

U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Plays for assessment in
Region V, West Texas and Eastern New Mexico
as of October 4, 1993
1995 National Assessment of Oil and Gas

compiled by

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

¹ U.S. Geological Survey
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The U.S. Geological Survey periodically makes appraisals of the undiscovered oil and gas resources of the Nation. For the 1995 National Assessment the onshore areas and adjoining State waters of the Nation have been divided into eight Regions which are subdivided into 72 provinces. Regions II through VIII comprise the Lower 48 States; Alaska comprises Region I. A map at scale 1:5,000,000 showing the boundaries of Regions II through VIII for this assessment has been released in open file (Dolton, G.L., Varnes, K.L., Gautier, D.L., and Baird, J.K. compilers, 1992, Oil and gas assessment areas, 1992, Lower 48 States: U.S. Geological Survey Open-File Report 92-696, scale 1:5,000,000).

The provinces and assigned Province Geologists for Region V are listed in Table 1. The basic assessment unit is the play. Table 2 lists by number and name the plays considered at this time (October 1993) in Region V, West Texas and Eastern New Mexico. Descriptions of the plays follow; in most cases these descriptions are written by the assigned Province Geologist (Table 1).

Because this National assessment is currently in progress, these listings and descriptions are preliminary. The plays and/or their names may change as the project progresses; some plays may be added, and others dropped. The descriptions may also change. The plays, play names, and descriptions may or may not duplicate plays appraised in other National assessments.

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Table 1. List of Provinces and Province Geologists in Region V, West Texas and Eastern New Mexico

Prov.	Province Name	Province Geologist	Telephone Number
42	Pedernal Uplift	Ball, M.M.	(303) 236-5784
43	Palo Duro Basin	Ball, M.M.	(303) 236-5784
44	Permian Basin	Ball, M.M.	(303) 236-5784
45	Bend Arch - Fort Worth Basin	Ball, M.M.	(303) 236-5784
46	Marathon Thrust Belt	Perry, W.J.	(303) 236-5767

Table 2. List of plays for consideration, Region V, West Texas and Eastern New Mexico

Prov.	Play No.	Play Name
42	4201	Pennsylvanian and Older Oil and Gas
42	4202	Permian Oil and Gas
42	4203	Mesozoic Oil
43	4301	Mississippian and Older Oil and Gas
43	4302	Pennsylvanian-Permian Oil and Gas
44	4401	Deep Ellenburger Gas
44	4402	Karsted Ellenburger Oil and Gas
44	4403	Simpson Sandstone Predominantly Gas
44	4404	Silurian-Devonian, Predominantly Carbonate, Oil and Gas
44	4405	Mississippian, Deep Delaware Basin Gas
44	4406	Atokan (Limestone, Dolomite, and Sandstone) Delaware and Midland Basins Gas
44	4407	Upper Pennsylvanian (mostly Strawn) Eastern Shelf, Fluvial Deltaic Sandstone Oil and Gas
44	4408	Upper Pennsylvanian, Shallow Marine Carbonate Platform Oil and Gas
44	4409	Horseshoe Atoll, Upper Pennsylvanian Oil
44	4410	Pennsylvanian and Permian Slope and Basin Sandstone, Ozona Arch and Eastern Shelf Margin and Val Verde Basin Gas
44	4411	Wolfcampian Carbonate Delaware Basin and Central Basin Platform Gas
44	4412	Eastern Shelf, Permian Platform Edge Carbonate Oil
44	4413	Spraberry-Dean (Leonardian) Deep-Water Sandstone Oil and Gas
44	4414	Clearfork Carbonate Platform, Central Basin Platform Oil and Gas
44	4415	Permian Sandstone and Carbonate, West Edge of the Central Basin Platform Oil
44	4416	San Andres-Grayburg, Central Basin Platform and Ozona Arch Oil and Gas
44	4417	San Andres-Grayburg, Northwestern Shelf Restricted Platform Dolomite Oil and Gas
44	4418	Delaware Sandstones Deep Delaware Basin Gas
45	4501	Pre-Mississippian Oil and Gas
45	4502	Mississippian Pinnacle Reefs Gas
45	4503	Marble Falls (Morrowan) Platform Limestone Gas
45	4504	Lower-Mid Pennsylvanian (Atokan-Morrowan) Sandstone-Conglomerate Oil and Gas
45	4505	Strawn (Desmoinesian) Fluvial-Deltaic Sandstone Oil
45	4506	Strawn (Desmoinesian) Caddo Reef Oil
45	4507	Post-Desmoinesian Carbonate and Sandstone Oil
46	4601	Frontal Zone Oil and Gas
46	4602	Lower Paleozoic Carbonates Basement Fault Block

Descriptions of Plays to be Considered
Region V, Permian Basin

Province 42. Pedernal Uplift

Play 4201 Pennsylvanian and Older Oil and Gas

This play is hypothetical. Pennsylvanian quartz sandstones and shales tend to infill grabens within the block-faulted basement rocks of north-central New Mexico that constitute the Pedernal Uplift Province. A range of trap types seems possible. Traps could include regional porosity pinch-outs toward the north and west, local porosity pinch-outs on the flanks of horsts, and local anticlinal closures in graben settings. Sandstones are the most likely reservoirs. Significant heavy oil shows occur in Mesozoic strata at shallow depth in north-central New Mexico.

Play 4202 Permian Oil and Gas

This play is hypothetical. Permian quartz sandstones and shales are draped over the block-faulted basement of north-central New Mexico. Low-relief traps are formed in the Permian section overlying basement horsts. Quartz sandstones in these structural highs are potential reservoirs. Proximity to significant oil shows are a reason for interest in this play.

Play 4203 Mesozoic Oil

This play is hypothetical. Ninety million barrels of oil-in-place occurs in outcrops of the Triassic Santa Rosa Sandstone near Santa Rosa, New Mexico. Sixty million barrels of oil-in-place occurs, in the same formation, in the shallow subsurface near Newkirk, New Mexico. These accumulations indicate that if adequate seals exist in the Mesozoic section of this region, important undiscovered oil resources should also be present in up-dip pinch outs or anticlinal closures containing quartz sandstone reservoirs.

Province 43. Palo Duro Basin

Play 4301 Mississippian and Older Oil and Gas

Traps in this proven play are structural, stratigraphic and combinations of these end members. Reservoirs are predominantly carbonates. The limiting factor in analysis of this play is the small area of potentially mature source rock included in the Palo Duro and Dalhart basins.

Play 4302 Pennsylvanian-Permian Oil and Gas

Traps in this proven play include the full spectrum from structural to stratigraphic. Reservoirs range through quartz sandstones to carbonates. The limiting factor in analysis of this play is its relatively small area and volume of mature source rock.

Province 44. Permian Basin

Play 4401 Deep Ellenburger Gas

Traps in this play are structural, fault anticlines and domes over basement horsts. Reservoirs are tectonically fractured karst and brecciated dolostones of Ordovician age, largely confined to the Delaware and Val Verde basins at depths ranging from 11,000 to 24,000 ft. Cumulative production from this play exceeds 20 TCF of gas.

Play 4402 Karsted Ellenburger Oil and Gas

Traps in this play are predominantly structural, fault anticlines over basement horsts. Reservoirs are karsted dolostones of Ordovician age that primarily occur on the Central Basin Platform and in the western and southern parts of the Midland Basin. Cumulative production from this play exceeds 1.5 BBO and 12 TCF of gas.

Play 4403 Simpson Sandstone Predominantly Gas

Traps in this play are predominantly structural with some complications associated with facies change. Reservoirs are quartz sandstones that were originally deposited in marine environments. Known reservoirs are currently restricted to locations on the Central Basin Platform. Cumulative production in this play is about 1 TCF of gas.

Play 4404 Silurian-Devonian, Predominantly Carbonate, Oil and Gas

Traps in this play are predominantly structural with some complications introduced by faulting, facies change, and erosional topography. Reservoirs are mainly carbonate with limestone, dolostone and some chert. Reservoirs are primarily located on the Central Basin Platform but also occur in the adjacent Delaware, Val Verde, and Midland Basins. Cumulative production from this play exceeds 1 BBO and 12 TCF of gas.

Play 4405 Mississippian, Deep Delaware Basin Gas

Traps in this play are predominantly structural with some complications introduced by faulting and facies change. Reservoirs are mainly limestone with some chert. Cumulative production exceeds 300 BCF of gas.

Play 4406 Atokan (Limestone, Dolomite and Sandstone) Delaware and Midland Basins Gas

Traps in this play typically combine anticlinal elements with influences of facies change. Reservoirs include quartz sandstones, limestones, and dolostones. Cumulative production exceeds 500 BCF of gas.

Play 4407 Upper Pennsylvanian (mostly Strawn), Eastern Shelf, Fluvial Deltaic Sandstone Oil and Gas

Traps in this play are primarily controlled by facies change with some influence exerted by structural closure. Reservoirs are composed of quartz sandstones. Cumulative production exceeds 50 MMBO and 100 BCF of gas.

Play 4408 Upper Pennsylvanian Shallow Marine Carbonate Platform Oil and Gas

Traps in this play are mainly controlled by facies change with some influence exerted by structural closure. Reservoirs are primarily composed of limestone with some dolostone, chert, and conglomerate. Reservoirs are located over a broad area including the Central Basin Platform, the Northwestern and Eastern Shelves, and the Midland and Val Verde Basins. Cumulative production exceeds 6 TCF of gas and 550 MMBO.

Play 4409 Horseshoe Atoll, Upper Pennsylvanian Oil

The traps in this play consist of depositional, reefal topography. Reservoirs are limestones with a minor amount of dolostone and range in age from Desmoinesian to Wolfcampian. Cumulative production exceeds 2.5 BBO.

Play 4410 Pennsylvanian and Permian Slope and Basin Sandstone, Ozona Arch, Eastern Shelf Margin and Val Verde Basin Gas

Traps in this play are primarily controlled by facies change with additional influence exerted by anticlinal closure. Reservoirs are composed of quartz sandstones originally deposited in slope and basin settings in the Midland and Val Verde Basin. Cumulative production exceeds 2 TCF of gas.

Play 4411 Wolfcampian Carbonate Delaware Basin and Central Basin Platform Gas

Traps in this play are predominantly structural with some complications introduced by facies change and faulting. Reservoirs are composed of detrital carbonate debris flows in the Delaware Basin and shallow-water platform and platform-edge limestones on the adjacent

Central Basin Platform. Cumulative production is approximately 1 TCF of gas.

Play 4412 Eastern Shelf, Permian Platform Edge Carbonate, Oil

Traps in this play are structural closures. Reservoirs are primarily composed of dolomite with admixtures of limestone and quartz sandstone. Cumulative production exceeds 800 MMBO.

Play 4413 Spraberry-Dean (Leonardian) Deep-Water Sandstone Oil and Gas

Traps in this play result from combinations of updip-pinchout, facies changes and anticlinal closures. Reservoirs mainly consist of quartz sandstones with some detrital carbonates. Reservoirs extend over most of the central part of the Midland Basin. Cumulative production exceeds 14 TCF of gas and 700 MMBO.

Play 4414 Clearfork Carbonate Platform, Central Basin Platform Oil and Gas

Traps in this play are controlled by combinations of anticlinal closure and facies change. Reservoirs are primarily composed of dolostone with admixtures of limestone common; in some cases, quartz sandstones contribute. Reservoirs are located on the Central Basin Platform and Northwestern Shelf. Cumulative production exceeds 1 BBO and 1.2 TCF of gas.

Play 4415 Permian Sandstone and Carbonate, West Edge of the Central Basin Platform Oil

Traps in this play are controlled by combinations of anticlinal closure and facies change. Reservoirs consist of dolostone and quartz sandstones that form a continuous production trend along the west edge of the Central Basin Platform. Cumulative production for this play exceeds 1.2 BBO.

Play 4416 San Andres-Grayburg, Central Basin Platform and Ozona Arch Oil and Gas

Traps in this play are controlled by combinations of anticlinal closure and facies change. Reservoirs are primarily composed of dolostone with minor amounts of limestone and quartz sandstone. Reservoirs occur on the Central Basin Platform and Ozona Arch. Cumulative production exceeds 5 BBO and 4 TCF of gas.

Play 4417 San Andres Grayburg, Northwestern Shelf Restricted Platform Dolomite Oil and Gas

Traps in this play are controlled by combinations of anticlinal closure and facies change. Reservoirs are predominantly composed of dolomite with small amounts of limestone. Cumulative production exceeds 4 BBO and 1.4 TCF of gas.

Play 4418 Delaware Sandstones, Deep Delaware Basin Gas

Traps in this play are primarily stratigraphic due to facies change with secondary influence stemming from structural closure. Reservoirs are composed of quartz sandstones deposited originally in relatively long, straight channels. Cumulative production exceeds 400 BCF of gas.

Province 45. Bend Arch - Fort Worth Basin

Play 4501 Pre-Mississippian Oil and Gas

Traps in this proven play may include drapes over basement highs, pinch outs on the flanks of highs, and erosional topographic highs. Ellenburger dolostones are the most probable reservoir rocks. The Ellenburger extends over most of the province but is missing on the crests of regional highs associated with the Red River and Matador Arches. Middle Ordovician Simpson quartz sandstones, upper Ordovician Montoya Limestone, and to a lesser degree Silurian-Devonian carbonates are other potential reservoirs. The latter are missing over extensive areas on the crest of the Bend Arch.

Play 4502 Mississippian Pinnacle Reefs Gas

Traps in this play are a result of some combination of depositional topography and erosion. Reservoirs are predominantly limestones and extend over most of the province but are absent on structural highs along the Red River and Matador Arches. Cumulative production exceeds 50 BCF.

Play 4503 Marble Falls (Morrowan) Platform Limestone Gas

Traps in this play result from facies change with secondary influences exerted by structural closures. Reservoirs are relatively tight limestones concentrated along the crest of the Bend Arch. Cumulative production exceeds 150 BCF of gas.

Play 4504 Lower-Mid Pennsylvanian (Atokan-Morrowan) Sandstone-Conglomerate Oil and Gas

Traps in this play result primarily from facies changes with secondary influences exerted by structural closure. Reservoirs of coarse quartz sandstones and conglomerates originally deposited in fan-delta

systems. Accumulations are concentrated on the eastern flank of the Bend Arch. Some additional gas fields occur in the Marietta Basin. Cumulative production exceeds 400 MMBO and 3.5 TCF of gas.

Play 4505 Strawn (Desmoinesian) Fluvial-Deltaic Sandstone Oil

Traps in this play are primarily structural with secondary influences exerted by facies change. Reservoirs are quartz sandstones deposited in fluvial-deltaic environments. Most important accumulations occur in the northern part of the province south of the Red River Arch. Cumulative production exceeds 350 MMBO.

Play 4506 Strawn (Desmoinesian) Caddo Reef Oil

Traps in this play are predominantly stratigraphic with secondary influences exerted by structural closures. Reservoirs are exclusively composed of limestones and most of the play's oil occurs along the west flank of the Bend Arch. Cumulative production exceeds 200 MMBO.

Play 4507 Post-Desmoinesian Carbonate and Sandstone Oil

Traps include structurally controlled anticlinal closures in shelf, quartz sandstones; updip, pinch-outs in slope sandstones; and deposition topography in platform-edge limestones. Most of this play is located in the western part of the province with the more important part extending onto the Eastern Shelf of the Permian Basin Province. Cumulative production exceeds 100 MMBO in Province 45.

Province 46. Marathon Thrust Belt

Play 4601 Frontal Zone Oil And Gas

The play occupies the northern part of the province. Source rocks are considered to be organic-rich shales associated with Mississippian to Pennsylvanian turbidites. Possible reservoir rocks include Mississippian-Pennsylvanian turbidite sands and fractured Ordovician to Devonian novaculite.

Play 4602 Lower Paleozoic Carbonates Basement Fault-Block

This play involves the basement block-faulted Lower Paleozoic carbonates believed to underlie the basal decollement of the frontal zone.