

Barnett,

The Barnett Shale Play

The Barnett Shale is a natural gas source bed rock that stretches over 16 to 21 North Texas counties and is still actively being discovered. Its 6,000 + square-mile reservoir is already the second largest producing on-shore domestic natural gas field in the United States after the San Juan Basin in New Mexico and Colorado. At three different times spread out by 100 million years, Texas was actually a shallow ocean that stretched up the central plains and even carried up into and through Canada. The first 100 feet of ocean is considered the Photo Eukaric Zone since light can penetrate the first 100 feet. With light and heat being a factor in this shallow body of water we can assume these oceans had a huge phytoplankton and zooplankton population and with that, massive coral reef beds were created by filtering the massive plankton population. This was the environment in most of Texas some 300 to 600 million years ago as the ocean came in and out at least three different times in the Fort Worth Basin. The Barnett Shale gas field was discovered by wildcatters in the early 1950's who were pioneering the Conglomerate, Marble Falls, Pregnant Shale, and Strawn Zones.

The technology to produce from The Barnett Shale did not evolve until 1980. **This is the first area in the entire world where we are pioneering the art of producing natural gas from a source bed rock and it is alive and anaerobic.**

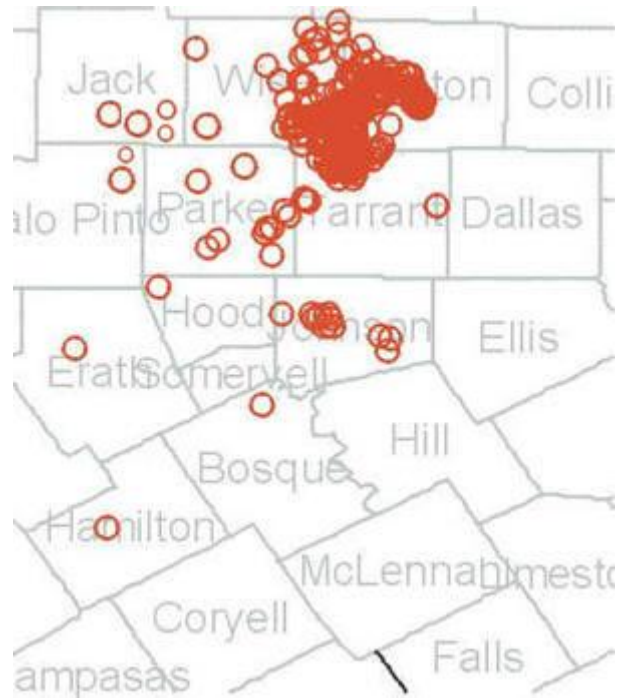
The vast majority of the industry is unconcerned with the oxygen output, CO2 reduction, or the circle of life, instead an industry wide success rate of 97% and 5% of the nations natural gas supply make this field the most active onshore drilling play in the United States.

In fact, in every other area of the world, every drop of oil and natural gas has already escaped from the source and has been actively working its way on up to the surface only to be trapped by structure and horizons of geological time zones. In these upper production zones, a degree of permeability and porosity must exist so that we can produce from the formation. The Barnett Shale has almost no porosity and no permeability which was the reason why until now source bed rocks have not been produced from. Therefore it is safe to say that these explorers will spread their knowledge of source bed rock stimulation and production throughout the world. So what is going on here in Texas is extremely different because every operator and producer here is a pioneer in the most advanced cutting edge and active play in the world.

Shale consists of very fine grained particles of quartz and clay minerals. It is consolidated mud that has been deposited in lakes, seas, inland oceans, and other similar environments. About, forty five (45%) percent of all exposed sedimentary rocks are shales.

Organic Sedimentary Rocks are formed from organic debris. It is the deposit of once-living organisms all collected and sealed into a medley of what once was. (shells, corals, calcareous algae, wood, plants, bones etc.) Although they are a form of clastic rock, organic rocks tend to contain a larger amount of immaculately preserved fossils, which laid down near the place where the animal, coral, plant, or plankton once lived.

As the rocky mountains formed, several separate ocean beds were created in the state of Texas and are identified as The Delaware Basin, The Permian Basin and The Fort Worth Basin. The Barnett Shale is in the Fort Worth Basin and because of its maturity and age we are able to fracture and produce from this blanket formation. The Permian basin sets an example from its exploration history and research being from coral reef beds itself. The word "frac" is used as a term out on the oil patch that describes our ability to fracture and stimulate zones horizontally by creating new channels and areas while increasing the porosity and permeability of an area out side of the production pipe we have just perforated. Perforating is shooting through the production casing and into our zone. In this case the "Barnett Shale Zone" is the organic settlement of life itself proving the theories of oceans, ice ages, volcanoes, and meteorite impacts. However, this field is completely different in many aspects. This ancient shallow ocean in which the Barnett Shale is believed to be divided in two zones; the upper and lower Barnett Shale. By producing and reviewing logs in the primary core of the Barnett shale I have noticed three zones; this proves three flooding events. Under the primary core and three layers you will find a thick layer of **obsidian** (obsidian is a blackish translucent glass). This is probably the result of a meteorite impact in conjunction with several triggered volcanic eruptions, which then caused the ice ages and eventually the oceans. The first two ocean occurrences were closer together in time and defined as the "lower zone"; the third one spanned at least 100 million years later which is now called the "upper zone".



Time zones are geologically missing from this shale area, which perplexes others as to what happened to this time frame in the Barnett Shale. My only assumption is that the oceans continually existed in this time and either eroded or absorbed the span of these missing formations. We have three faults and three times that the ocean came in and out of the Fort Worth Basin spread out over 300-700 million years we also have three vertical faults in the shale. Unlike most formations these Barnett Shale faults are areas to avoid because they are incapable of producing any gas or form of production such as the Muenster Arch Basin fault zone. Add plate tectonic action and 200 million more years for maturity and we have our current situation today. At the core area of the Barnett Shale we find the third zone in this shale which is the existence of the first ocean sediment itself. Also in this lower level there is more maturity and higher levels of gas and condensate with a higher (BTU) British Thermal Unit rating.

Obsidian is found underneath this third layer proving some meteorite and volcanic activity before the creation of these oceans. The northern and older part of the Barnett Shale between Denton and Decatur produces a higher 1278-BTU rating as we follow the Shale south to Fort Worth the BTU drops to 966-BTU. I have noticed that some operators are only successful in certain areas and most of this has to do with their frac techniques in conjunction with either the low BTU or High BTU areas. CO2 stimulation is what I would scientifically recommend to induce breathing in an anaerobic organic environment. Major oil companies have decided to concentrate in different areas of this shale and even other new shale discoveries because of

their different fracturing techniques, beliefs, discoveries, and abilities. By inducing the anaerobic environment with CO₂ we stimulate oxygen and natural gas. We can then separate the natural gas into Hydrogen and CO₂ we then use the Hydrogen and return the "CO₂" to the "anaerobic bacteria environment" to produce more "Oxygen" and more "Natural Gas"; the result is the first major "circle of life" between our ecosystem and sustainable natural gas production in the Barnett Shale.

The reason for failure in the Barnett Shale Play is simple. Spacing and depth are the essentials in producing from this zone. A fine layer of obsidian covers the Ellenberger Zone which must be watched and avoided. 60 acre spacing seems to be a common norm for safety in vertical wells. If a well hits the Ellenberger it will produce water and we consider the well "Killed". Horizontal wells require at least 4 times the normal spacing. Problems: If one of the fractures goes into the Ellenberger Zone which is below the Barnett Shale then all of the gas will follow the path of least resistance and flow into the Ellenberger zone which is mainly water here in this area. Certain new companies have learned how to find this gas now trapped in the Ellenberger and are working on a purification process which extracts all of the gases and precious metals from the water. Some of the water will be used to maintain the water level of Lake Bridgeport.



What is creating all of this gas and why is it considered a source bed rock? The Shale is basically compacted organic composition and living at a high temperature. Inside this compacted shale we find that it has life and that there is anaerobic bacteria feeding on a decomposed coral reef shale producing gas. The bacteria I believe lives in an anaerobic environment and can be stimulated with CO₂, the bacteria in turn is stimulated and literally excretes methane. However the rock is so dense that a lot of the gas stays trapped uniformly perfect and even in the rock. What happens with this

other gas that leaves through the surface of the shale? It rises and is trapped in other structures and feeds other zones such as the conglomerate. Most of these zones were discovered before we discovered the shale because we did not go deeper. The Barnett Shale is about at 8900 to 8400 feet deep along highway 380 in between Denton and Decatur Texas. We know that the ocean / Ellenberger is at around 8000' - 10,000' here. The inorganic theory suggests that petroleum can come from an inorganic- or nonliving source; this theory has failed to produce a single drop of oil or natural gas. The Barnett Shale is 100% percent organic and produced from an organic source (an old dead ocean) it is like having a huge anaerobic digester trapped miles deep and if maintained correctly could last indefinitely. I use the earth itself as an anaerobic digester much like the one below - but instead of building a container at the surface - I use the shale very much in the same fashion except 7,000 - 10,000 deep. Truthfully, many cities could take advantage of this same principle using large Carsts or Caverns in connection with the cities sewage systems - the results would immediately produce usable gas just like we are doing in the shale. Look at the anaerobic digester below using cotton hulls it can power over 300 homes in Texas -talk about a use for waste!

The United States Geological Society estimates that the entire Barnett Shale field contains 27 trillion cubic feet of gas. Estimates of the size of Barnett Shale's reserves are rapidly increasing; the field is starting to make a big impact on the nation's gas business at a time of declining domestic production and projections of rising demand. Gas executives predict that the current production of 1.5 billion cubic feet a day — 2.5 percent of the national output — has the potential to climb to 3 billion to 4 billion cubic feet a day in a few years. New discoveries in the "outer fringes" of the shale define as what Mr. Jim Leatherwood calls "the Paleo landscape" this term correctly defines the reason for success and failure due to the result of the ancient ocean's floor and channel contour. The "Paleo landscape" is now the wildcatters frontier in the Barnett shale.

Questions and concerns? Extremely high gas pressures leak into shallow to deep fresh ground water fields. The problem. The annulus in between the production casing and the earth / dirt or ground itself creates a passageway for gas to escape into different horizons. Gas can work its way up a small channel that can develop in between the production casing and the dirt we call this channel the annulus this channel can grow because of extreme lower gas zone pressures and poison large shallow fresh water reserves. Is there a solution? Yes! In Artesia New Mexico they noticed a great natural resource early on with their artesian fresh water springs - they did not want to contaminate their naturally carbonated water. So, they cement around the pipe the whole way down destroying the annulus. Yes its more expensive, but water is really more of a precious resource than gas.

The Interstate I-35 E was the edge of this ocean and as a result it is the edge of the Barnett Shale Zone. A history of the drilling activity teaches us that the "primary zone" of this Barnett Shale is in between Denton and Decatur Texas stretching down to Fort Worth Texas. We know that the zone is thicker and richer in natural gas the further north in the Barnett shale and has a higher BTU rating @1200 and the further south towards Fort Worth we find a BTU rating @ 996. Unlike other source beds we have learned to avoid the fault lines that exist because they do not produce gas and are accurately mapped by geo map on active production in the area.

Frank Dux the legendary world champion martial arts Bloodsport & Kumite master is using money from the Barnett Shale to save the rainforests and children throughout the world. The three men run Dux Inc. and are Asian Ambassadors for the Clean World Wide Water Plan. The plan combines solar panels and wind generators which feed water dehumidifiers for constant clean water and constant hydrogen energy. These three men not only hold the key to world wide freedom but they educate everyone about the answer to save everyone by providing clean water to every child, animal, crop, and city throughout the world, by using the sun, the wind, and commercial dehumidifiers together as the sustainable solution. The water extracted in the atmosphere is the cleanest water ever tested according to the Environmental Protection Agency (EPA). The cost of water extraction is free because of sustainable integration (solar & wind) the results are the keys to world wide freedom and peace. The technology is the exact reverse of what is done in the Barnett shale to stimulate anaerobic life.

The most interesting thing about this Barnett Shale is how solid it is. Typically when we measure for permeability or porosity we calculate in darceys as a form of measurement. However, in the Barnett Shale we calculate our porosity and permeability in anchstroms or shall I say, atomic measure. This means that the shale is so tight that gas has a hard time escaping it. Drilling through the shale is like drilling through a Brunswick pool table or bowling ball. Yet we find several interesting factors in the shale itself such as micro fractures that travel from the north east to the southwest. We use these micro fractures when we horizontally drill to utilize the structure in combination with the multi stage frac job. Halliburton has several multi frac techniques that will literally amaze you. Using micro radio transmission devices and special fluids the company is literally able to follow each fracture in amazing detail. You get what you pay for and horizontal frac jobs can go easily between 4\$ and 12\$ million. Devon itself claims that the work itself is very costly and still an educational process. James Hall of Devon is leading the industry in horizontal production discoveries and results.

Many smaller operators are experiencing the same dramatic results using standard old vertical techniques and open hole completions. Open hole completions? Yes, you heard me right. The shale is so very solid that it is more stable than what we could put down there and it allows us to cover more area. The trick in developing this field is spacing. 60 acre's seems to be a safe space for wells in the Barnett Shale. Many of the majors have killed off some of their nearby wells by drilling to close or having a huge horizontal with a bad frac job lose the area. The trick in this field is not finding the zone - its not getting greedy. If you pass the Barnett Shale you have entered the ocean you hit the ocean you ruined your project. Engineers, be ready to spot obsidian which covers the Ellenberger Zone- the zone you must avoid. If a nearby well hits the ocean and has fractured into your zone that well has just ruined your production region. That gas will shoot out into the ocean instead of up your hole.

The most successful wildcatter in Texas history is, C.W. Sanders (32°) with a wildcat success rate of 87.5% in the days before advanced 3D seismic technology. He used two very conventional methods for drilling success; one he coined "lineology", whereas you would draw a straight line between two good wells and create a location.

The Paleo Landscape and the Birth of the Barnett Shale began with the defining of the Fort Worth Basin and also the Conglomerate Zone discovered by early Wildcatters such as Coke Gage, P. Ellenberger, T.B. Pickens, George Mitchell, Norman Stovall, C.W. Sanders, Frank Pitts, and William ZuHone. But George Mitchell discovered how to stimulate this zone and with that and the established conglomerate zone above it a blanket coverage was quickly defined to be the "Barnett Shale". It was soon later known through science that this layer was in fact responsible for feeding the above zones with natural gas and that this was in fact the source bed rock.

Mitchell Energy / George Mitchell was acquired by Devon in January 2002, and began developing the Barnett Shale in the Fort Worth Basin in the northeast sector of central Texas in 1981. His down hole man F.M. Wigington a.k.a. "Doc" has now teamed up with the Natural Gas Group, Organic Inc., and Dedic and is expected to begin production in southern Jack County early in 2006. This team along with William Zuhone of Dedic have the most experience in the shale today. The Mississippian-age Barnett Shale is one of the most uniform stratigraphic units in the basin, outcropping along the flanks of the Llano uplift in central Texas, where it is about 30 to 50 feet thick. The Barnett Shale dips gently and thickens to the north, reaching a maximum depth of around 8,900 feet and a maximum width of almost 1,000 feet near the Texas-Oklahoma border.

Large fractures in the Barnett Shale are created by tectonic stresses created after deposition about 300 million years ago. Huge grids of small sized fractures extend northeast southwest across the area, but could not be produced until onset of newer fracturing techniques. Barnett Shale production was first established in the Newark East Field in Wise and Denton counties, where it grew from less than one billion cubic feet of gas from 25 wells in 1985 to 19.2 billion cubic feet from 306 wells in 1995. During the past five years, production has more than doubled to 40.6 billion cubic feet from over 500 wells.

The Barnett Shale is really only to the west of I-35 and leaves Dallas County pretty much out of the play. Chris Sanders has created several new entities which all demand earth friendly and sustainable projects that are combined into his Barnett Shale projects. Sanders Drilling is now negotiating a drilling program with 1.7 million acres that are both ready for natural gas and wind farms. The firm continues to expand its play area with twenty wells in Southeast Jack County. In 1998 Rich Green / Chevron / LNG and Chris Sanders experimented with a new stimulation technique that employed water as the fracturing fluid, required significantly less proppant and was about 60 percent less expensive than the conventional stimulation treatments. The technique proved successful and has since been implemented field wide. September of 2005 the team completed its 77 successful well in the Barnett Shale using this process with the injection of treated carbon dioxide in water. They also provide millions of cubic feet of oxygen to the atmosphere for our breathing environment because the substrate in the shale transforms this CO2 into both natural gas and oxygen. Since then a new frac method called the "soda pop" has been developed with 12 wells that have already pushed 22 million dollars in natural gas returns. Currently, they are concentrating on the oil returns of the shale in the North West region of the play.

STRAWN SANDS	Usually above 5000' ; occurs as channel sands, extremely productive locally.
CADDO LIME	Occurs below the last Strawn Sand and may be thick and prolific as at Breckenridge.
CADDO CONGLOMERATES	A series of coarse-grained sands particularly prolific in Montague County just to the northwest.
CONGLOMERATES	The major pay in this area producing over 3 trillion cubic feet of gas in Wise County.

CONGLOMERATES ATOKA-BEND	The major pay in this area producing over 3 trillion cubic feet of gas in Wise County.
MARBLE FALLS LIME	A zone above the Barnett at about 7000';. This may produce in the Fletcher well.
BARNETT SHALE	"SOURCE BED ROCK" Thick hydrocarbon rich shale between 100' - 1000'; thick occurring at depths below 7000'; to as deep as 9000';.
OBSIDIAN	Evidence of a massive explosion or super volcano. - perhaps Yellowstone
MISSISSIPPIAN REEF	Thick and prolific but rare, reefs produce mostly to the west or in the Bend Arch.
VIOLA LIME	Locally productive on structures in the northern portion of the Fort Worth Basin needs a structural trap.>
Ellenberger	The deepest pay at nearly 10,000' deep in the deeper portion of the Fort worth Basin needs a structural trap. two major epics the Devonian is missing Silurian is missing 100 of millions of years.

The three key advantages of shale gas plays are as follows: moderate development costs, high success rates, and slow production decline rates. The rapid growth in the late 1980s and early 1990s in the Barnett Shale which is being repeated today in the Antrim Shale, and San Juan basins, is driven by the powerful economic incentives of low risks and low reserve finding costs. Recent technological advances in hydraulic fracturing, coupled with the application of multiple fracture stimulations over the life of a well to recover additional reserves create an attractive opportunity to produce in the Barnett Shale.
