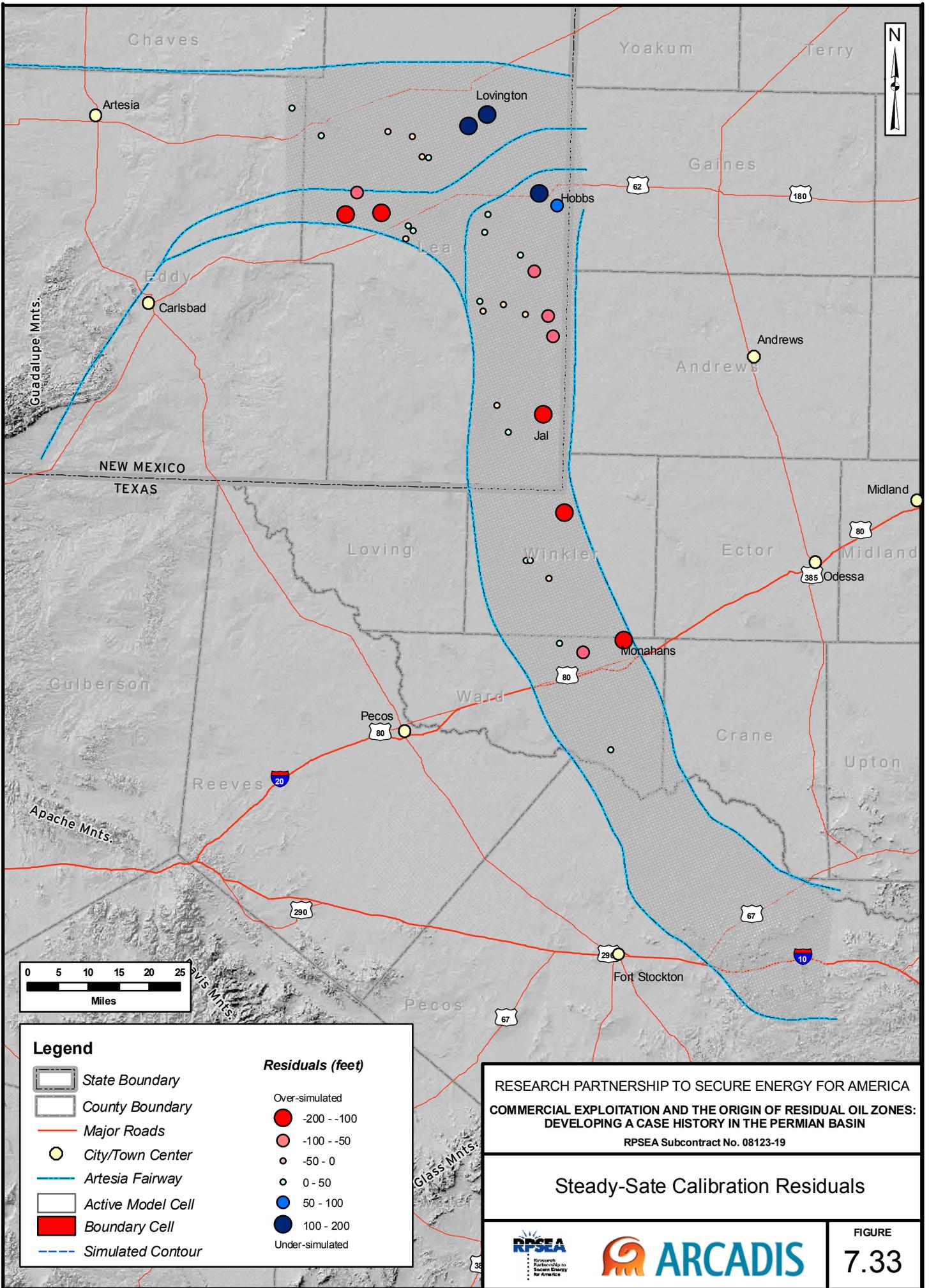
Note: Simulated contours are in feet above mean sea level (contour interval 25 feet)

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Simulated Pre-Development
 Potentiometric Surface



FIGURE
 7.32



Legend

- State Boundary
- County Boundary
- Major Roads
- City/Town Center
- Artesia Fairway
- Active Model Cell
- Boundary Cell
- Simulated Contour

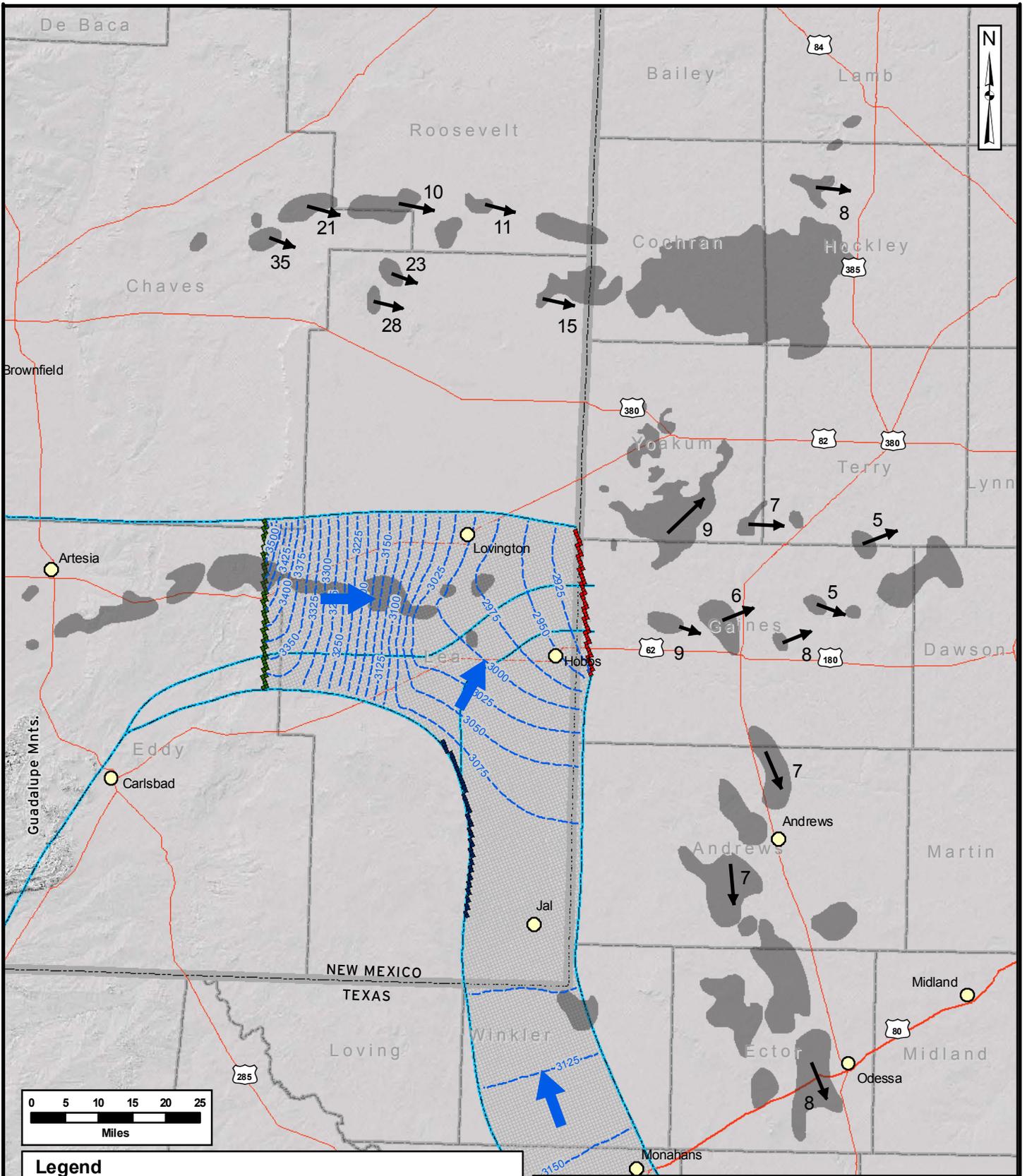
Residuals (feet)

- Over-simulated
- 200 - -100
- 100 - -50
- 50 - 0
- 0 - 50
- 50 - 100
- 100 - 200
- Under-simulated

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN**
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Steady-State Calibration Residuals





Legend

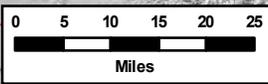
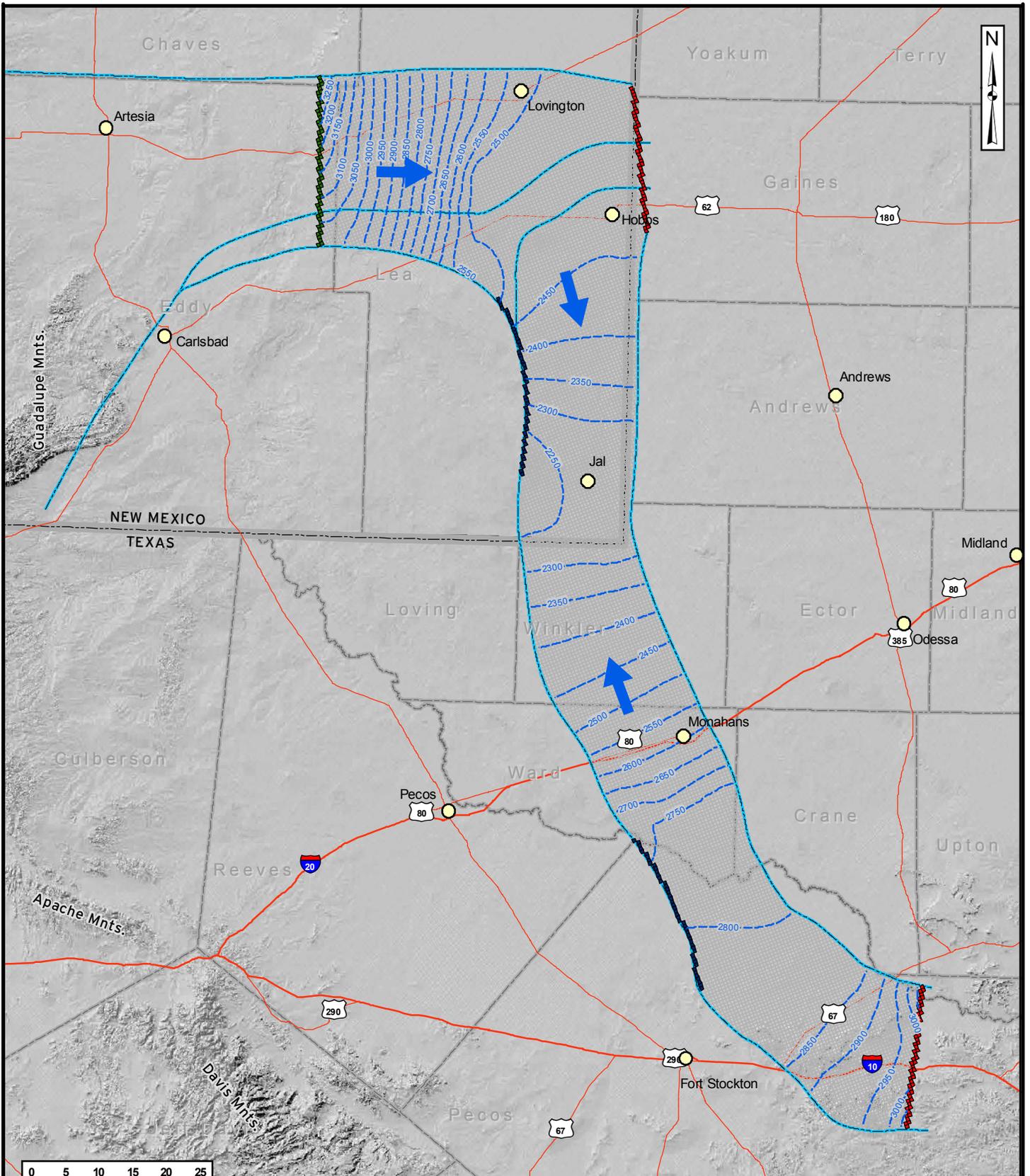
State Boundary	Boundary Cell
County Boundary	Simulated Head Contour
Major Roads	San Andres Oil Field
City/Town Center	Oil/Water Contact Tilt
Artesia Fairway	Calculated Hydraulic Gradient
Active Model Cell	

Note: Calculated hydraulic gradient is the gradient required to produce the tilt in the oil/water contact tilts from Brown (2001) and is shown in feet/mile.

Note: Simulated contours are in feet above mean sea level (contour interval 25 feet)

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Oil/Water Contact Tilts for Regional San Andres Oil Fields



Legend

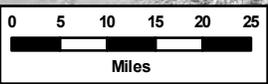
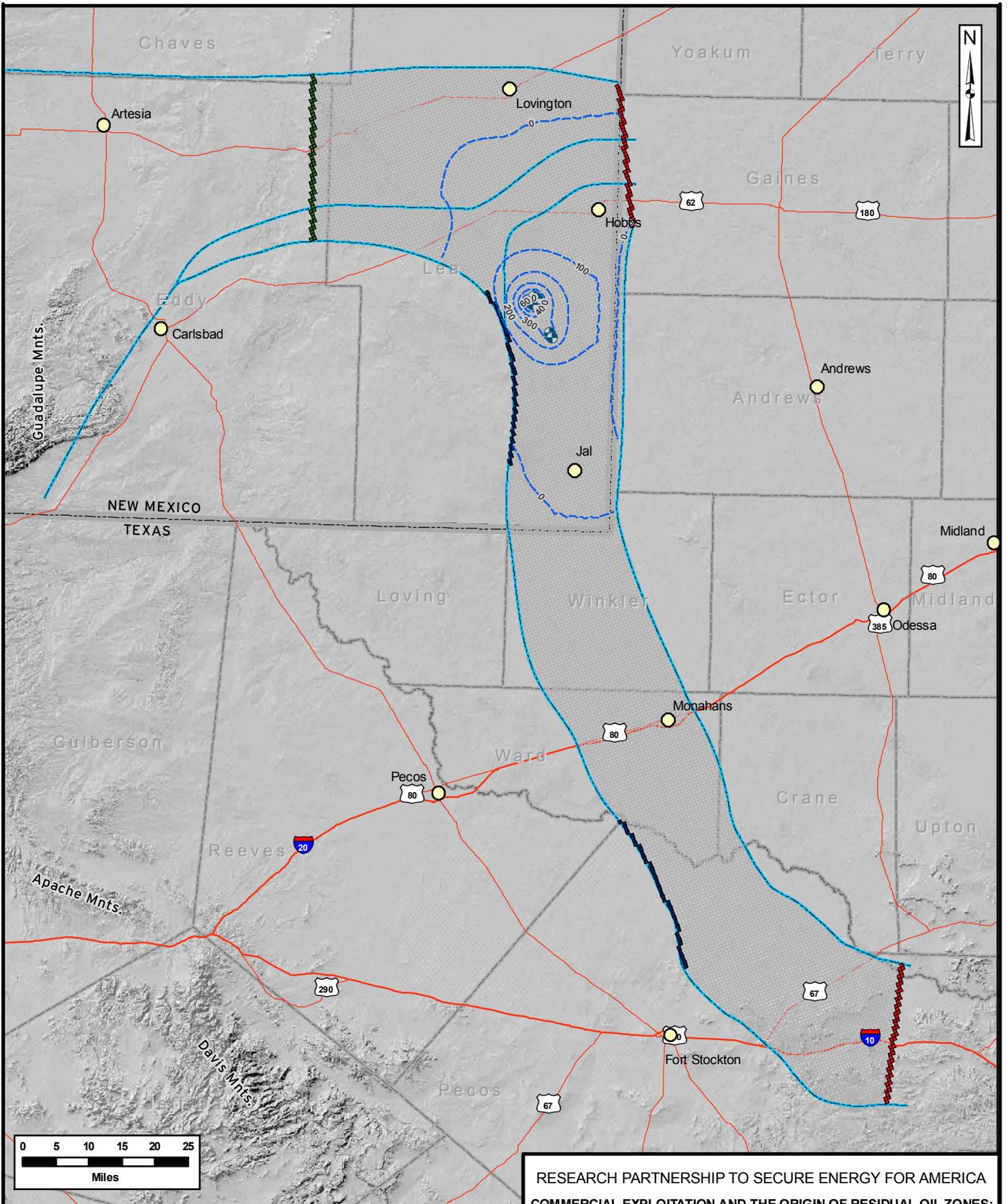
State Boundary	Artesia Fairway
County Boundary	Active Model Cell
Major Roads	Boundary Cell
City/Town Center	Simulated Head Contour

Note: Simulated contours are in feet above mean sea level (contour interval 50 feet)

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Simulated Post-development
 Potentiometric Surface

<p>Research Partnership to Secure Energy for America</p>		<p>FIGURE 7.35</p>
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Legend

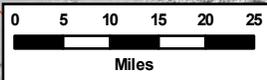
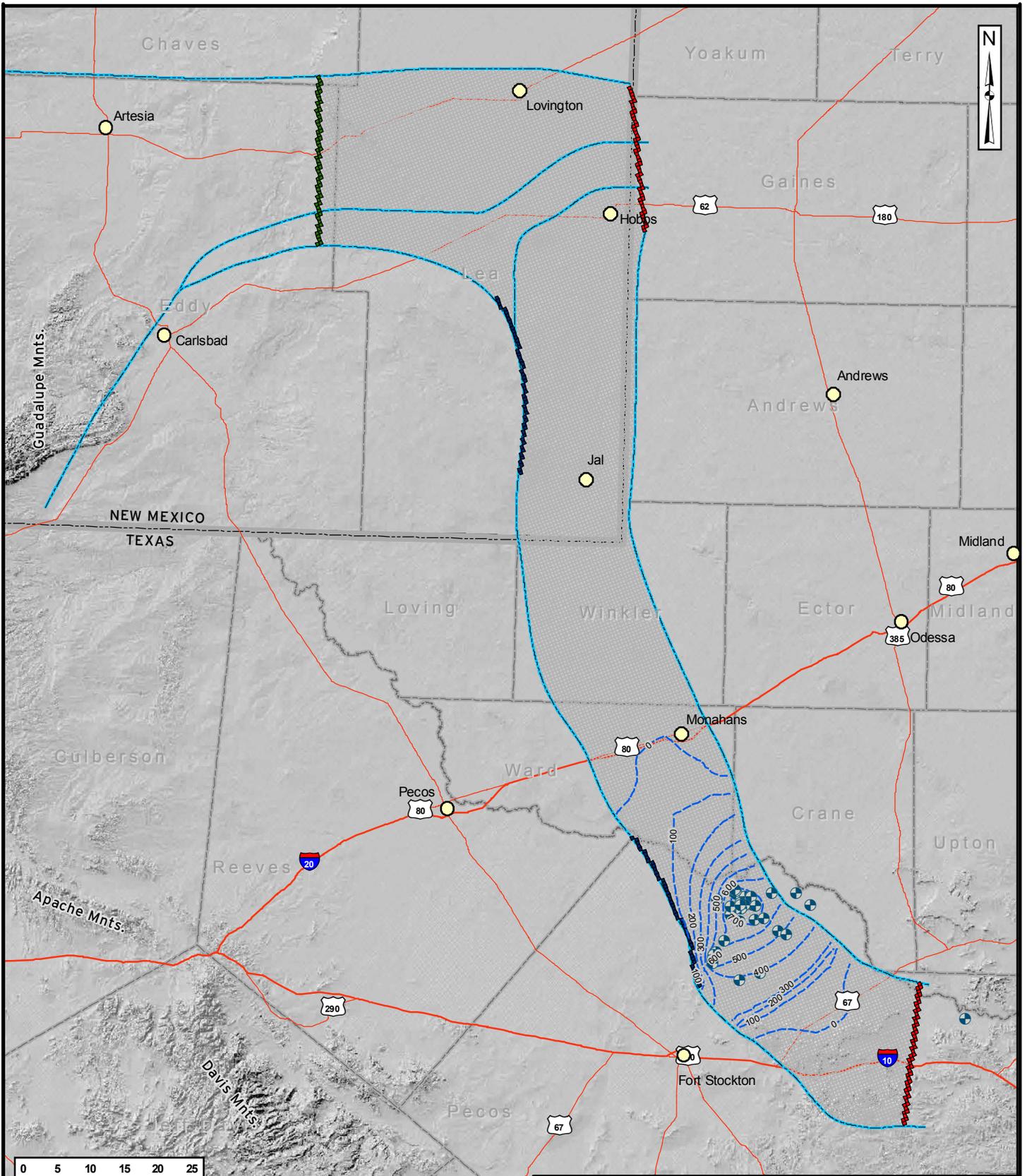
State Boundary	Artesia Fairway
County Boundary	Active Model Cell
Major Roads	Boundary Cell
City/Town Center	Simulated Drawdown Contour

Note: Simulated contours are in feet (contour interval 100 feet)

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 COMMERCIAL EXPLOITATION AND THE ORIGIN OF RESIDUAL OIL ZONES:
 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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**Lea County Water Flood Supply Well Field
 Maximum Simulated Drawdown**

		<p>FIGURE 7.36</p>
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Legend

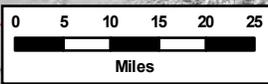
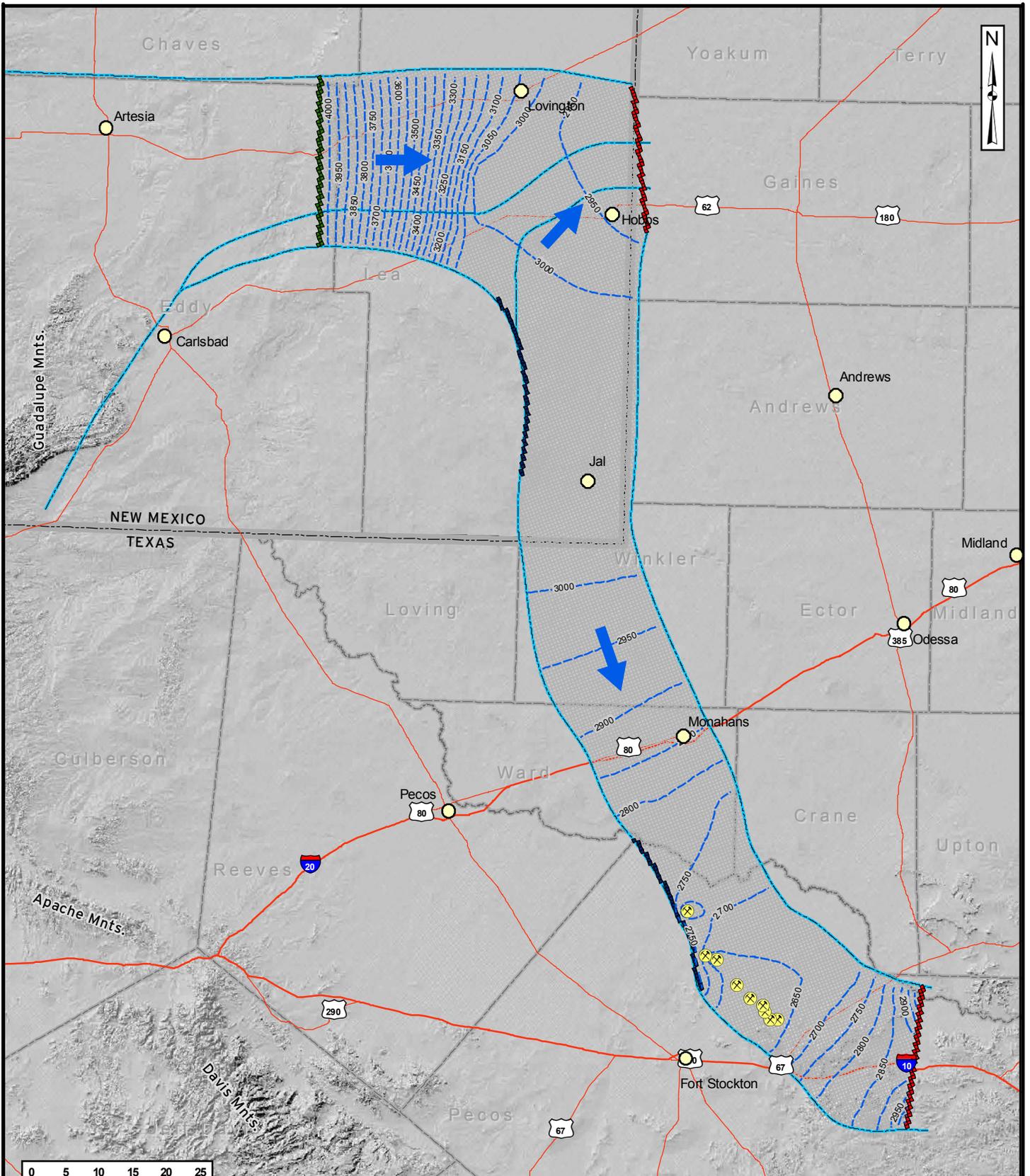
	State Boundary		Artesia Fairway
	County Boundary		Active Model Cell
	Major Roads		Boundary Cell
	City/Town Center		Simulated Drawdown Contour

Note: Simulated contours are in feet (contour interval 100 feet)

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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**Pecos County Irrigation Supply Well Field
 End-of-Simulation Drawdown**

		FIGURE 7.37
--	--	------------------------



Legend

	State Boundary		Artesia Fairway
	County Boundary		Active Model Cell
	Major Roads		Boundary Cell
	City/Town Center		Sulfur Deposit
			Simulated Head Contour

Note: Simulated contours are in feet above mean sea level (contour interval 50 feet)

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 DEVELOPING A CASE HISTORY IN THE PERMIAN BASIN
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Simulated Potentiometric Surface
 for the Geologic Past

		FIGURE 8.1
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