Final Site Visit Report
CDX Gas Company LLC
Central Appalachian Basin
Coalbed Methane Operations

Prepared for:

U.S. Environmental Protection Agency
Engineering and Analysis Division
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1.0 SITES VISITED AND DATES

On September 25, 2007, EPA visited the CDX Gas West Virginia Field Office. CDX provided an overview of developing fields in the area and led participants on a tour of wells, produced water disposal facilities, and drilling sites typical of their operations in West Virginia.

2.0 ATTENDEES

Meeting participants are listed below. Contact information is listed in Appendix A.

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Susan Gregersen
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John R. Duda

CDX Gas, LLC
Tom Moore
Chris Veazey

CNX Gas Corporation
Claude D. Morgan

Spilman Thomas & Battle (Representing Penn Virginia)
Drew McCallister

ERG (Contractor to EPA)
Lori Weiss
Christopher Krejci

3.0 BACKGROUND AND OBJECTIVES

The U.S. Environmental Protection Agency (EPA) organized a site visit to the Appalachian Basin in West Virginia and Virginia as part of the data collection efforts for EPA's Coalbed Methane (CBM) Detailed Study. The CBM sector was identified for additional review in the final 2006 Effluent Guidelines Program Plan.[1] EPA is conducting this review to determine if it would be appropriate to revise the effluent guidelines for the Oil and Gas Point Source Category to control pollutant discharge in CBM produced water. EPA would like to work with a range of stakeholders (e.g., industry representatives; Federal, State, and Tribal representatives; public interest groups and landowners; and water treatment experts) throughout the CBM Detailed Study to obtain the best information available on the industry. To initiate stakeholder involvement EPA conducted seven teleconferences in June and July 2007 to identify interested parties and provide an overview of the study and data collection needs. During the stakeholder calls EPA provided information on the following topics:

- EPA Regulation Development Process;
- Initial Review of CBM Sector;
- CBM Information Collection Request (ICR); and
- Schedule and Next Steps.

The West Virginia/Virginia site visit was the second of a series of site visits for this industry. During the visits, EPA plans to view a range of CBM operations that demonstrate the typical production and water management options for that area. Because CBM operations vary by basin, EPA intends to conduct five site visits to view production in the following basins:

- Black Warrior (Alabama);
- Upper Appalachian (southwestern Pennsylvania, eastern Ohio, northern West Virginia);
- Central Appalachian (southern Virginia and West Virginia);
- Powder River (Wyoming and Montana); and
- San Juan and Raton (Colorado and New Mexico).

During the site visits, EPA plans to collect general site information (e.g., location, operator name, field name, pooling arrangements, well spacing); produced water reuse and

[1] See 71 FR 76644; 21 December 2006.

disposal methods; treatment methods; and economic information such as descriptions of factors affecting decisions to begin production or shut-in a well, lease, or other area.

Representatives from CDX Gas, LLC led a tour of their southern West Virginia CBM production. This report presents an overview of the tour.

4.0 OVERVIEW OF COALBED METHANE PRODUCTION IN WEST VIRGINIA

Coalbed methane (also known as coalbed natural gas) is contained within coal seams and forms as part of the geological processes that generate coal. To extract the CBM, the coal seam must first be depressurized by removing water until the methane begins to desorb from the coal and can be pumped to the surface. Typically, large amounts of water are produced during the early stages of CBM production and then the amounts of water decrease over the life of the well as the methane production increases. The quantity and quality of produced water will vary from basin to basin, within a particular basin, from coal seam to coal seam, and over the lifetime of a CBM well.

In the Central Appalachian Basin CBM production is dominated by the following five companies: CNX, CDX, Geomet, Equitable Production Company and Penn Virginia. Table 4-1 shows cumulative CBM production through 2007 for the major operators in West Virginia. The majority of CBM is produced from the Pocahontas #3 coal seam, although production from other seams is also not uncommon. Claude Morgan, CNX Gas, explained that CBM development in the Central Appalachian Basin began as an effort to degas coal seams to prepare for future mining operations. Because methane is explosive, it must be removed so coal mining operations can proceed safely. In the initial stages of CBM development, wells were drilled three years before planned mining projects, and the gas was vented to the atmosphere.

West Virginia CBM operators provided EPA with a copy of a West Virginia Oil and Natural Gas Association report that provides an overview of production information for West Virginia. The report states that total gas production in 2005 was 216, 915 Mcf. The report does not specify how much of this is CBM. In 2005, the state had 43,863 operating gas wells and 419 operating CBM wells (1).

Table 4-1. Top CBM Production by Company as of 2007.

Company	Cumulative CBM Production (Mcf)
Penn Virginia Oil and Gas Corp.	8,154,962
CDX Gas, LLC	4,062,951
Geomet Operating Company, Inc.	3,592,319
CNX Gas Company, LLC	1,229,078
Cabot Oil & Gas Corporation	458,368
CNG Producing Company	110,229
Northport Production Company	83,647
Equitable Production Company	50,243
Energy Search, Inc.	25,745
Dominion Exploration	21,471
Exploration Partners, LLC	20,868
Petroleum Development Corp.	16,364
Eastern States Oil & Gas, Inc.	9,390
East Resources, Inc.	2,366
Noumenon Corporation	1,831

Source: West Virginia Oil and Natural Gas Facts (1)

The West Virginia Office of Oil and Gas issues permits for all production-well and Underground Injection Control Class II injection-well drilling in the state and collects monthly gas production data. The Office of Oil and Gas also issues the general land application permit (See DCN 05241). The West Virginia Department of Environmental Protection (WVDEP), Division of Water and Waste is responsible for National Pollutant Discharge Elimination System (NPDES) permits for discharge of produced water to surface streams, as well as Underground Injection Control Class V injection well permits.

Formation water produced from CBM wells in West Virginia is typically re-injected or land applied. The choice between these alternatives depends on the quality of the water and site conditions related to the land’s ability to assimilate the water. In West Virginia, limiting water quality parameters for land application of CBM water are chloride content and total dissolved solids (TDS). Although water may be below the general permits limit for chlorides and TDS, multiple operators noted that land application is not always possible. For example, wet or frozen conditions may impede infiltration into the soil causing produced water to runoff into nearby streams or rivers. In addition, soils with high clay fractions often have little to no infiltration. Any conditions causing limited infiltration preclude land application. Water that cannot be land applied is usually treated with a coagulant to reduce suspended solids and injected into a disposal well. Suspended solids are removed to avoid damage (plugging) of the injection well.

The state severance tax[2] in West Virginia is five percent for natural gas, but CBM operations are currently exempt in an effort to stimulate development. For wells drilled before 2011, the exemption is valid for the first five years of production. Wells drilled before the deadline will receive the five-year exemption, but all wells drilled after 2011 will be subject to the regular severance tax, barring any new legislation.

5.0 OVERVIEW OF CDX GAS EXPLORATION AND PRODUCTION OPERATIONS

EPA visited the CDX Gas Wyoming County Field Office in Pineville, West Virginia. Mr. Tom Moore provided an overview of CDX's West Virginia operations and discussed the advantages of their trademark Z-pinnate™ CBM wells. Mr. Moore also provided a handout discussing CDX's CBM operations (Appendix C).

CDX Gas operates approximately 35 CBM wells in West Virginia, all drilled using the Z-pinnate ™ horizontal drilling technology. Z-pinnate™ employs directional drilling to create leaf-pattern drainage structures that can improve gas recovery, lower costs, reduce surface footprints, increase drainage areas, and drain areas that would be otherwise inaccessible by conventional vertical wells. The system was developed in West Virginia in 1998 and has been used in parts of Colorado, Eastern Oklahoma, and Western Canada (2). Part of the success of this technology in West Virginia is due to the structural properties of the coal, which is stronger than coals in other basins.

Figure 5-1 is a plan view of the Z-pinnate ™ technology that illustrates the aerial extent of its drainage. The main branches of the drill pattern – referred to as "laterals" – are 3,000 feet in length on average. A system with four main laterals like the example in Figure 5-1

[2] A severance tax is a tax imposed by a state on the extraction of material resources, such as coal or gas, that will be used in other states.

can drain an area of up to 1,920 acres, replacing as many as 48 conventional vertical wells. These horizontal wells do not require hydraulic fracturing and can degas a coal seam in approximately six years, compared to 20 or more years for vertical wells. Typical peak gas production for these wells ranges from 0.5 to 2 million cubic feet per day, with the average well producing 1.5 million cubic feet per day and the best wells producing 4 million cubic feet per day. Typical peak gas production for a vertical well in the area is approximately 200,000 cubic feet per day. In addition to accelerated peak gas production, the peak water production occurs earlier in the production cycle of these wells.

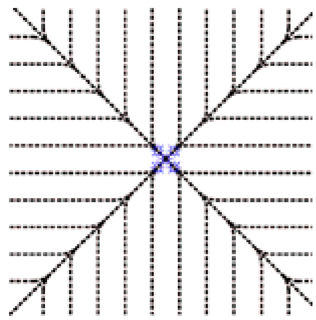

Figure 5-1. Horizontal Cross-Section of a Z-pinnate ™ Pattern. (2)

Horizontal drilling projects require a conventional vertical well to circulate drilling fluid in the horizontal well and produce the gas once the drilling is complete. Figure 5-2 shows a vertical cross-section of a typical CDX well site. CDX operations in West Virginia usually start with a vertical well that is drilled to an average depth between 500 and 600 feet. Once this well is completed, the drilling well is started at a horizontal offset of approximately 300 feet. This well is drilled vertically at first, and then begins to curve toward the vertical well until it intersects it at the level of the target coal formation. The drilling well continues to be drilled in the coal seam, perpendicularly to the vertical well, while the vertical well pumps air down into the system to lift drilling fluid from the drilling well. This fluid exits at the head of the drilling well containing the coal and rock cuttings removed by the drill bit.

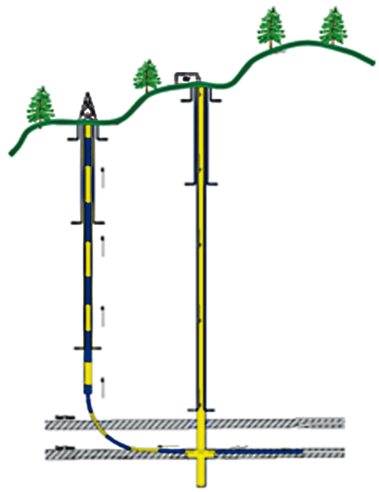

Figure 5-2. Vertical Cross-Section of the Z-PINNATE ™ Well System. (2)

Maintaining proper drill bit position within the coal seam is one of the biggest challenges of the Z-pinnate™ drilling technique, since coal seams are usually less than five feet thick. CDX uses Measurement-While-Drilling (MWD) to insure proper positioning of the drill bit. The MWD system collects data for four parameters:

- **Azimuth**- Angle from north. Used to calculate direction of drilling.
- **Inclination**- Angle from horizontal. Used to calculate direction of drilling.
- **Formation Pressure**- Pressure at the bottom of the well bore. Used to identify over-pressured formations where gas may be present.
- **Gamma Ray Count**- Natural gamma ray emission from rock. Used to determine down-hole geology. Shales have high readings, sands and coals have low readings.

These data are broadcast from the MWD device through the formation to four surface receivers using radio waves. The MWD device is located 23 feet behind the drill bit; therefore, there is a slight time lag in recording.

In addition to using MWD information, drillers obtain additional information on drilling position by observing torque in the drill string. The shales surrounding the coal seams are much stiffer than the coals themselves and cause more torsion at the drill bit. This allows the driller to know when the bit has left the coal seam; however, the driller usually will not know if the bit has entered the shale above or below the coal seam.

CDX estimates that each Z-pinnate™ well costs approximately $1.6-$1.8 million to drill compared to $400,000 for a conventional vertical well. However, unlike vertical wells, which typically drain 40 to 80 acres, horizontal wells can drain 640 to 1800 acres

6.0 SITE TOUR

CDX provided a tour of their typical CBM operations. EPA visited locations in the Pinnacle and Crab Orchard fields and viewed a CDX horizontal drilling site.

6.1 Pinnacle 97 Site

The Pinnacle 97 Site included three wells, two horizontal and one vertical, and a land application system. The site was located at 37^{o} 32’ 27.834” latitude and 81^{o} 37’ 19.6134” longitude. Figures 6-1 through 6-3 show the Pinnacle 97 B and C wells and compressor station in Wyoming County, West Virginia. The wells at Pinnacle 97, which were drilled in 2004, represent a typical CDX site, producing approximately 1.5 million standard cubic feet (scf) of gas and 260 barrels of water per day. One well’s pinnate pattern faces east while the other’s faces west, providing approximately 1,600 total acres of drainage at a depth of about 1,000 feet. These wells were completed in an area to be worked in the Pinnacle mine, and were not cased to avoid complicating the mine-through. The wells are located at a topographic high, on the edge of a steep ridge that overlooks a small stream in the valley. Gas produced from these wells is transported to sale by pipeline. Water produced from these wells is land-applied on the north slope of the ridge. The gas compressors at this site (Figure 6-3) are powered by methane from the wellhead. Produced gas and water are measured by the flow monitor shown in Figure 6-4.

Figure 6-1. Pinnacle 97 Well Pad.

Figure 6-2. Pinnacle 97 B and C Wells.

Figure 6-3. Pinnacle 97 Compressor Station.

Figure 6-4. Flow Meter Used on CBM Wells.

Produced water from the Pinnacle 97 wells is disposed of via a land application system installed approximately 75 feet from the wellhead. The system was installed in 2004 and is currently used to dispose of all of the water produced from the two wells on-site. Land application in West Virginia is currently allowed under a general permit which requires all users to register their system with the state (DCN 05241). The general permit also requires that the users of each system perform periodic assessments of the soil, vegetation, and produced water to determine any impacts that the system is having on the surrounding environment. The soil and vegetation are visually inspected for signs of stress and the water is sent to a laboratory for analysis of parameters such as total dissolved solids, sodium adsorption ratio, and chloride concentration.

Produced water flows from the two wells into two 8,400-gallon holding tanks. Prior to entering the tanks, Nalco chemicals are added to the water to aid in flocculation of suspended solids. Mr. Chris Veazy, CDX Gas, explained that solids accumulation in the tank is minimal and that the tanks have never required cleaning. Approximately 12,000 gallons of produced water per day flow from the tanks through a 2-inch pipe to the gravel apron, which consists of limestone gravel backfill. The gravel apron helps to disperse the water prior to land application. The water then flows downward through a set of logs and hay bails that act as a weir to control water flow. (See Figures 6-5 through 6-8). The soil downhill from the discharge point is sandy clay. Mr. Moore stated that when wet or frozen conditions preclude discharge from the system, the water is trucked offsite to an injection well. He also reported that water was continuously hauled when the producing wells were first drilled and the produced water flows were higher. Due to the increased drainage area from the Z-pinnate system compared to vertical wells, these wells produce more water than vertical wells completed nearby in the same formation.

Figure 6-5. Wastewater Disposal Site for the Pinnacle 97 Wells

Figure 6-6. Wastewater Storage Tank

Figure 6-7. Wastewater Discharge Point

Figure 6-8. Gravel Apron and Hay Bails

The gravel apron, which was installed in the spring of 2007 to assist in lateral dispersion of the applied water, increases the width of the land application area to approximately 20 feet. According to Mr. Moore, the design length of the system is about 200 feet, and the produced water infiltrates into the soil and does not enter the stream at the bottom of the hill. Mr. Moore also stated that there have not been any observed changes in plant or soil quality to date. The Pinnacle 97 site is expected to be shut in within the next three years.

EPA collected a sample of the water discharge. However, it was not possible to collect water directly from the tanks, so the sample contained some soil from the surrounding area. EPA tested the pH, conductivity, and turbidity of the sample. The results are presented in Table 6-1.

Table 6-1. Field Measurements of Discharged Water from Pinnacle 97 Wells.

Field Measurement	Value
pH	8.2
Conductivity, mS	1.38
Turbidity, NTU[a]	>440

[a]EPA's sample contained soil from the area near discharge. These values are for informational purposes only.

CDX currently monitors the soil and vegetation at the site monthly. According to Mr. Moore, CDX will reduce their monitoring frequency to two times per year due to a lack of observed impacts on the site. Mr. Moore also commented that their routine monitoring shows chloride levels are usually less than 100 mg/L, dissolved iron is less than 1 mg/L, and total dissolved solids are between 500 and 600 mg/L. In addition to monthly monitoring, CDX's 35 West Virginia wells are checked daily by four contractors employed by CDX.

EPA requested capital and operating and maintenance costs for the Pinnacle 97 land application system but it was not provided by the site (Appendix B).

6.2 Crab Orchard Site

The second part of the CDX tour focused on a drilling operation in the Crab Orchard field and included a Z-pinnate ™ drilling rig, three drilling pits, and two new wells. The site was located at 37^{o} 47' 43.33" latitude and 81^{o} 16' 11.23" longitude.

The first well completed at the site was a conventional vertical well drilled to a depth of approximately 500 feet. This was the 'B' well, which will act as the producing well for the horizontally drilled sections. It was set with a 7-inch casing of cement with a density of 23 pounds per cubic foot. It was drilled pneumatically, using compressed air to lift the cuttings instead of fluid. At the bottom of the well bore, the driller created a cavity through which the horizontal bore would later be drilled.

CDX expects to drill three vertical producing wells, B, C, and D which will drain 1,800 acres total. At the time of EPA's visit on September 25, the drill rig was positioned on the 'A' well, which drills the multi-lateral, Z-pinnate ™ patterns into the 'B', 'C', and 'D' wells. The

‘A’ well is the drilling well, like the one in Figure 5-3, except that it has three horizontal laterals branching off in different directions. According to Mr. Chris Veazey, CDX Gas, the drill rig had been working on the ‘A’ well since the middle of August, and was expected to be finished with both patterns about a week from the date of the site visit. The patterns drilled at this site are expected to drain areas below an 18-hole golf course and the suburban Beckley area. Draining these areas using multiple vertical wells would be impractical and expensive.

CDX operates a hollow stem, rotary wash drill rig that uses drill string sections which are each 30 feet long. Figure 6-9 illustrates the drill rig in operation. For horizontal drilling, CDX uses formation water as the drilling fluid to lift the rock cuttings and maintain drilling pressure. Because the drilling fluid pushes against the face of the well bore at a lower pressure than hydrostatic, the operation is considered under-balanced. This situation is ideal for the operator because fluid flows into the borehole from the formation. If the driller used a heavier fluid to create an over-balanced situation, the fluid and rock cuttings would flow into the formation and clog the pores of the coal, causing formation damage and resulting in lower gas production. One disadvantage of under-balanced drilling, however, is that it results in more fluid in the drilling pits requiring disposal.

Figure 6-9. CDX Rotary Drill Rig

As mentioned in Section 5, the drill rig is also equipped with MWD. The drill bit's location is known with such accuracy that the horizontal well reached the vertical production well cavity exactly on point 500 feet below the surface. Although horizontal drilling has advanced a great deal in the past decade, Mr. Moore commented that a significant problem is that the drill bits can get stuck at the end of long horizontal laterals.

The water that is produced from the formation and used during the drilling of the horizontal wells typically contains a high percentage of suspended solids – such as coal fines and clay particles – in addition to dissolved solids found in the groundwater. The drilling operation also produces large quantities of gravel-size rock fragments which are pushed to the top of the water column by the injection of fluid into the vertical well bore.

Figure 6-10 shows a schematic of the drilling fluid treatment process at the Crab Orchard site. The drilling fluid goes directly from the wellhead into a filtering pit. Once the large fragments settle, the water flows into two 6,300-gallon mixing tanks where coagulant and lime are added to further aid in settling (See Figure 6-11). The coagulant used is Enivrofloc CF-1, a mixture of alum and polymer. After the mixing tanks, the water flows into two settling pits in series, where a sludge consisting primarily of coal fines accumulates and thickens (See Figures 6-11 and 6-12). These pits are lined with a 20-mil HDPE liner. The state's regulation for these liners is 10-mil. The effluent from these pits is circulated back into the well bore via two 150-barrel holding tanks (Figure 6-13) or discharged by land application. When the drilling project is complete, the pit liners are folded around the solids and the pit is backfilled to the pre-existing grade.

CDX is currently planning to use a land application system to dispose of produced water at the Crab Orchard site, pending initial water quality tests. The critical parameters that will be tested are chloride concentration and total dissolved solids. Like Pinnacle 97, this site is located at a topographic high, and Mr. Moore expects that a system similar to the one at the Pinnacle 97 site will be constructed.

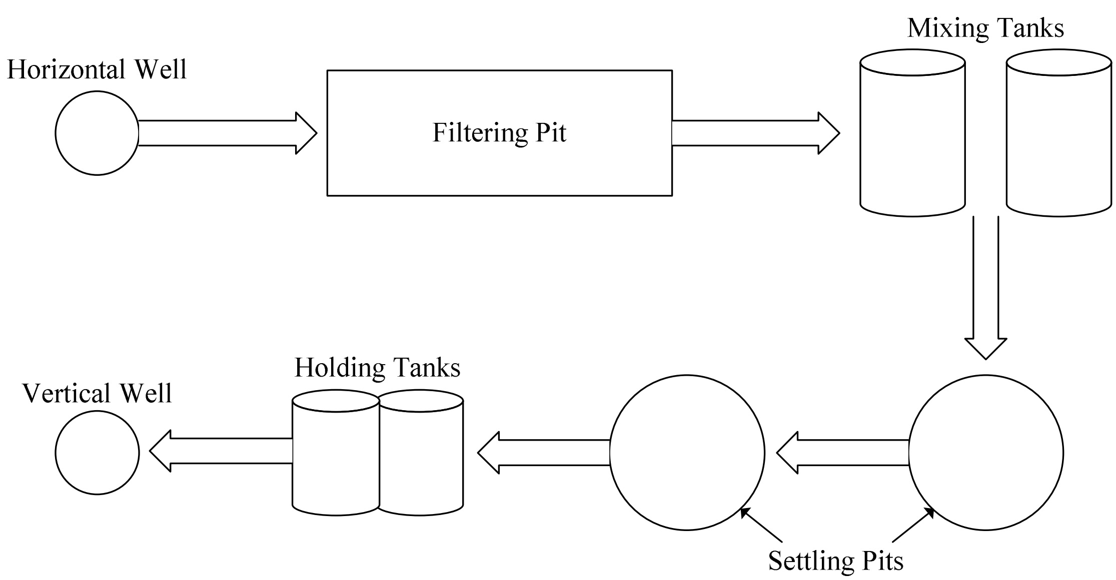

Figure 6-10. Drilling Fluid Treatment at the Crab Orchard Site

Figure 6-11. Mixing Tanks for Drilling Fluid Treatment

Figure 6-12. Primary Settling Lagoon for Drilling Fluid

Figure 6-13. Secondary Settling Lagoon for Drilling Fluid

Figure 6-14. Holding Tanks for Treated Drilling Fluid

7.0 REFERENCES

1. West Virginia Oil and Natural Gas Association, *West Virginia Oil and Natural Gas Facts*, First Edition, Charleston, West Virginia, 2007. DCN 05240

2. CDX Gas, LLC Homepage, *http://www.cdxgas.com,* Dallas, Texas, 2007. Accessed October 8, 2007.

Appendix A

LIST OF PARTICIPANTS IN THE CDX SITE VISIT

First Name	Last Name	Organization	Phone Number	Email
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Appendix B

WASTEWATER DISPOSAL COST INFORMATION

EPA requested the following cost information for the Pinnacle 97 land application system but it was not provided by CDX.

Table B-1. Land Application System Design Information and Costs
Pinnacle 97 Land Application Facility

Design Parameter	Number	Specification	Material	Initial Costs	Op./Maint. Costs (Annual)	Comments
Piping from Well Head to Equalization Tanks	1	Length Diameter		$	$	
Equalization Tanks	2	Barrels		$	$	
Discharge (outlet) Pipe	1	Length Diameter		$	$	
Gravel Apron	1	Cubic Yards	Limestone Conglomerate	$	$	
Monitoring Equipment				$	$	
System Monitoring	N/A	N/A	N/A	$	$	

Appendix C

HANDOUT PROVIDED BY CDX

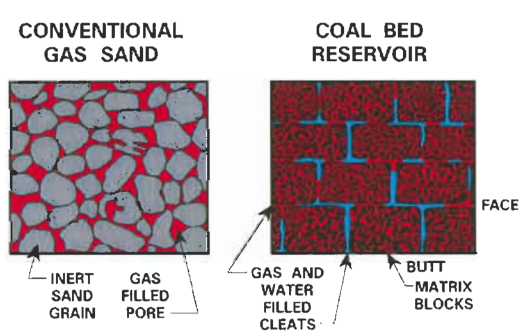
CDX GAS

What is "CBM"?

Coal Bed Methane is a naturally occurring, methane-rich gas, generated by and held within coal beds.

It is an **unconventional gas resource**, similar to shale gas or tight sand gas; a **dry natural gas** and a source of **clean, hydrogen-rich** fuel.

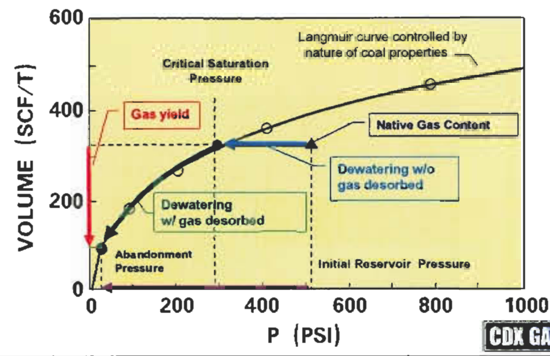
CBM is a different kind of reservoir
in a very different kind of rock…



So, just how is CBM different?

- Unique Reservoir and Rock type
- Self-sourcing by two Distinct Processes
- Self-Trapping with Unusual Adsorption Gas-Storage Mechanism

ADSORPTION ISOTHERM



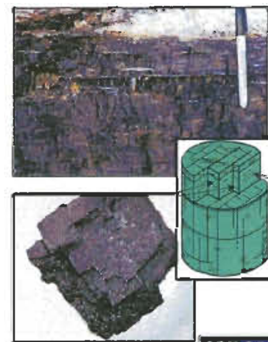
Coal Bed Permeability

Permeability of coal matrix is very low

Bed-scale permeability can be high because of naturally occurring fractures or "cleats"

Vary in length, spacing, aperture, roughness, mineralization, and orientation

Easily damaged by drilling mud infiltration

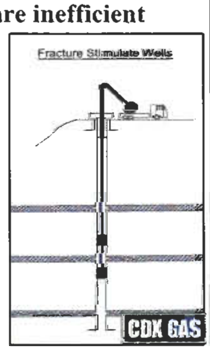


CDX GAS

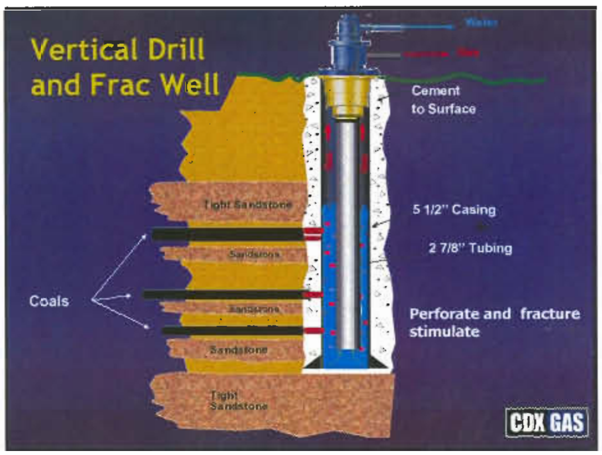
Traditional Drilling Approach

The problem: vertical wells are inefficient

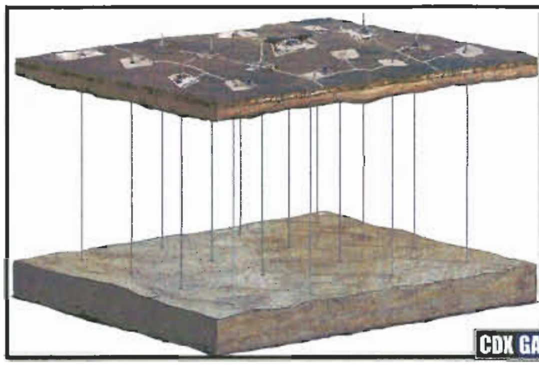
- **Mud damage to permeability**
- **Low and slow recovery of gas reserves**
- **Lengthy dewatering period**
- **High well density needed**
- **Limited by surface access**
- **Large, expensive locations**
- **Ineffective degasification ahead of mining**



Vertical Drill and Frac Well



Conventional Development 16 locations (1280 acres)

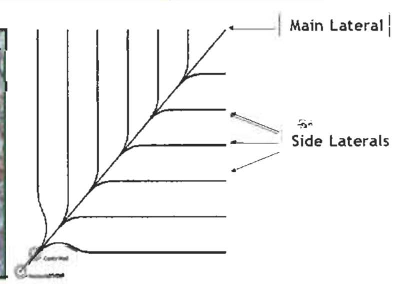


Conventional Drill & Frac Location

CDX Gas Objectives

- Economically and effectively produce unconventional reservoirs
- Optimize dewatering and drainage of reservoirs
- Greater and faster recovery
- Minimize surficial demographic and environmental impact
- Therby returning superior results to both our owners and society as a whole

CDX's Horizontal Drilling System:
Z-Pinnate™ Drainage Pattern



CDX Patented Technology

<u>Worldwide</u>

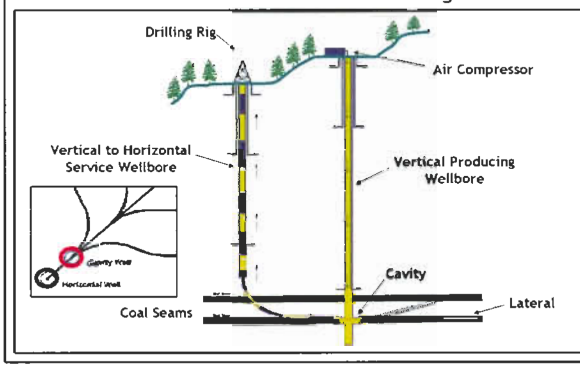
33 Patents Granted

6 Notices of Allowance

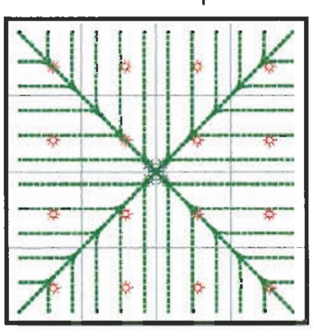
CDX GAS

CDX's Horizontal Drilling System:

Dual-Well Underbalanced Drilling



CDX's Horizontal Drilling System: Multiple Z-PINNATE™ Patterns

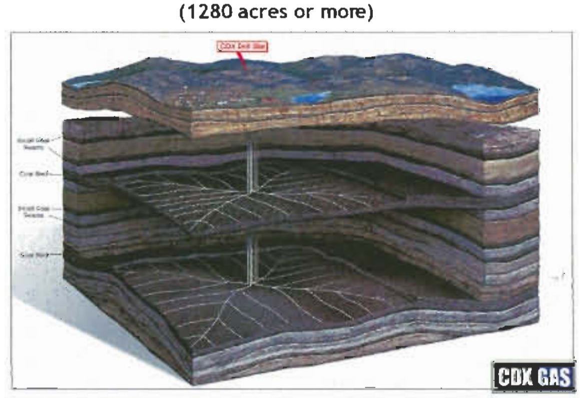


1 Quad Z-Pinnate™ Pattern 16 Conventional Wells

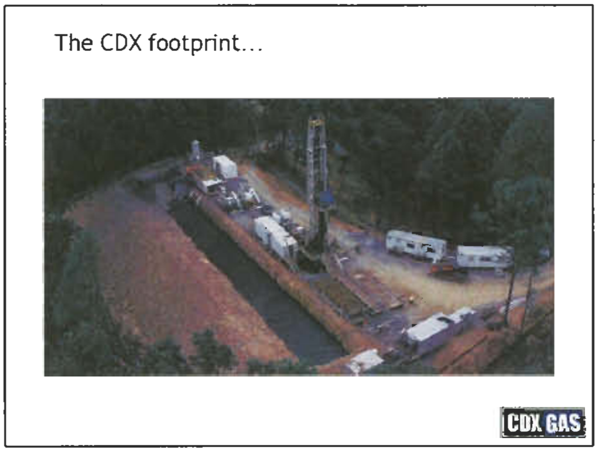
- One wellsite
- Pinnate pattern drains 1,280 acres and replaces 16 standard 80 acre locations
- 360° drainage
- Quicker and greater gas recovery
- Uniform drainage and pressure depletion
- Environmental advantages of compact, shared surface locations

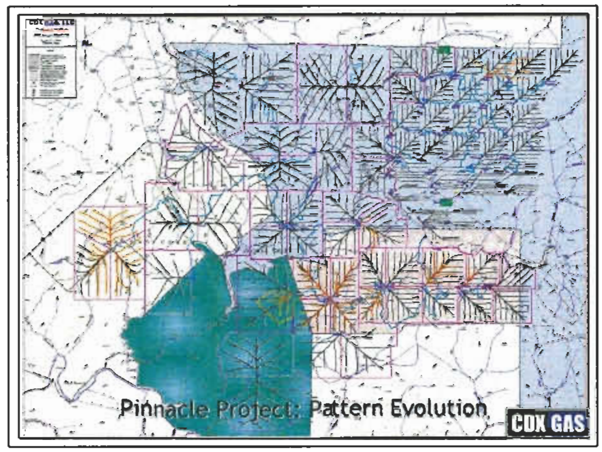
CDX GAS

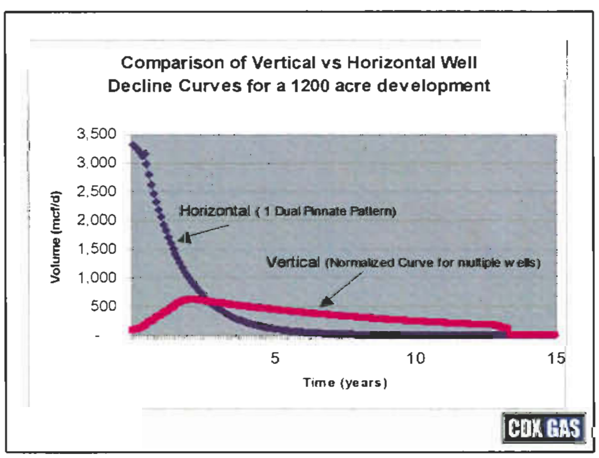
CDX Z-Pinnate™ Development (1280 acres or more)

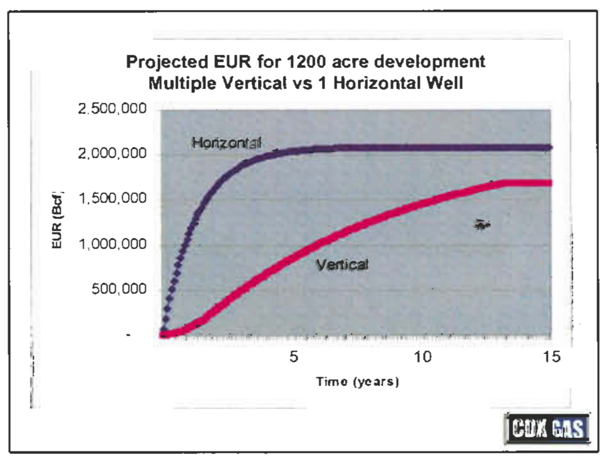


CDX GAS


The CDX footprint...
CDX GAS


Pinnacle Project: Pattern Evolution
CDX GAS


Comparison of Vertical vs Horizontal Well Decline Curves for a 1200 acre development
Volume (mcf/d)
3,500
3,000
2,500
2,000
1,500
1,000
500
-
Horizontal (1 Dual Pinnate Pattern)
Vertical (Normalized Curve for multiple wells)
5
10
15
Time (years)
CDX GAS


Projected EUR for 1200 acre development
Multiple Vertical vs 1 Horizontal Well
EUR (Bcf)
2,500,000
2,000,000
1,500,000
1,000,000
500,000
-
Horizontal
Vertical
5
10
15
Time (years)
CDX GAS

Environmental Benefits of Z-Pinnate™ Drilling

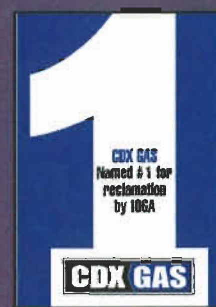
- Captures methane emissions that would be otherwise released by coal mining operations
- Reduced well life reduces period of impact
- Fewer wells mean less traffic and less interference
- Extensive drainage pattern reduces surface impact
- Can safely produce gas from beneath restricted surface areas

CDX GAS

Environmental Awards & Recognitions

IOGA of West Virginia
Surface & Land Reclamation Awards 2002, 2003 & 2005…

West Virginia Chamber of Commerce
Environmental Award 2006



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