Exploration in Utah—A Look at the Past

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Summary

Utah's oil and gas exploration history extends back almost 130 years. Over the decades, many lessons have been learned from past exploration efforts and resulting production. This history has led Utah to be consistently ranked in the top 15 states in oil and gas production since the 1960s. In 2019, nearly 37 million barrels of oil (MMBO) and 272 billion cubic feet of gas (BCFG) were produced from over 11,000 wells.

In 1891, the Bamberger and Millis No. 1 well in east-central Utah was drilled to a depth of 1000 feet at a cost of $4,000. Although a dry hole, it was the first well in Utah to specifically target hydrocarbons. That same year, natural gas was accidentally discovered in Farmington Bay on the eastern shore of Great Salt Lake during the drilling of a water well. Between 1895 and 1896, gas from several wells near this location was transported to Salt Lake City in a wooden pipe, marking Utah's first use of local oil or gas.

Wildcats drilled in the early part of the 20th century targeted large surface anticlines and areas with oil seeps. Discoveries included Rozel Point (1904) near the north arm of Great Salt Lake, Virgin (1907) west of Zion National Park, Mexican Hat (1908) near Monument Valley, and Cane Creek (1925) along the Colorado River near Moab, now a significant horizontal drilling play. These fields produced only small amounts of oil, and only Mexican Hat still pumps a few barrels of oil per day (BOPD).

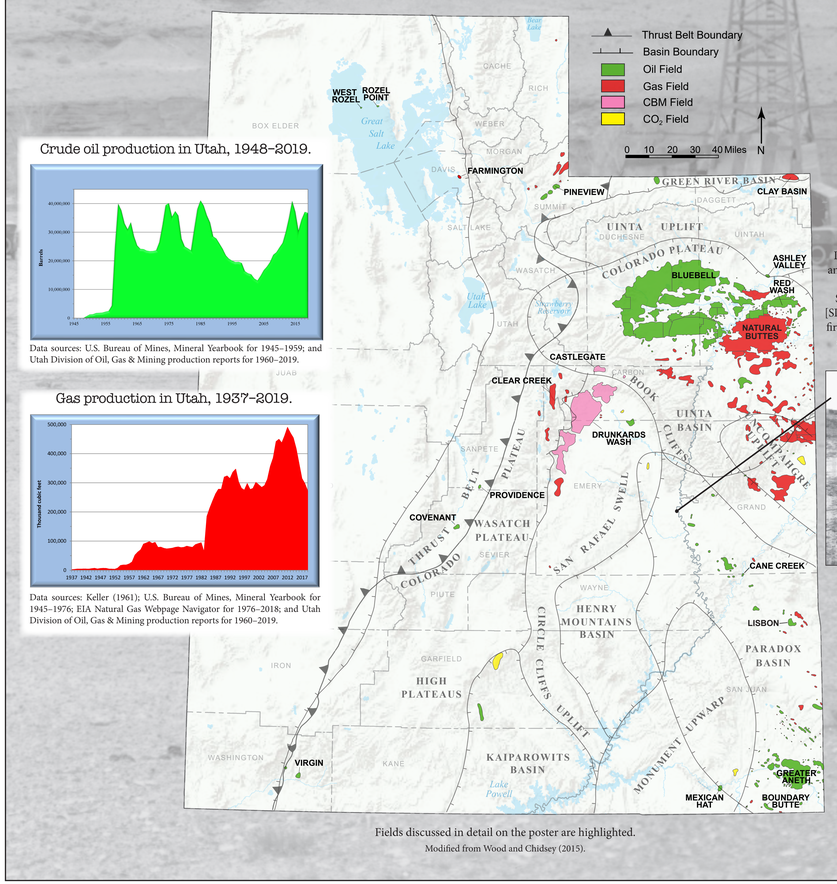
The first commercial gas field, Clay Basin, was discovered in 1927 in the southern Green River Basin near Flaming Gorge along the north flank of the eastern Uinta Mountains. In 1948, the first truly commercial oil well, Ashley Valley No. 1, was drilled in eastern Utah near Dinosaur National Monument (Ashley Valley field has produced over 21 MMBO). Not long after, major discoveries opened the large basins where most of the drilling activities continue today: Roosevelt (now Bluebell) (1949), Redwash (1951), and Natural Buttes (1952) fields in the Uinta Basin, and Boundary Butte field (1948), Utah's largest oil field Greater Aneth (1956), and Lisbon field (1960) in the Paradox Basin.

In 1951, the Ferron Sandstone Member of the Cretaceous Mancos Shale proved gas productive with the discovery of Clear Creek field on the Wasatch Plateau. During the 1980s, companies began testing coalbed methane (CBM) in Utah coalfields. Ferron coalbeds proved productive with the 1992 discovery of Drunkards Wash field, in what would become the "Ferron fairway," which has produced over 1.4 trillion cubic feet of gas (TCFG).

The discovery of Pineview field in 1975 led to a series of major oil and gas finds in the Utah-Wyoming thrust belt during the late 1970s and early 1980s after years of drilling failures. Heavy oil was discovered in Great Salt Lake as part of a 15-well "offshore" drilling program from 1978 to 1980. The 2004 discovery of Covenant field in the central Utah thrust belt turned that region from one of speculation to proven potential.

Over 1.7 billion barrels of oil and 14 TCFG have been produced in Utah. Horizontal drilling in the Green River Formation of the Uinta Basin is the new frontier. The exploration efforts and successes of the past provide a great legacy for Utah's future hydrocarbon potential.

Oil and Gas Fields Map of Utah



Fields discussed in detail on the poster are highlighted.
Modified from Wood and Chidsey (2015).

Crude oil production in Utah, 1948–2019.

Data sources: U.S. Bureau of Mines, Mineral Yearbook for 1945–1959; and Utah Division of Oil, Gas & Mining production reports for 1960–2019.

Gas production in Utah, 1937–2019.

Data sources: Keller (1961); U.S. Bureau of Mines, Mineral Yearbook for 1945–1976; EIA Natural Gas Webpage Navigator for 1976–2018; and Utah Division of Oil, Gas & Mining production reports for 1960–2019.

Location of the 1891 Bamberger and Millis No. 1 well (SW1/4SE1/4 section 15, T. 21 S., R. 16 E., Salt Lake Base Line & Meridian [SLBL&M], Grand County)—Utah's first well drilled seeking petroleum; depth = 1000 feet, plugged and abandoned as a dry hole.

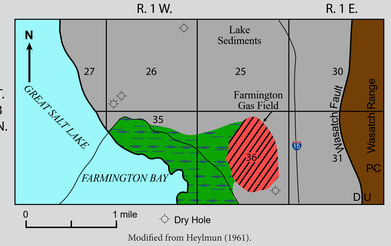
From Clem (1991).

Late 19th and Early 20th Century Discoveries

1891: Farmington Gas Field, East Shore of Great Salt Lake, Basin and Range Physiographic Province, Davis County, Northern Utah

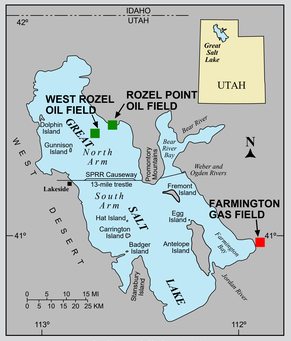
- Reservoir: Quaternary pre-Lake Bonneville lenticular sands and silts
- Type of trap: stratigraphic, slight topographic rise suggests structural arching
- Exploration method leading to discovery: initially drilled for a water well
- Hydrocarbon source: biogenic gas from Quaternary marsh and peat deposits
- Average well depth: 400–700 feet
- Cumulative production: est. 150,000 thousand cubic feet of gas (MCFG)
- Status: abandoned

General geology of Farmington gas field area.



Modified from Heylmun (1961).

Locations of Farmington, Rozel Point, and West Rozel fields, Great Salt Lake.

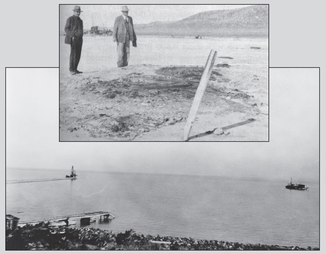


After Hunt and Chidsey (2002).

1904: Rozel Point Oil Field, North Shore of Great Salt Lake, Basin and Range Physiographic Province, Box Elder County, Northern Utah

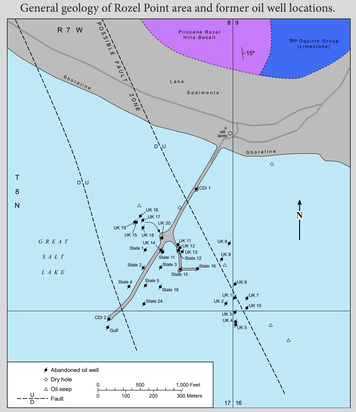
- Reservoir: Late Tertiary (Pliocene?) fractured basalts
- Type of trap: structural, associated with faulting
- Exploration method leading to discovery: surface oil seeps
- Hydrocarbon source: lacustrine strata of the Miocene-Pliocene Salt Lake Group
- Oil characteristics: 5° to 9° API gravity, 13% sulfur
- Average well depth: 125–300 feet
- Cumulative production: 2665 barrels of oil (BO)
- Status: abandoned

Natural oil seep at low lake level of Great Salt Lake, Rozel Point field, circa 1937.



Leonora Mining & Milling Co. No. 1 well, Rozel Point field, Great Salt Lake, 1929.

General geology of Rozel Point area and former oil well locations.



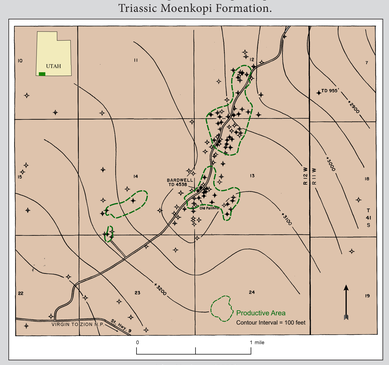
Modified from Eardley (1963), Kendell (1993).

1907: Virgin Oil Field, Colorado Plateau Physiographic Province, Washington County, Southwestern Utah

- Reservoir: shallow marine Timpoweap Member of the Lower Triassic Moenkopi Formation
- Type of trap: permeability barriers and fractures in carbonates, structural nose with some drainage into synclinal pockets on flanks
- Exploration method leading to discovery: surface oil seeps
- Hydrocarbon source: unknown marine Permian
- Average well depth: 425–750 feet
- Cumulative production: 2007 BO, 49,164 MCFG
- Status: abandoned

Virgin Dome Oil Co., Virgin field, near the west entrance to Zion National Park, 1919.

Structure contours on top of the Timpoweap Member of the Triassic Moenkopi Formation.



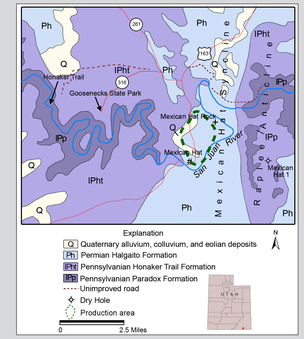
After Heylmun (1993).

1908: Mexican Hat Oil Field, Monument Upwarp/Paradox Basin, San Juan County, Southeastern Utah

- Reservoir: "Goodridge Sandstone," of the shallow marine Pennsylvanian Honaker Trail Formation
- Type of trap: stratigraphic, drainage into syncline
- Exploration method leading to discovery: surface oil seeps
- Hydrocarbon source: organic-rich marine shale in Pennsylvanian Paradox Formation
- Average well depth: 50–500 feet
- Cumulative production: 313,961 BO
- Status: producing – 1087 BO in 2019

Cable tool drilling near Mexican Hat, circa 1920.

Geologic map of the Mexican Hat syncline-Raplee anticline area and location of Mexican Hat field.



Modified from Hintze (1980).

1925: Cane Creek Oil Field, Paradox Fold and Fault Belt, Northern Paradox Basin, Grand and San Juan Counties, Southeastern Utah

- Reservoir: Cane Creek shale zone, restricted marine Pennsylvanian Paradox Formation
- Type of trap: anticline, fractured organic-rich shale, siltstone, sandstone, and dolomite
- Exploration method leading to discovery: surface anticline
- Hydrocarbon source: organic-rich marine shale in Cane Creek shale zone, Pennsylvanian Paradox Formation
- Average well depth: 3500–5800 feet
- Cumulative production: 1887 BO, 25,000 MCFG
- Status: abandoned; however, the Cane Creek is still productive in the area via horizontal and vertical wells

The Midwest Exploration and Utah Southern No. 1 Shafer well, drilled in 1924; view down the Colorado River to the southwest. The cable-tool rig was floated 20 miles down the river from the town of Moab. The well blew out while drilling at 2028 feet and the rig caught fire and was destroyed.

Location of Cane Creek and other oil fields productive in the Cane Creek shale zone. **Fields discovered since 1992 have used horizontal drilling technology.**

After Doelling and others (2010).

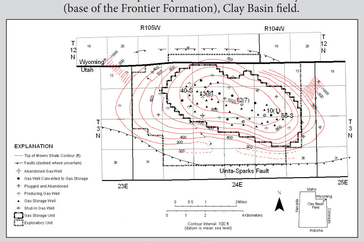
Panorama to the east-northeast from Dead Horse Point State Park showing the Cane Creek anticline which exposes Pennsylvanian through Triassic strata; laccolithic La Sal Mountains in the distance.

Total Cane Creek Shale Production (as of January 1, 2020): 9,536,472 barrels of oil and 3.9 billion cubic feet of gas

First Commercial Gas Discovery – 1927: Clay Basin Field, Southern Green River Basin Along the North Flank of the Eastern Uinta Mountains, Daggett County, Northeastern Utah

- Reservoirs: fluvial to lower coastal plain Cretaceous Dakota and marine shoreface to foreshore Frontier Formations
- Type of trap: combined anticline with fault closure and stratigraphic
- Exploration method leading to discovery: surface anticline
- Hydrocarbon source: organic-rich Cretaceous marine shale
- Average well depth: 5800–6200 feet
- Cumulative production: 190.5 BCFG, 371 thousand barrels of oil (MBO)
- Status: producing – 0.98 BCFG in 2019 from Frontier; Dakota serves as a gas storage reservoir, the largest gas storage facility in the Rocky Mountain region

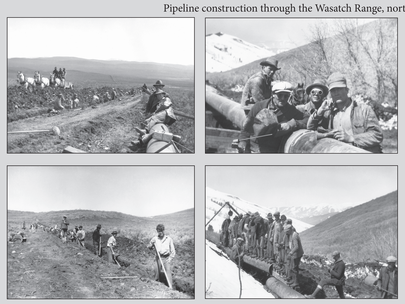
Structure contour map on top of the Cretaceous Mowry Shale (base of the Frontier Formation), Clay Basin field.



After Morgan (2005).

Gas Pipelines from Baxter Basin Area (Near Rock Springs), Wyoming, to Northern Utah, Late 1920s and Early 1930s

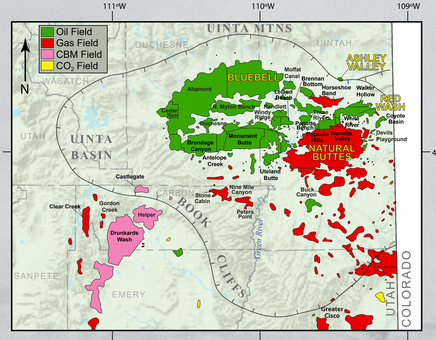
Pipeline construction through the Wasatch Range, northern Utah.



Gas mains being installed on South Temple Street, downtown Salt Lake City, 1929.

Early Uinta Mountain/Uinta Basin Discoveries, Eastern Utah

Oil and Gas Fields in the Uinta Mountains/Uinta Basin, Eastern Utah.



Fields discussed in detail below are highlighted.

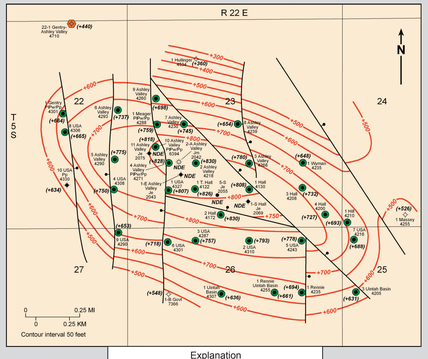
Modified from Wood and Chidsey (2015).

First Commercial Oil Discovery – 1948: Ashley Valley Field, Southern Flank of the Eastern Uinta Mountains, Uintah County, Utah

- Reservoirs: eolian Pennsylvanian/Permian Weber Sandstone with minor production from the Permian Phosphoria Formation, Jurassic Entrada Sandstone, and Jurassic Morrison Formation
- Type of trap: anticline with fault closure
- Exploration method leading to discovery: mapped surface anticline, core drilling
- Hydrocarbon source: mixed Permian Phosphoria Formation and Cretaceous Mancos Shale
- Average well depth: 4200–4300 feet
- Cumulative production: 21.1 MMBO, 39.4 million cubic feet of gas (MMCFG)
- Status: producing – 22,547 BO and 5801 MCFG in 2019 from the Weber Sandstone

Oil flowing from the Ashley Valley No. 1 discovery well, October 1948.

Structure contour map of the top of the Weber Sandstone, Ashley Valley field, based on subsurface well control. Contour interval = 50 feet; datum = mean sea level.

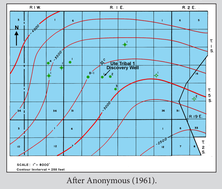


Modified from Peterson (1950, 1957, 1961), Johnson (1964), and Larson (1993).

1949: Roosevelt (now Bluebell) Field, Uinta Basin, Uintah and Duchesne Counties, Utah

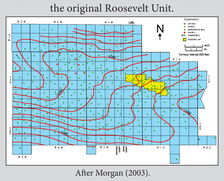
- Reservoirs: lacustrine Eocene Green River Formation with later production from the alluvial/fluvial Paleocene/Eocene Wasatch Formation
- Type of trap: anticline (structural nose) combined stratigraphic pinch out of alluvial and marginal lacustrine sandstone beds into offshore marlstone and shale
- Exploration method leading to discovery: subsurface mapping by projecting down from shallow wells
- Hydrocarbon source: kerogen-rich lacustrine shale and marlstone of the Green River Formation
- Average well depth: 8000–10,000 feet
- Cumulative production: 199.6 MMBO, 292.6 BCFG from the Green River and Wasatch Formations
- Status: producing – 5,532,936 BO and 9.7 BCFG in 2019

1961 structure contour map of the Green River Formation at Roosevelt field, Uintah County.



After Anonymous (1961).

2003 structure contour map of the top of the middle marker of the middle member of the Green River Formation, Bluebell field, Uintah and Duchesne Counties; note the location of the original Roosevelt Unit.

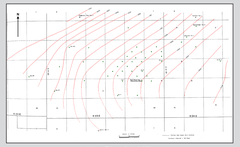


After Morgan (2003).

1951: Red Wash Field, Uinta Basin, Uintah County, Utah

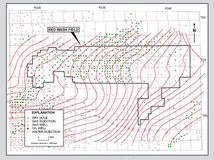
- Reservoir: lacustrine Eocene Green River Formation with minor production (gas) from the Cretaceous Mesaverde Group and Eocene Uinta Formation
- Type of trap: anticline (structural nose) combined stratigraphic updip stratigraphic pinch out of high-energy shoreface sandstone and ostracodal grainstone beds
- Exploration method leading to discovery: photogeology, surface and subsurface mapping
- Hydrocarbon source: kerogen-rich lacustrine shale and marlstone of the Green River Formation
- Average well depth: 5000–6000 feet
- Cumulative production: 89.3 MMBO, 474.3 BCFG
- Status: producing – 319,200 BO and 12 BCFG in 2019

1957 structure contour map of the top of the Green River Formation at Red Wash field, Uintah County.



After Picard (1957).

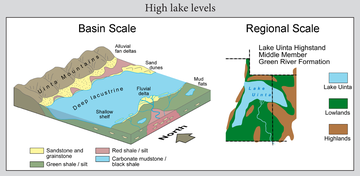
1993 structure contour map of the top of the Douglas Creek Member of the Green River Formation, Red Wash field, Duchesne County. Contour interval is 100 feet; datum = mean sea level.



After Schuh (1993).

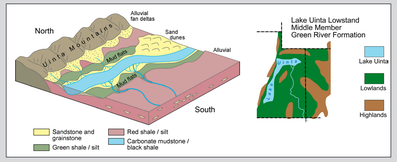
Depositional Setting for the Lacustrine Green River Formation: Eocene Lake Uinta

High lake levels



From Morgan and others (2003).

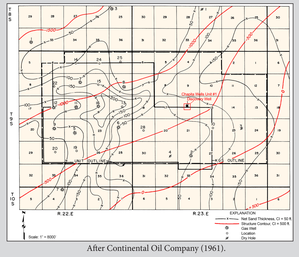
Low lake levels



Largest Gas Field in Utah – 1952: Natural Buttes Field, Uinta Basin, Uintah County, Utah

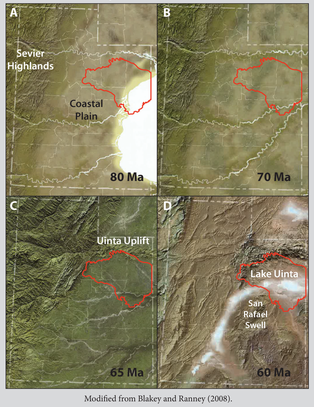
- Reservoirs: deltaic to marine Cretaceous Mesaverde Group and fluvial-alluvial Paleocene-Eocene Wasatch Formation, lacustrine Eocene Green River Formation
- Type of trap: stratigraphic updip stratigraphic pinch outs of lenticular fluvial, channel, point bar, deltaic, shoreface sandstone beds
- Exploration method leading to discovery: seismic and subsurface mapping
- Hydrocarbon source: coal beds in the Mesaverde Group, kerogen-rich lacustrine shale and marlstone of the Eocene Green River Formation
- Average well depth: 5000–10,000 feet
- Cumulative production: 31.7 MMBO, 4.14 TCFG
- Status: producing – 913,427 BO and 126.1 BCFG in 2019

1961 combined thickness and structure contour map of the top of the Chapita zone of the upper part of the Wasatch Formation, Chapita Wells field (now part of Natural Buttes field), Uintah County.



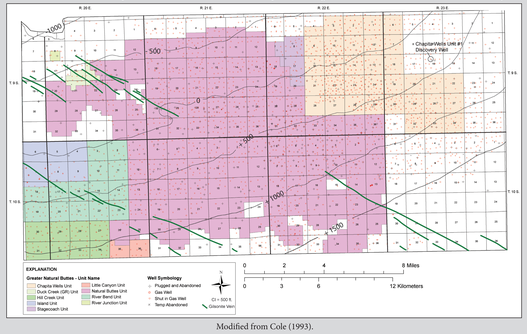
After Continental Oil Company (1961).

Paleogeographic maps show the Sevier highlands west of the Uinta Basin area (shown in red), and Laramide uplifts including the Uinta Mountains and San Rafael Swell. The final eastward regression of the Mancos Sea (part of the Cretaceous Western Interior Seaway) is shown in A and B. Rivers flowed across the coastal and alluvial plain from the Sevier highlands, north from the distant Mojave region, and south from the Uinta uplift during deposition of the Mesaverde Group and Wasatch Formations (C and D).



Modified from Blakey and Ranney (2008).

Structure contour map of the Wasatch Formation over part of the giant Natural Buttes field, Uintah County.

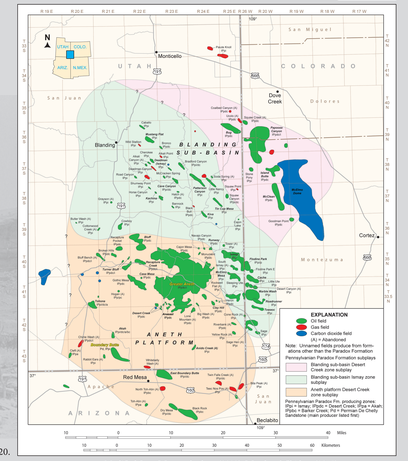


Modified from Cole (1993).

Total Uinta Basin Production (as of January 1, 2020): 832,000,000 barrels of oil and 7.1 trillion cubic feet of gas

Early Paradox Basin Discoveries, Southeastern Utah

Oil and Gas Fields Productive from the Paradox Formation, Paradox Basin, Southeastern Utah, Southwestern Colorado, and Northeastern Arizona



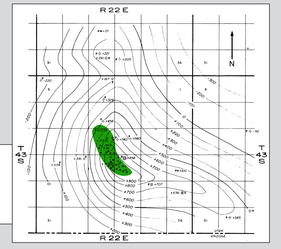
Fields in italics have produced over 500,000 BO as of January 1, 2020. Fields discussed in detail below are highlighted.

Modified from Wray and others (2002), Wood and Chidsey (2015).

First Commercial Discovery in the Paradox Basin – 1948: Boundary Butte Field, San Juan County, Southeastern Utah

- Reservoirs: eolian Permian De Chelly Sandstone (oil) and shallow-shelf carbonates of the Ismay zone of the Pennsylvanian Paradox Formation (gas)
- Type of trap: anticline with tilted O/W contact; discontinuous facies intervals in the Ismay
- Exploration method leading to discovery: mapped surface anticline with seismic support
- Hydrocarbon source: oil in the De Chelly Sandstone likely sourced from organic-rich marine shale in the Paradox Formation
- Average well depth: 6100–6600 feet
- Cumulative production: 5.62 MMBO, 13.95 BCFG
- Status: producing – 6530 BO and 17,682 MCFG in 2019

Structure contour map of the top of the Ismay zone, Paradox Formation at Boundary Butte field. Contour interval = 100 feet; datum = mean sea level.

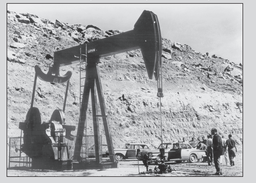


After McEachin and Royce (1978).

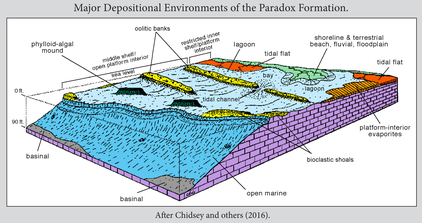
Largest Oil Field in Utah – 1956: Greater Aneth Field, Paradox Basin, San Juan County, Southeastern Utah

- Reservoirs: shallow-shelf marine carbonates of the Desert Creek zone of the Pennsylvanian Paradox Formation
- Type of trap: stratigraphic (ooid banks, bioclastic shoals, phylloid-algal mounds)
- Exploration method leading to discovery: surface mapping and seismic surveys
- Hydrocarbon source: organic-rich marine shale in Chimney Rock and Gothic shales, Paradox Formation
- Average well depth: 5600–6200 feet
- Cumulative production: 494.4 MMBO, 464.4 BCFG
- Status: producing – 3,606,487 BO and 8.1 BCFG in 2019

Texaco No. 1 Navajo C discovery well, February 1956.

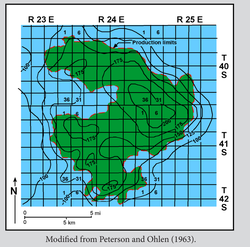


Major Depositional Environments of the Paradox Formation.



After Chidsey and others (2016).

Generalized thickness map of the Desert Creek zone, Greater Aneth field; contour interval = 25 feet.



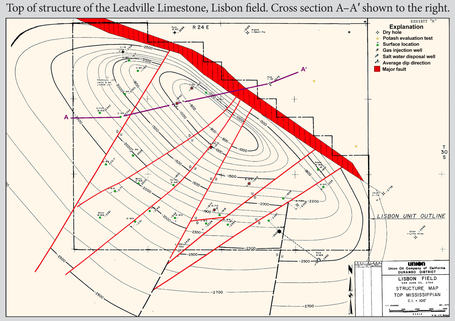
Modified from Peterson and Ohlen (1963).

Early Paradox Basin Discoveries (Continued)

First Mississippian Oil and Gas Field in Utah – 1960: Lisbon Field, Paradox Basin, San Juan County, Southeastern Utah

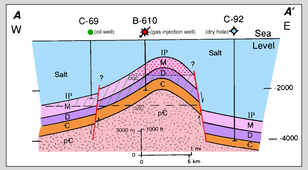
- Reservoirs: shallow-shelf carbonates of the Mississippian Leadville Limestone with extensive post-burial diagenesis (karstification, dolomitization, and hydrofracturing), with minor production from the McCracken Sandstone Member of the Devonian Elbert Formation
- Type of trap: faulted anticline
- Exploration method leading to discovery: subsurface mapping and seismic surveys
- Hydrocarbon source: organic-rich marine shale in the Pennsylvanian Paradox Formation
- Average well depth: 6200–7400 feet
- Cumulative production: 51.5 MMBO, 810 BCFG
- Status: producing – 8990 BO and 0.5 BCFG in 2019

Top of structure of the Leadville Limestone, Lisbon field. Cross section A–A′ shown to the right.



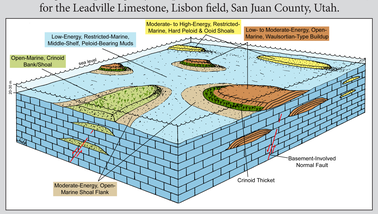
Modified from C.F. Johnson, Union Oil Company of California files (1970) courtesy of Tom Brown, Inc.

Schematic east-west structural cross section, Lisbon field. Note the juxtaposition of the Mississippian (M) section against the Pennsylvanian (IP) section which includes evaporites (salt) and organic-rich shale. OGC = oil-gas contact, OWC = oil-water contact. Line of section shown to the left.

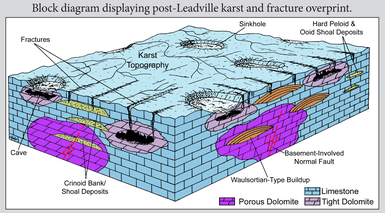


Modified from Clark (1978).

Block diagram displaying major depositional facies, as determined from core, for the Leadville Limestone, Lisbon field, San Juan County, Utah.



Block diagram displaying post-Leadville karst and fracture overprint.



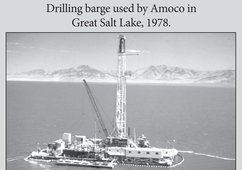
Total Paradox Basin Production in Utah (as of January 1, 2020): 612,000,000 barrels of oil and 1.5 trillion cubic feet of gas

Exploration in Great Salt Lake, Northern Utah

1979: West Rozel Heavy Oil Field, Great Salt Lake, Basin and Range Physiographic Province, Box Elder County, Northern Utah

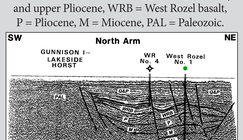
- Reservoir: Late Tertiary (Pliocene) fractured basalts
- Type of trap: structural, closured faulted anticline in horst and graben system
- Exploration method leading to discovery: seismic surveys
- Oil characteristics: 4° API gravity, pour point = 75°, viscosity = 3000–4000 cp @140°F, 12.5% sulfur
- Hydrocarbon source: Neogene lacustrine sediments
- Average well depth: 2100–2400 feet
- Cumulative production: 33,028 BO
- Status: abandoned

Drilling barge used by Amoco in Great Salt Lake, 1978.



From Bortz (2002).

Seismic section through West Rozel field and the north arm of Great Salt Lake. Q&P = Quaternary and upper Pliocene, WRB = West Rozel basalt, P = Pliocene, M = Miocene, PAL = Paleozoic.

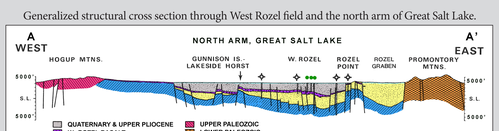


After Bortz (1987, 2002), Bortz and others (1985).

Location of Amoco West Rozel heavy oil field and exploration wells in Great Salt Lake from 1978 through 1980. Cross section A–A′ shown below and seismic line of section (dashed) is shown to left.

After Bortz (1987, 2002), Bortz and others (1985).

Generalized structural cross section through West Rozel field and the north arm of Great Salt Lake.



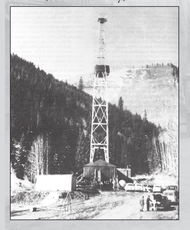
After Bortz (1987, 2002), Bortz and others (1985).

First Cretaceous Conventional Gas and Coalbed Methane Discoveries, Central Utah

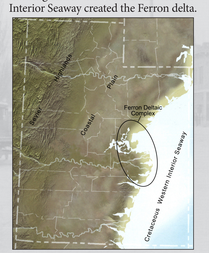
First Conventional Gas Discovery, Wasatch Plateau – 1951: Clear Creek Field, Carbon and Emery Counties, Utah

- Reservoir: Ferron Sandstone Member of the Cretaceous Mancos Shale
- Type of trap: combined faulted anticline and stratigraphic pinch out of lenticular alluvial and delta-plain sandstone
- Exploration method leading to discovery: surface and subsurface mapping
- Hydrocarbon source: coal beds and interbedded organic-rich mudstone within the Ferron Sandstone
- Average well depth: 4600–4800 feet
- Cumulative production: 114.7 BCFG
- Status: producing – shut in

Drill rig on early development well, Clear Creek gas field, Wasatch Plateau, Carbon County; circa 1955.

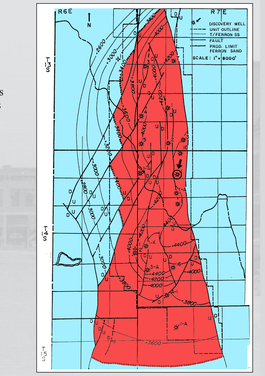


Paleogeographic map of the Late Cretaceous showing the Sevier highlands where rivers flowing east to the Cretaceous Western Interior Seaway created the Ferron delta.



Modified from Blakey and Ranney (2008).

Top of structure of the Ferron Sandstone, Clear Creek field.

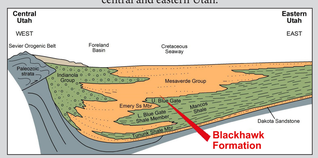


After Preston (1961).

First CBM Discovery, Book Cliffs – 1990: Castlegate Field, Carbon County, Utah

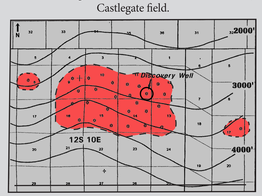
- Reservoir: coal beds of the Cretaceous Blackhawk Formation
- Type of trap: molecular sorption within the coal matrix
- Exploration method leading to discovery: extrapolation of surface geology to the subsurface
- Hydrocarbon source: coal beds within the Blackhawk Formation
- Average well depth: 3200–4200 feet
- Cumulative production: 16.2 BCFG
- Status: producing – 641,373 MCFG in 2019

Generalized regional cross section of Upper Cretaceous strata, central and eastern Utah.



Modified from Armstrong (1968).

Base of Castlegate coal zone, Blackhawk Formation, Castlegate field.



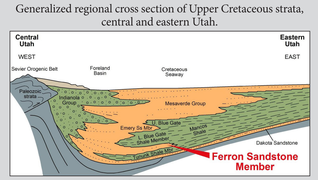
After Ruhl and Meibos (1996).

Largest CBM Discovery and Utah's Second Largest Gas Field, Wasatch Plateau and San Rafael Swell – 1992: Drunkards Wash Field, Carbon and Emery Counties, Utah

- Reservoir: coal beds of the Ferron Sandstone Member of the Cretaceous Mancos Shale
- Type of trap: molecular sorption within the coal matrix
- Exploration method leading to discovery: core drilling to test coal thickness and gas content
- Hydrocarbon source: coal beds within the Ferron Sandstone
- Average well depth: 1100–3500 feet
- Cumulative production: 1.07 TCFG
- Status: producing – 19.7 BCFG

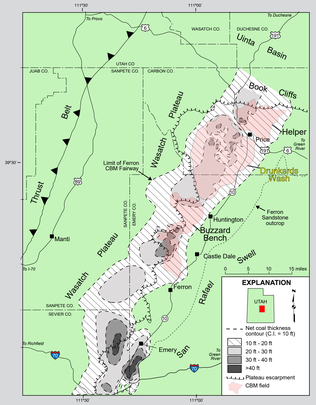
Pumping well dewatering coal beds to increase gas production in Drunkards Wash field.

Generalized regional cross section of Upper Cretaceous strata, central and eastern Utah.



Modified from Armstrong (1968).

Regional setting, gas fields, and extent of Ferron CBM fairway, central Utah. Also included is the total net coal thickness in the Ferron Sandstone.



Modified from Tabet and others (1995), Montgomery and others (2004).

Total CBM Production in Utah (as of January 1, 2020): 1.47 trillion cubic feet of gas

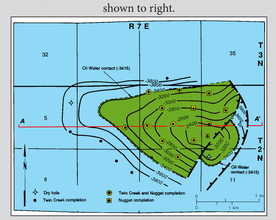
Early and Significant Thrust Belt Discoveries

First Commercial Discovery in the Utah-Wyoming Thrust Belt – 1975: Pineview Field, Summit County, Utah

- Reservoirs: eolian Triassic-Jurassic Nugget Sandstone and shallow marine Middle Jurassic Twin Creek Limestone with minor production from the Middle Jurassic Stump Formation
- Type of trap: ramp anticline along leading edge of the Absaroka thrust
- Exploration method leading to discovery: seismic identification, updip to initial dry hole
- Hydrocarbon source: subthrust Cretaceous marine
- Average well depth: 10,000–11,000 feet
- Cumulative production: 33.3 MMBO, 43.7 BCFG
- Status: producing – 125,056 BO and 222,472 MCFG in 2019

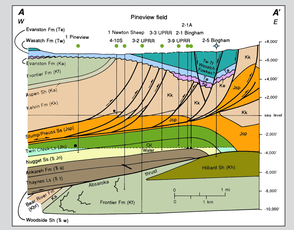
American Quasar Newton Sheep Company No. 1 discovery well, January 1975.

Structure contour map of the top of the Nugget Sandstone, Pineview field. Contour interval = 200 feet, datum = mean sea level. Cross section A–A′ shown to right.



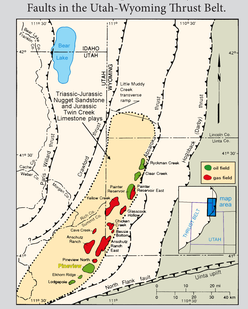
After Utah Division of Oil, Gas and Mining (1978).

East-west cross section through the Pineview structure. Note productive Twin Creek Limestone has a common oil/water contact with the Nugget Sandstone. Reservoir zones are juxtaposed against Cretaceous source rocks in the subthrust along the east flank of the structure. Line of section shown to left.



After Lamerson (1982).

Oil and Gas Fields, Uplifts, and Major Thrust Faults in the Utah-Wyoming Thrust Belt.



Play area in the thrust belt colored light orange; Pineview field highlighted.

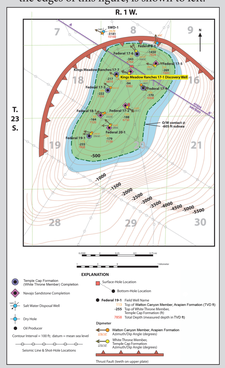
Modified from Petroleum Information (1981), Sprinkel and Chidsey (1993).

Total Thrust Belt Production in Northern Utah (as of January 1, 2020): 169,000,000 barrels of oil and 3.18 trillion cubic feet of gas (includes cycled gas)

First Discovery in the Central Utah Thrust Belt ("Hingeline") – 2004: Covenant Field, Sevier County, Utah

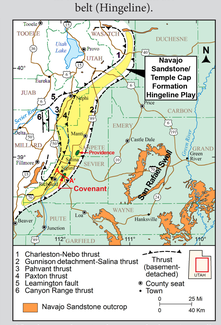
- Reservoirs: eolian (erg) Lower Jurassic Navajo Sandstone and eolian (coastal dunes) White Throne Member of the Middle Jurassic Temple Cap Formation
- Type of trap: ramp anticline and back thrust along leading edge of the Gunnison-Salina thrust
- Exploration method leading to discovery: seismic identification, updip to initial dry hole
- Hydrocarbon source: intraplate or subthrust Carboniferous marine
- Average well depth: 6800–7850 feet
- Cumulative production: 27.4 MMBO, 0 MCFG
- Status: producing – 1,265,527 BO in 2019

Structure contour map of the top of the White Throne Member of the Temple Cap Formation, Covenant field. Contour interval = 100 feet, datum = mean sea level. Cross section A–A′, which extends beyond the edges of this figure, is shown to left.



Original map courtesy of Wolverine Gas & Oil Corporation; after Chidsey and others (2007).

Location of Covenant and Providence oil fields, uplifts, and selected thrust systems in the central Utah thrust belt (Hingeline).



Numbers and sawteeth are on the hanging wall of the corresponding thrust system.

Modified from Hintze (1980), Sprinkel and Chidsey (1993), and Peterson (2001).

Total Central Utah Thrust Belt Production (as of January 1, 2019): 27,800,000 barrels of oil and 4.38 million cubic feet of gas

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