Fayetteville Shale

Brian Teller
Senior Drilling Engineer
XTO Energy

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Where is the Fayetteville Shale?

Fayetteville Shale - Central Arkansas (Arkoma Basin)
What is the Fayetteville Shale?

- Mississippian Age organic rich shale
  - Thermally mature shale – dry gas (98% methane)
- Geologic Equivalent to the Barnett Shale of North Texas
- Size – 4,000 square miles
- Productive Formations
  - Hale Sand
  - Fayetteville
    - Upper and Lower (Lower is usually our target)
  - Moorefield
- Depth – 1500’ - 6500’ TVD
- Thickness – 50’ Western AR – 500’ Eastern AR
History

2003 – SEECO starts leasing acreage
2004 – SEECO successfully tests horizontal drilling and completion technology
2005 – Current
  – XTO acquires 380,000 acres
  – SEECO acquires 860,000 acres
  – Chesapeake acquires 415,000 core acres
  – Several smaller companies acquire sizeable acreage positions
June 2007 – XTO spuds 1st Well
2008 – XTO ramps up drilling activity
Currently – 7 rigs drilling for XTO
Acreage

XTO - 380,000 net acres
**SURFACE**

- Air/Mist
- Hammer

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**Example Well 9N 10W**

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**GEOLOGY (TVD)**

- Primary Objective
- Secondary Objective

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**SURFACE:**

- Hole Size: 12 3/8
- Csg Size: 9 5/8
- Csg Set @: 550'

**Production:**

- Hole Size: 8 3/4 / 8 1/2
- Csg Size: 5 1/2
- Csg Set @: 10,560'

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**Top of Surface Cement:** Circulate Cement to Surface

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**Mud Up Point (TVD):** 5,000'

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**Top of Production Cement:** 400 ft. Above Kick Off Point.

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**Kick Off Point (TVD):** 5,170'

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**Landing Point (TVD):** 5,973'

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**TD (TMD/TVD):** 10,560'/5,973'

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**1,645'** Dunn A
**2,096'** Orr
**3,276'** Brentwood
**3,496'** Upper Hale
**4,849'** Lower Hale
**4,984'** Basal Hale
**5,928'** Upper Fayetteville
**5,943'** Lower Fayetteville
**6,023'** Hindsville
**6,403'** Moorefield
**6,530'** Pilot Hole TD
General Well Plan

**SURFACE**
- Air/Mist
  - Hammer

**PRODUCTION**
- Vertical /Pilot Hole
  - Air/mist to Morrowan Shale
  - Hammers
  - Tricones
  - Mud up w/ Oil
  - Base @ Morrowan Shale
  - 6-blade PDC w/ backup cutters (Pilot Hole)

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- Top of Surface Cement: Circulate Cement to Surface
- Top of Production Cement: 400 ft. Above Kick Off Point.
- Kick Off Point (TVD): 5,170'
- Landig Point (TVD): 5,973'
- Mud Up Point (TVD): 5,000'
- TD (TVD/TMD): 10,560'/5,973'

- 1,645’ Dunn A
- 2,096’ Orr
- 3,276’ Brentwood
- 3,496’ Upper Hale
- 4,849’ Basal Hale
- 4,984’ Morrowan Shale
- 5,928’ Upper Fayetteville
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- 6,530’ Pilot Hole TD
General Well Plan

**SURFACE**
- Air/Mist
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**PRODUCTION**
- Vertical /Pilot Hole
  - Air/mist to Morrowan Shale
  - Hammers
  - Tricones
  - Oil Base @ Morrowan Shale
  - 6-blade PDC w/ backup cutters
- Curve
  - Whip Stock (Pilot Hole)
- 10 deg build rate

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- 3,276' Brentwood
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- 6,403' Boone
- 6,530' Pilot Hole TD
General Well Plan

**SURFACE**
- Air/Mist
  - Hammer

**PRODUCTION**
- Vertical /Pilot Hole
  - Air/mist to Morrowan Shale
  - Hammers
  - Tricones
  - Oil Base @ Morrowan Shale
  - 6-blade PDC w/ backup cutters
- Curve
  - Whip Stock (Pilot Hole)
  - 10 deg build rate
- Lateral
  - Lower Fayetteville
  - 2500’ to 4300’

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- Hole Size: 12 3/8
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**Production**
- Mud Up Point (TVD): 1,645’
- Top of Surface Cement: Circulate Cement to Surface
- Top of Production Cement: 400 ft. Above Kick Off Point.
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- 6,403’ Moorefield
- 6,530’ Pilot Hole TD
Primary Drilling Activity

NE AREA

SW AREA

Cleburne

Independence

Faulkner

White
NE AREA
Less complex / more forgiving area
(Independence, N. White, Cleburne Co.)

- **Vertical**
  - One Hammer bit to Mud up pt (Morrowan)
  - Possible 300-400 bbl/hr water

- **Curve**
  - Still using Tricones to build curve
    - Sands in Morrowan damage the gauge of a PDC

- **Lateral**
  - Hole cleaning
    - ROP > 120 fph
    - Pump rates ~ 375 gpm
    - Mud properties
      - R-6 value > than 14
SW AREA
More complex / less forgiving area
(Faulkner, White, S. Cleburne Co.)

- **Vertical**
  - Multiple Hammer bits to Mud up pt (Morrowan)
  - Possible Tricone depending on water.
  - 6-Blade PDCs with backup cutters.

- **Curve**
  - Can drill the curve with a PDC (w/o Whipstock)

- **Lateral**
  - Target less defined and thinner
  - Hole cleaning is much more important!
Hammer Bits

Several Transitions between Shales and Sands throughout section.

Generally Damages Gauge row.

– Tricone run to ream out under gauge hole

DUNN A - 695'
ORR - 1,005'
BRENTWOOD - 1,985'
HALE - 2,165'
BASAL HALE - 2,740'
MORROWAN - 2,740'
Hole Cleaning

- Pump Rate
- Pipe Rotation
- Circulation
- Mud Properties
- Avoid Packing Off
  - Monitor Drilling Parameters
    - Torque
    - Drag
    - Pressure
Hole Stability

- Mud Weight
- Mud Additives
  - Plugging Agents
    - Gilsonite
    - Asphaltine
- Monitor Pump Pressures!
  - Avoid pressuring up on the formation
Keys to Success

- Consistent program

- Minimize hole problems
  - Seismic data
    - Well planning (fault predictions)
  - Upgrade equipment and services
    - Pumps
    - Top Drives

- Control well costs to keep the project economic!
2009 Activity

- Budgeted 115 Wells
- 7 Drilling Rigs
- Continue to develop our infrastructure
- Dependent on product prices
QUESTIONS?
Additional Information
XTO’s Acreage (Approximately)

- Western AR Fairway – 100,000 acres
- Additional Leasing - 100,000 acres
- Pathfinder - 64,000 acres
- SEECO - 55,000 acres
- Alta - 20,000 acres
- Anadarko - 19,000 acres
- EUR Energy - 17,000 acres
- Other Acquisitions - 5,000 acres
- Total - 380,000 acres
Hammer Bits

Drilled from 512’ to 1486’
(Orr Formation)
974’ in 15 hrs @ 65 fph

Drilled from 1625’ to 2337’
(Just topped the Lower Hale Formation)
712’ in 22 hrs @ 32 fph