

Geological Characterization of the Uteland Butte Member of the Eocene Green River Formation: An Emerging Unconventional Carbonate Tight Oil Play in the Uinta Basin, Utah

Michael D. Vanden Berg

michaelvandenberg@utah.gov, 801-538-5419

Rebekah E. Wood

Stephanie M. Carney

Craig D. Morgan

Project website: geology.utah.gov/emp/shale_oil

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UTAH GEOLOGICAL SURVEY

geology.utah.gov

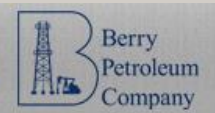
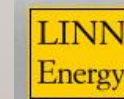
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- Utah Geological Survey



Company support:

- Bill Barrett Corp.
- Berry Petroleum (LINN Energy)
- QEP Resources
- Anadarko Petroleum Corp.
- Newfield Exploration Company
- EOG Resources



Collaborators:

- Dr. John McLennan - Energy and Geoscience Institute, University of Utah
 - Detailed geomechanical characterization
- Dr. J. Fredrick Sarg – Colorado School of Mines
 - Facies characterization, east side of basin
- Dr. Hans Machel – University of Alberta
 - Origin of dolomite

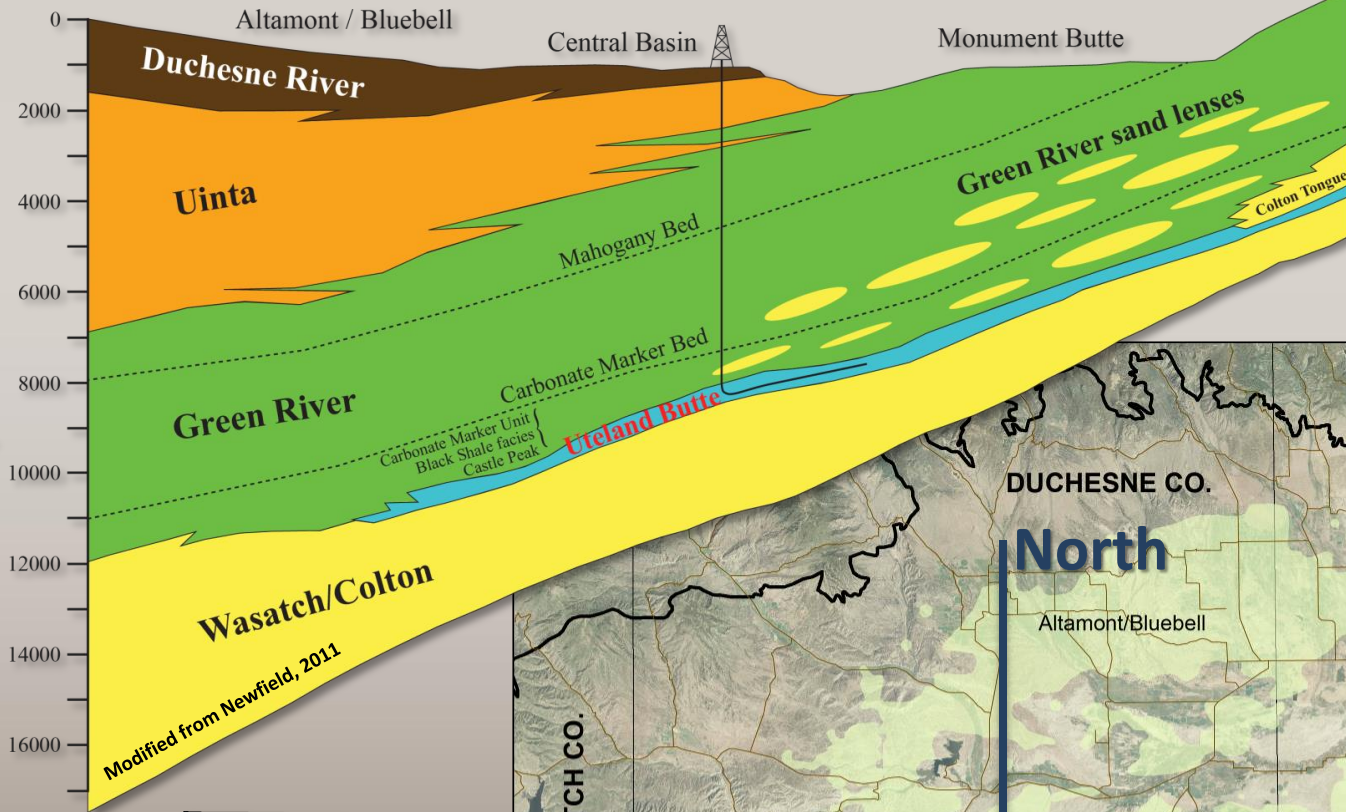


NORTH

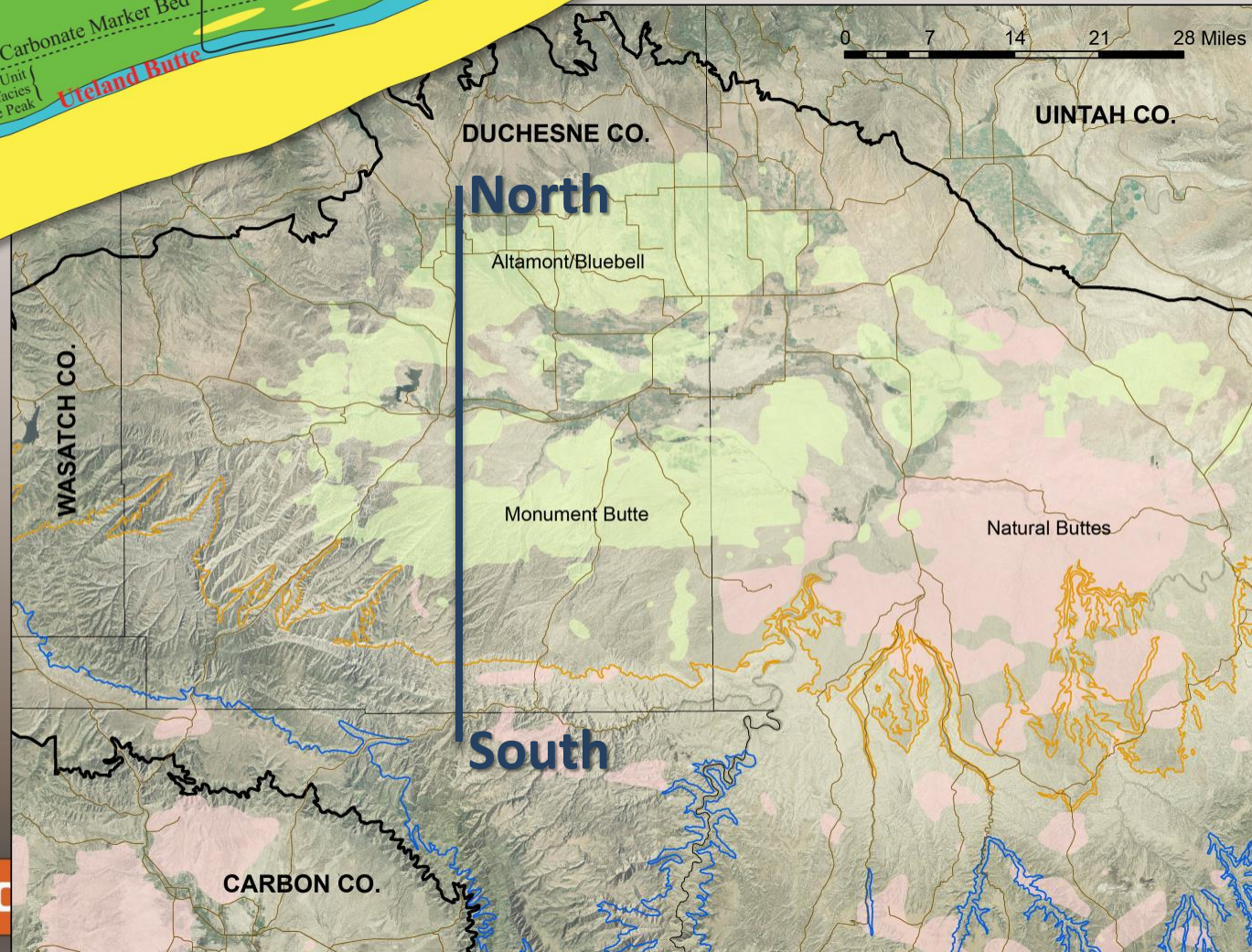
SOUTH

Background

Depth in Feet

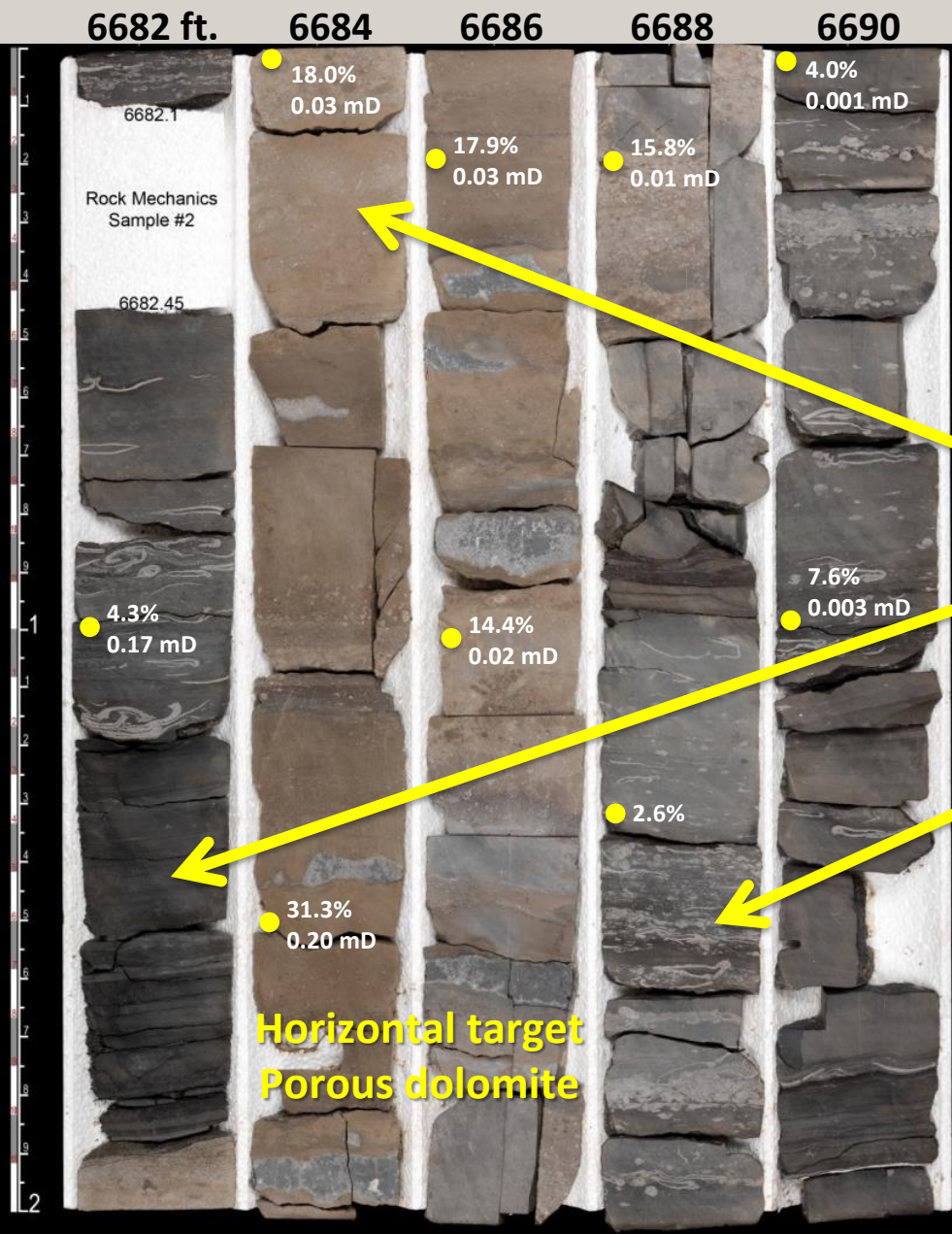


UTAH GEOLOGIC

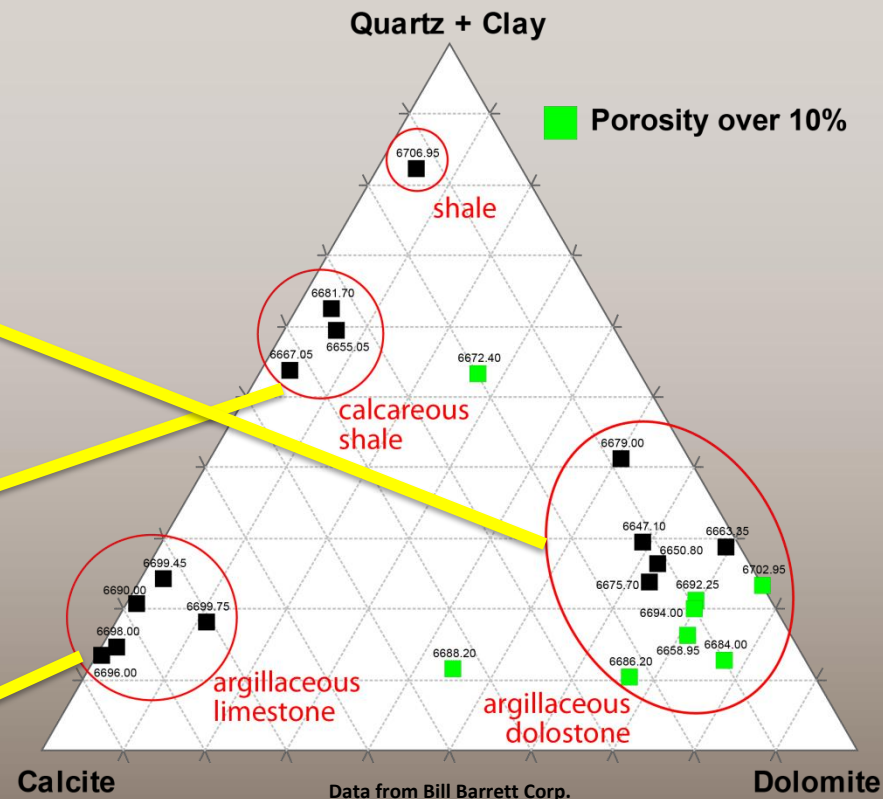


Operator: Bill Barrett Corp.
Well name: 14-1-46

Basic Lithology of Uteland Butte



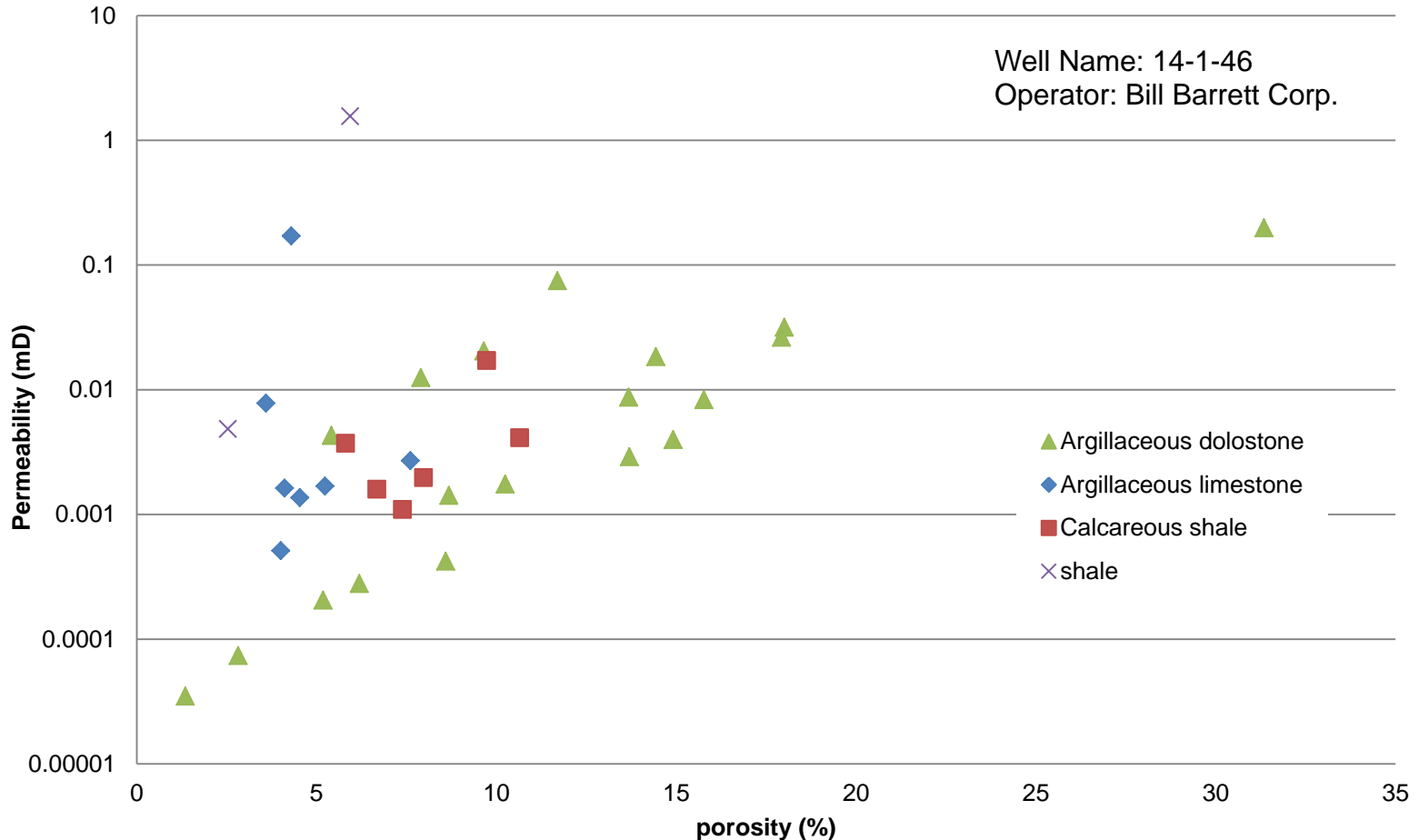
BBC 14-1-46



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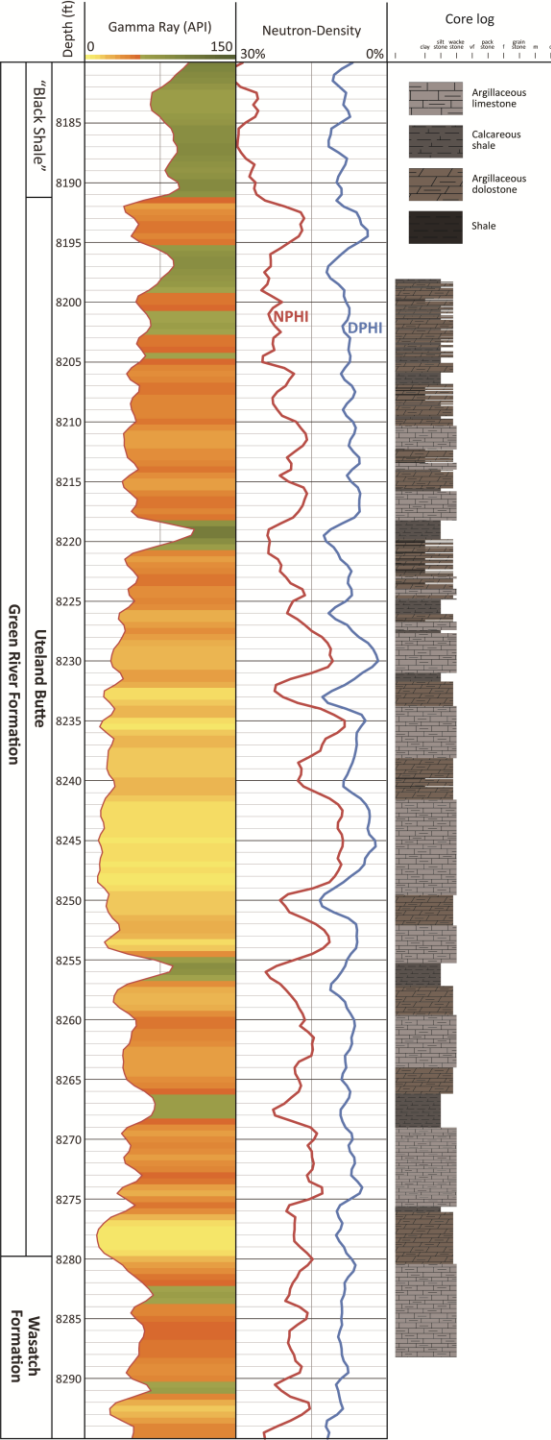
Basic Lithology of Uteland Butte

6682 ft. 6684 6686 6688 6690



er 10%

Dolomite



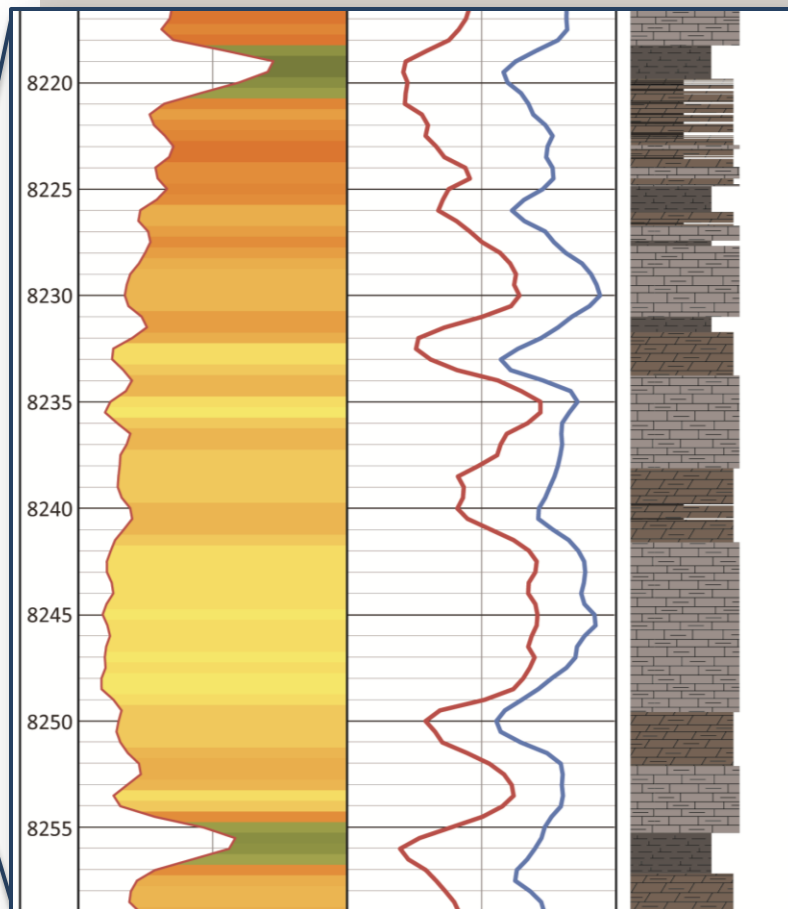
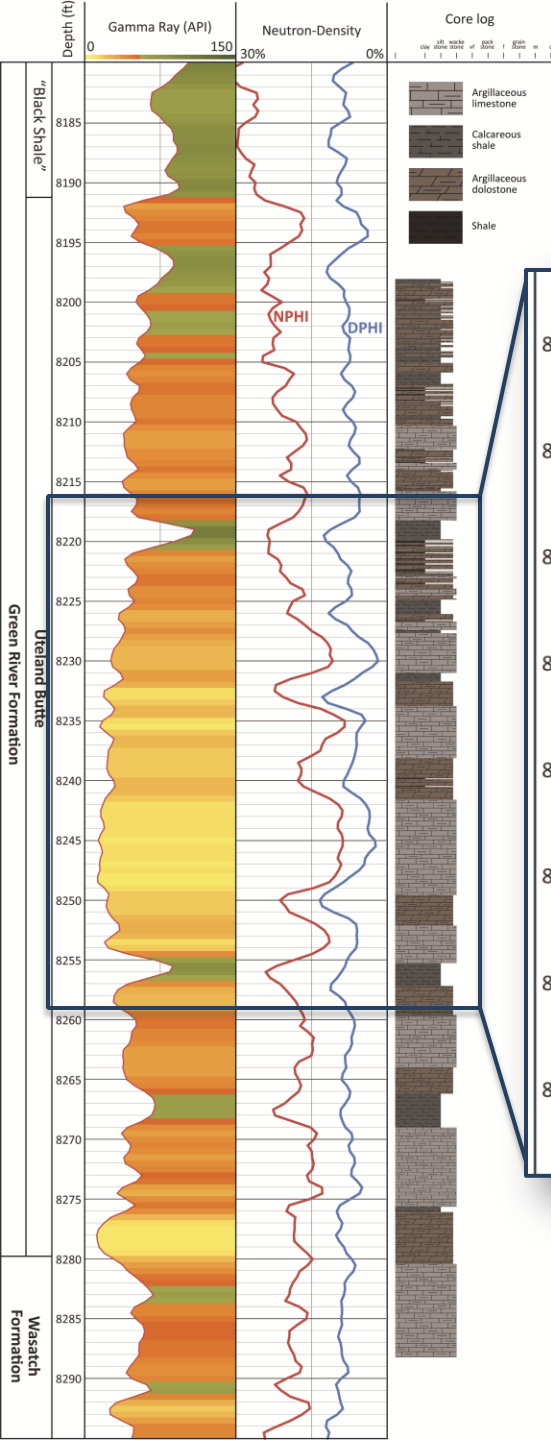
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Operator: Newfield Exploration Co.

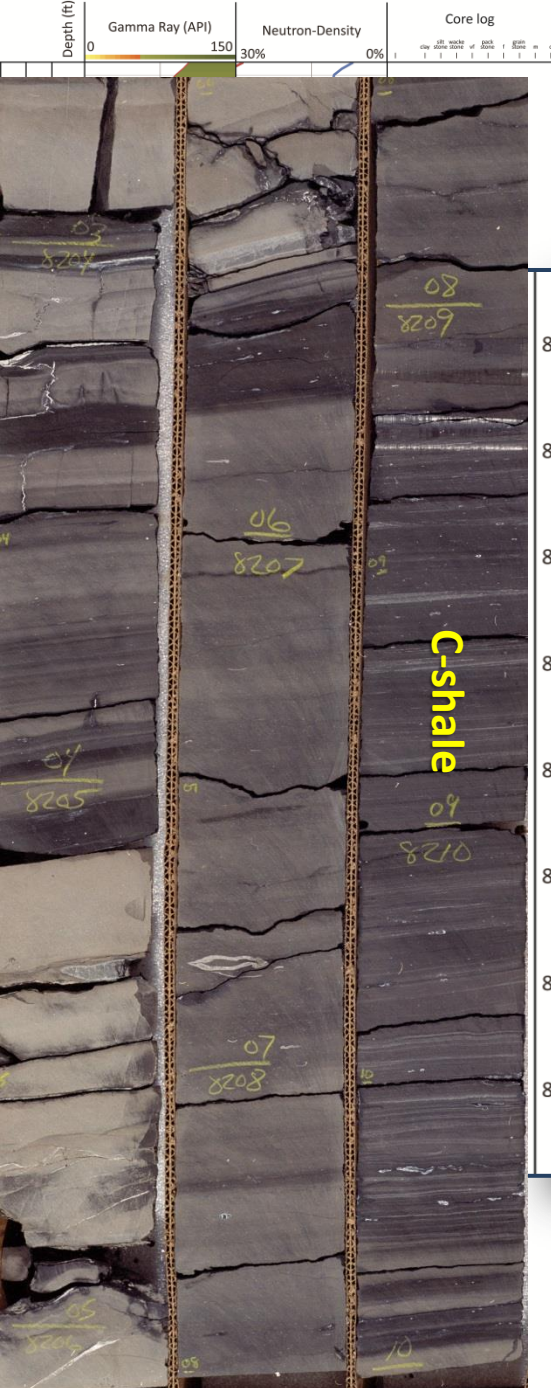
Detailed Stratigraphy



Detailed Stratigraphy

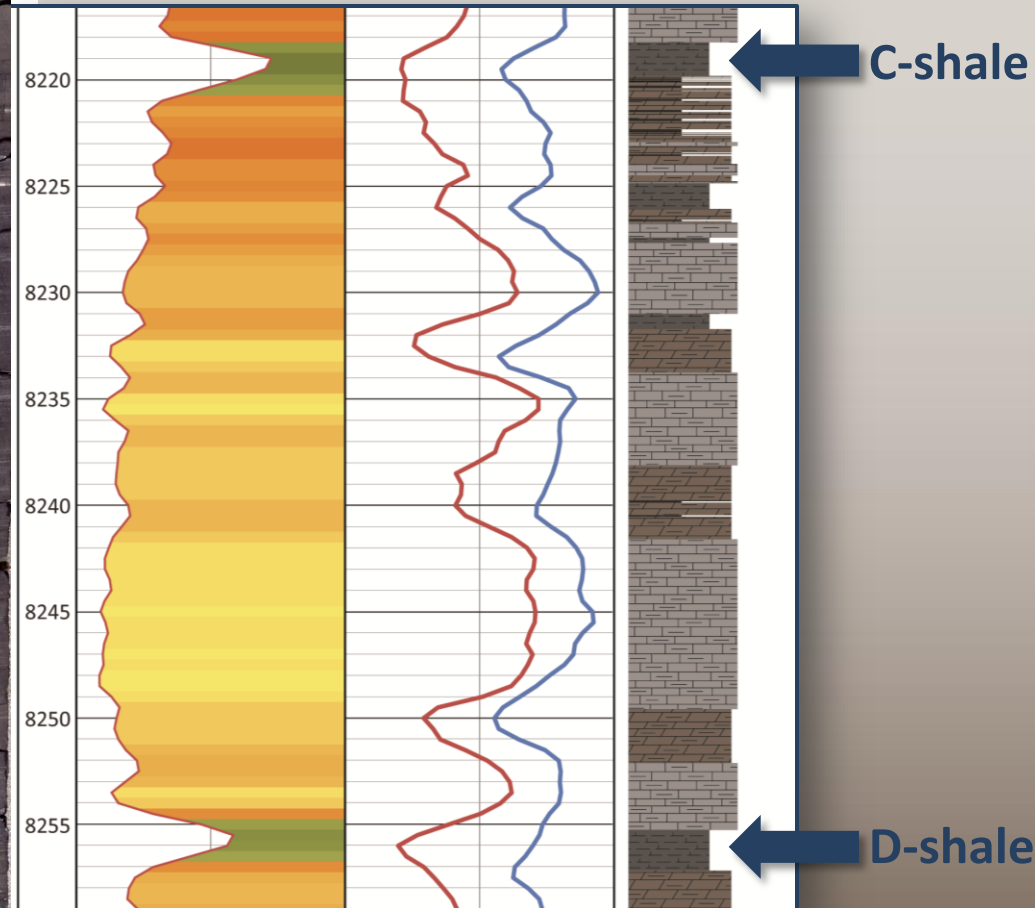
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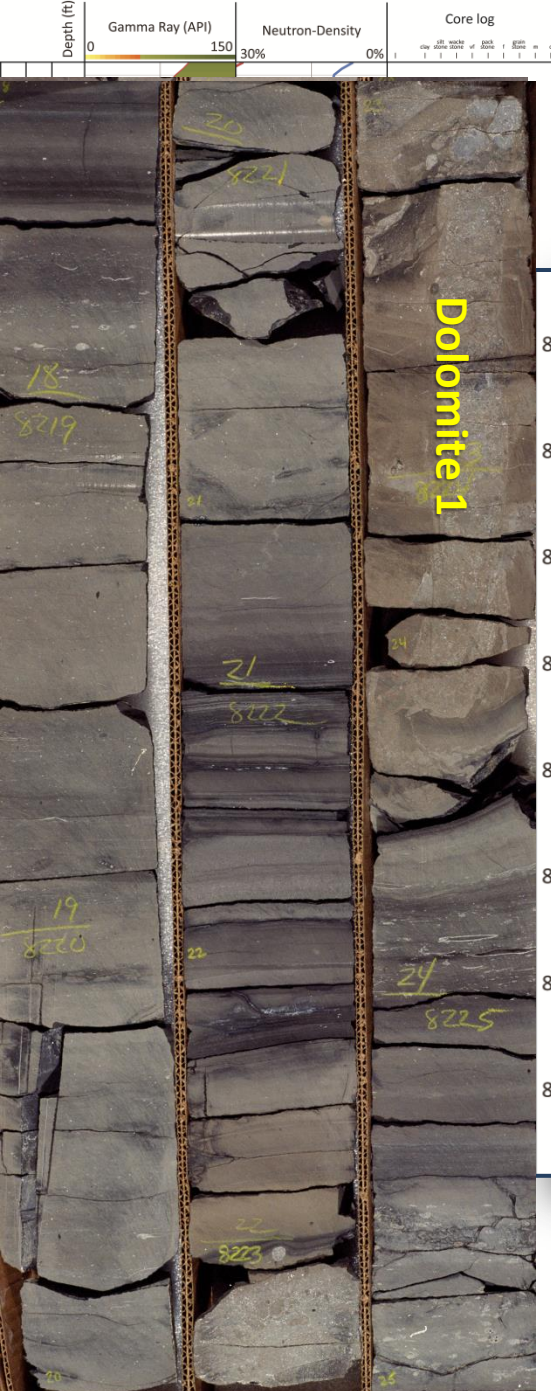




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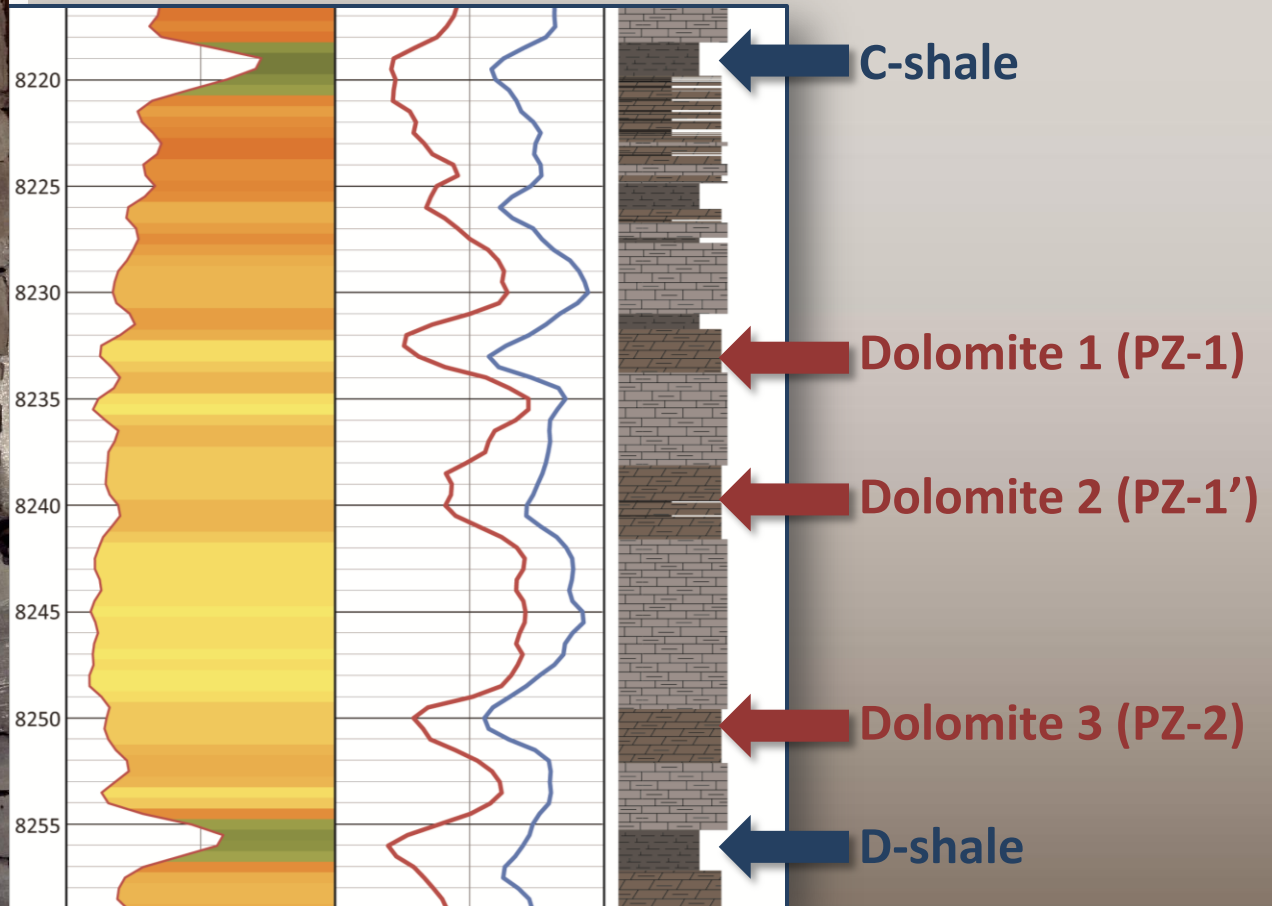
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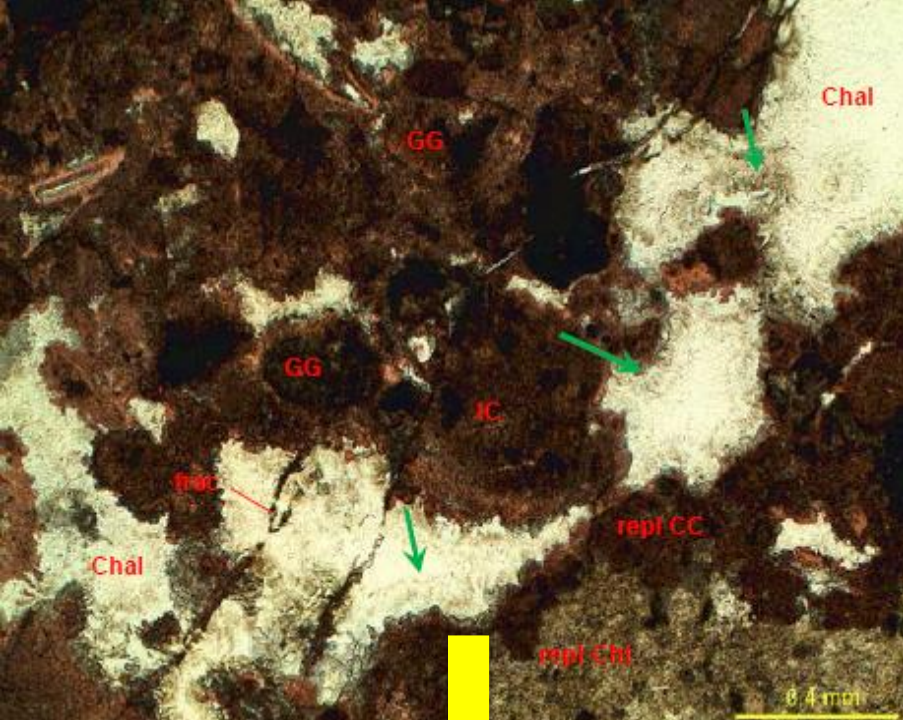




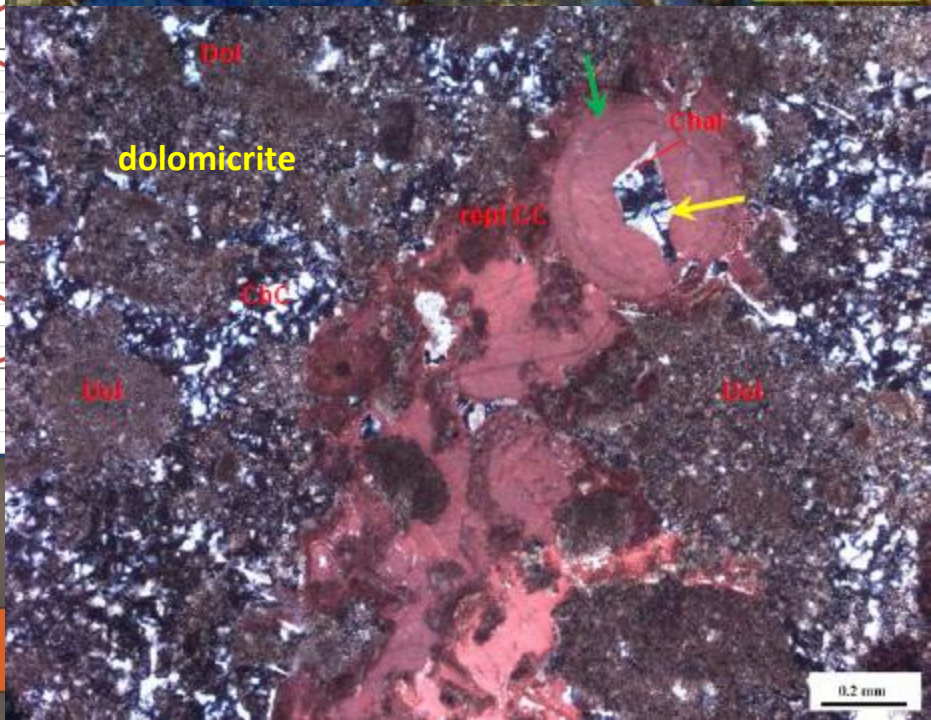
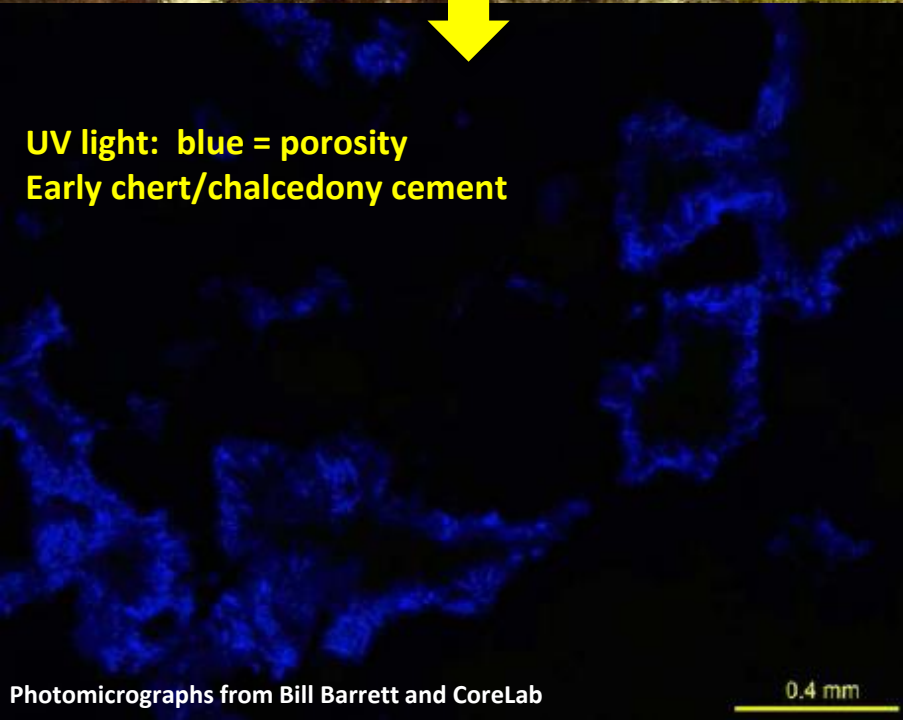
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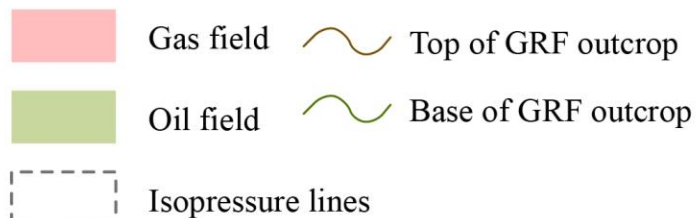
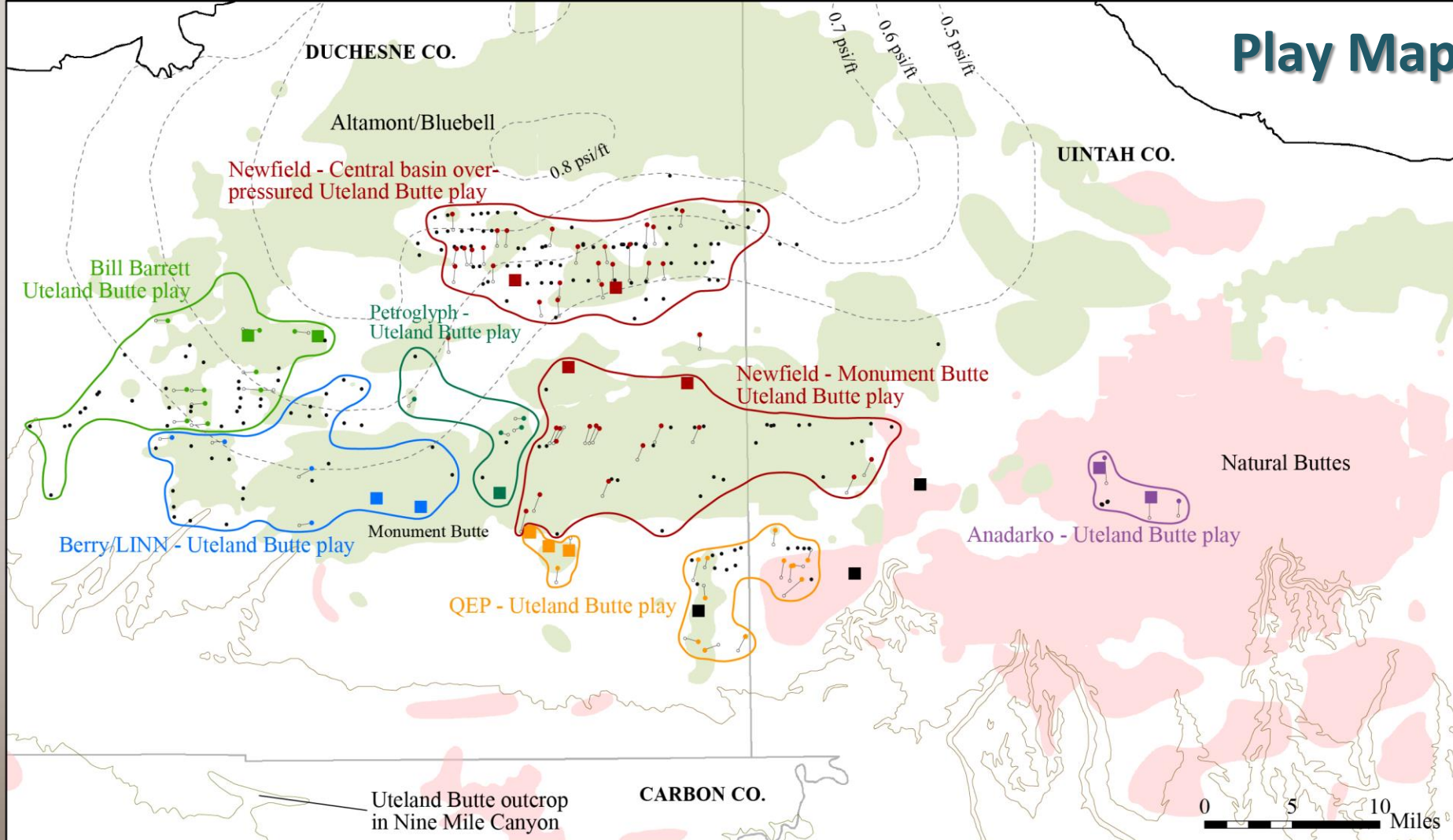




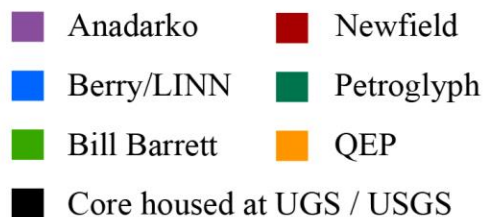
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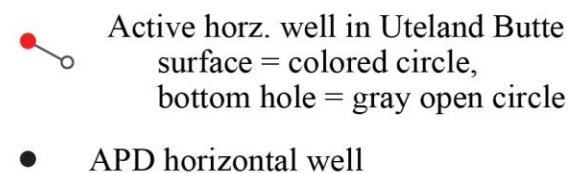
Play Map



Available cores

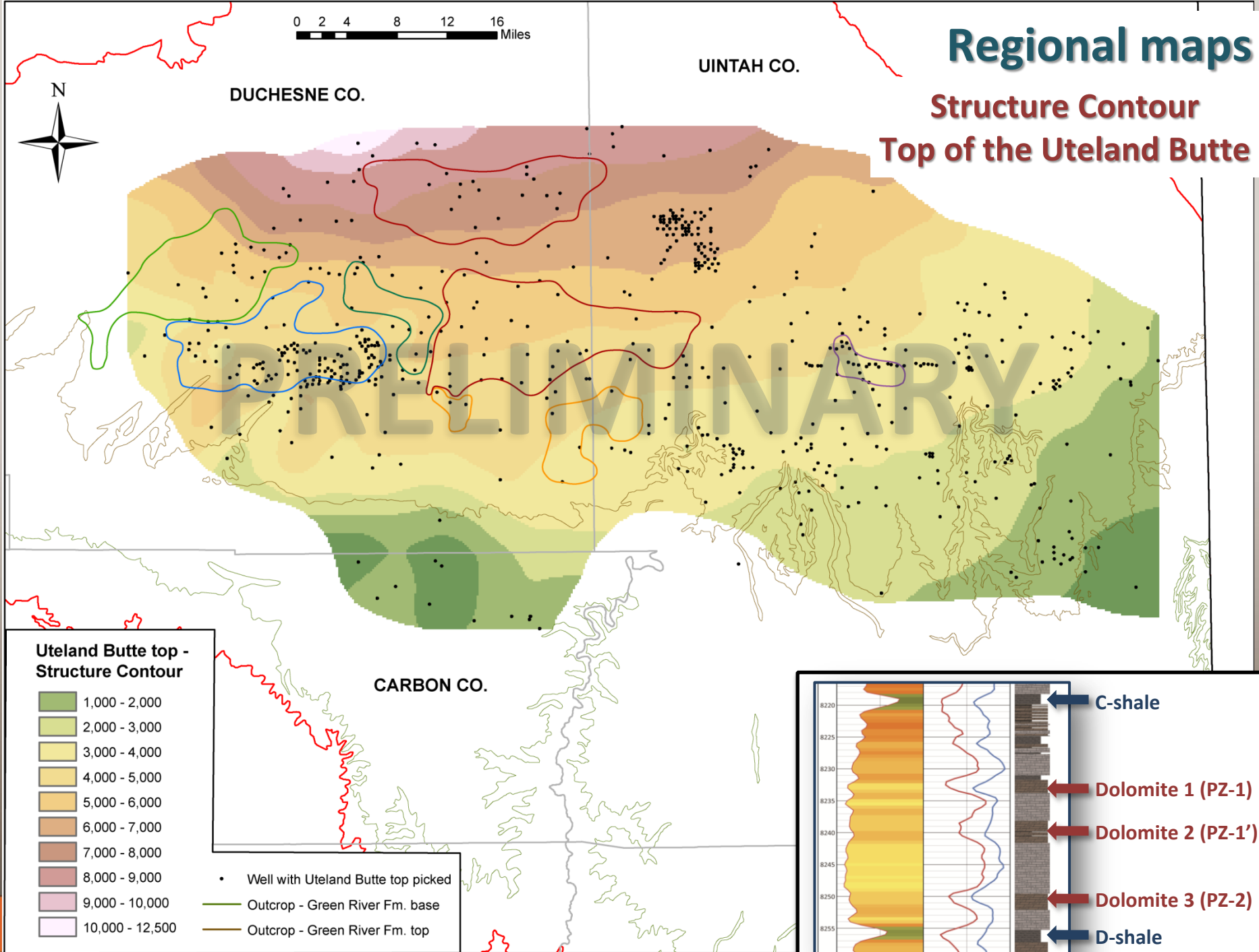


Active/proposed horz. wells



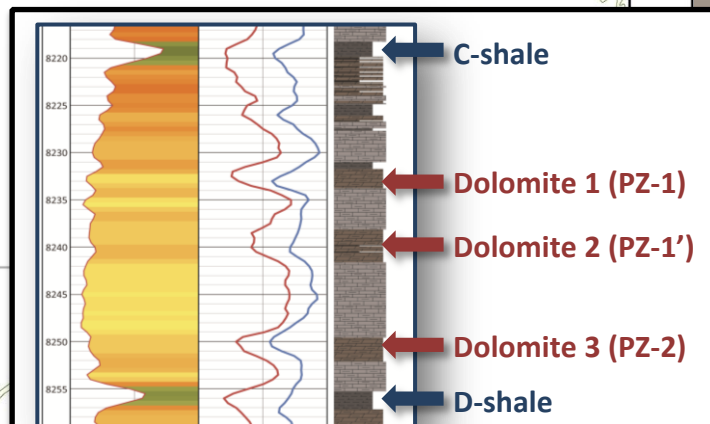
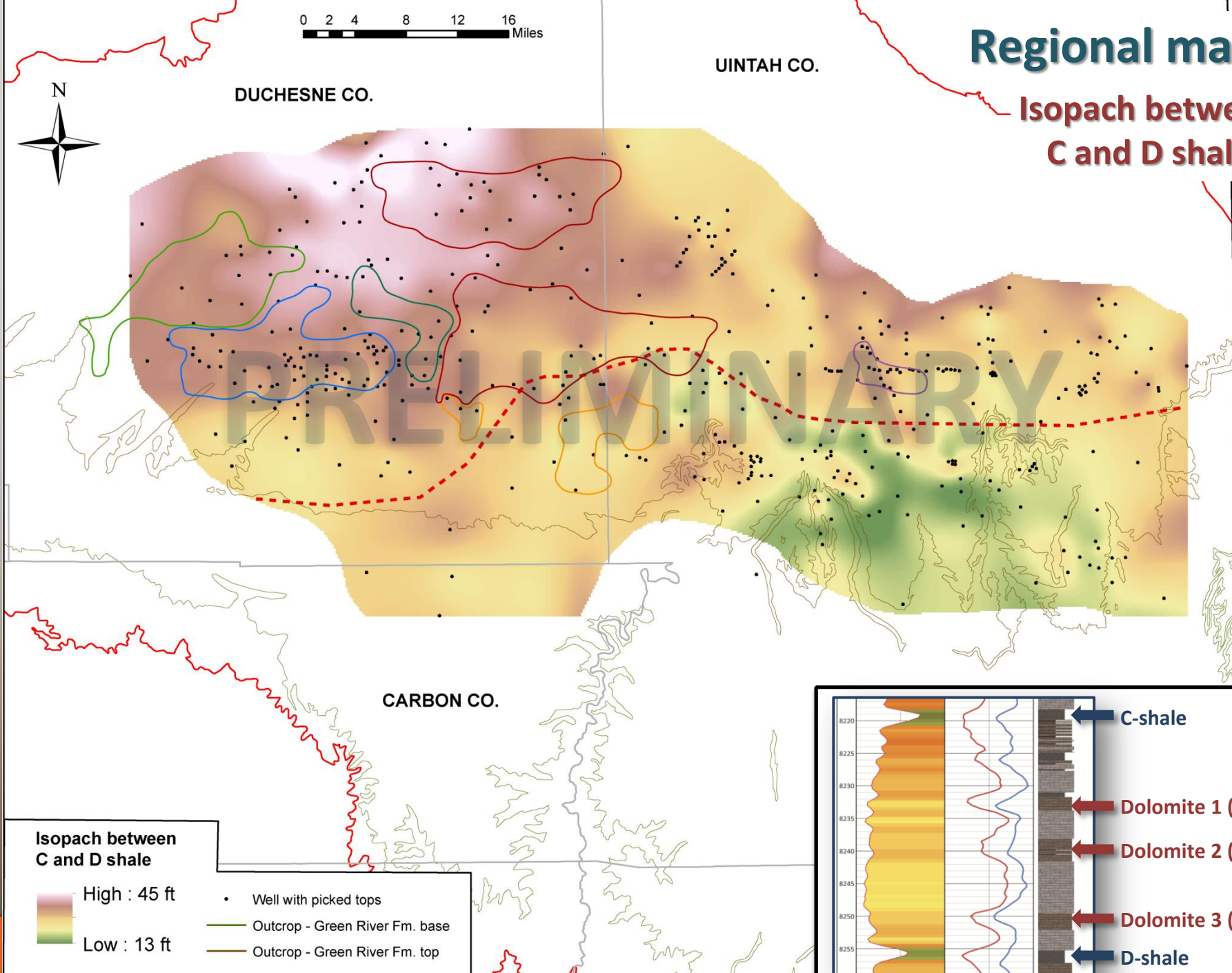
Regional maps

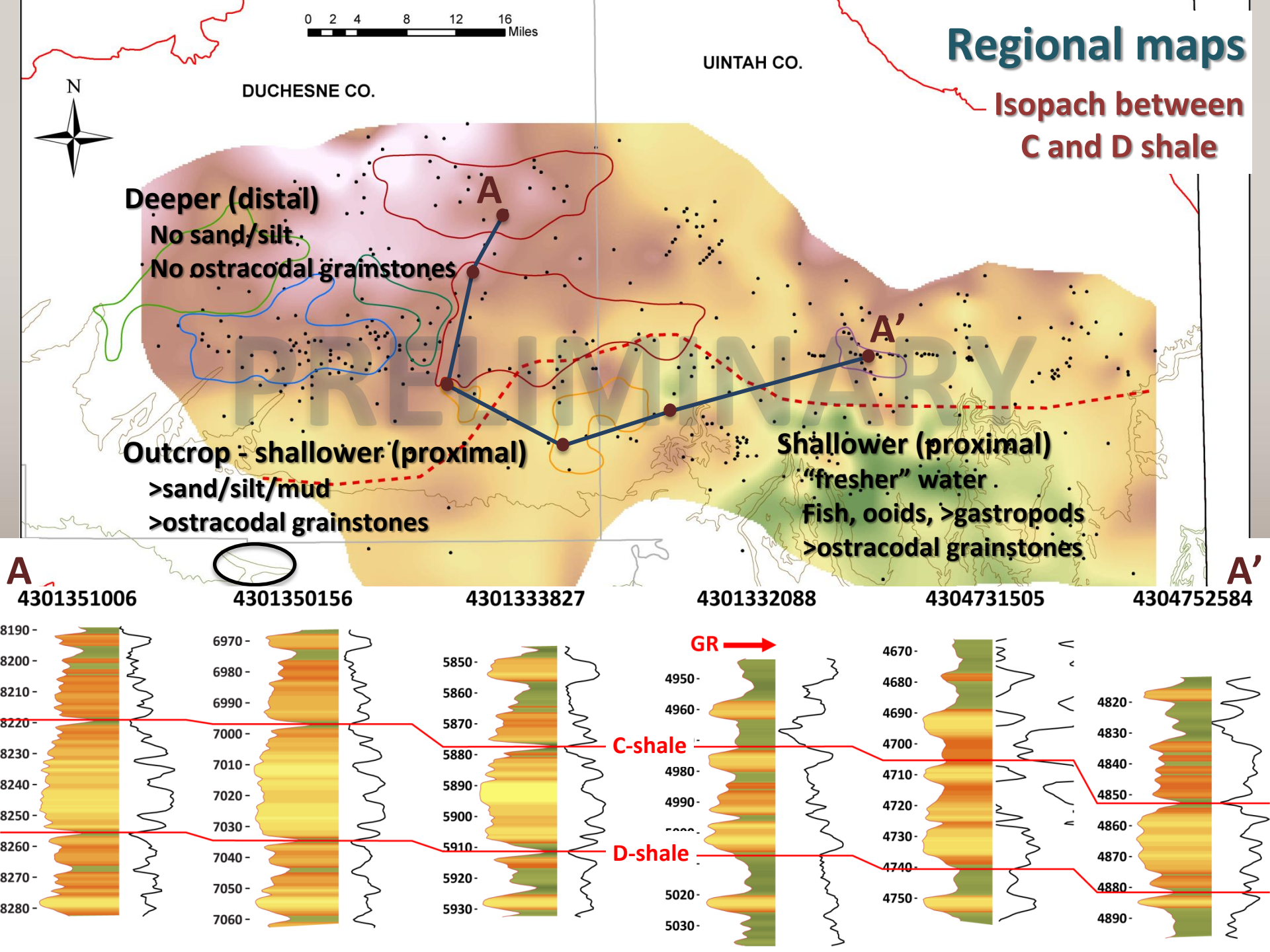
Structure Contour Top of the Uteland Butte



Regional maps

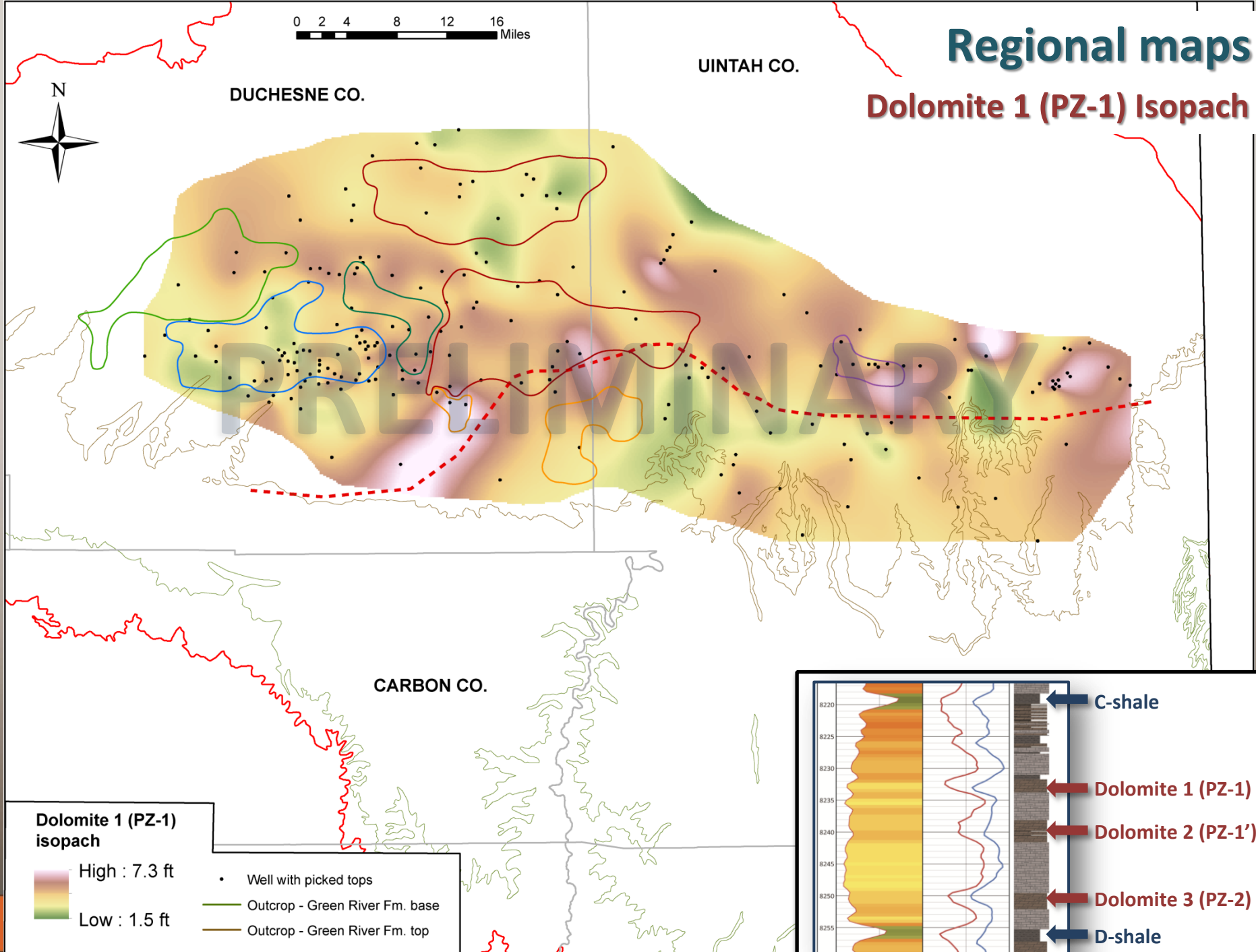
Isopach between C and D shale





Regional maps

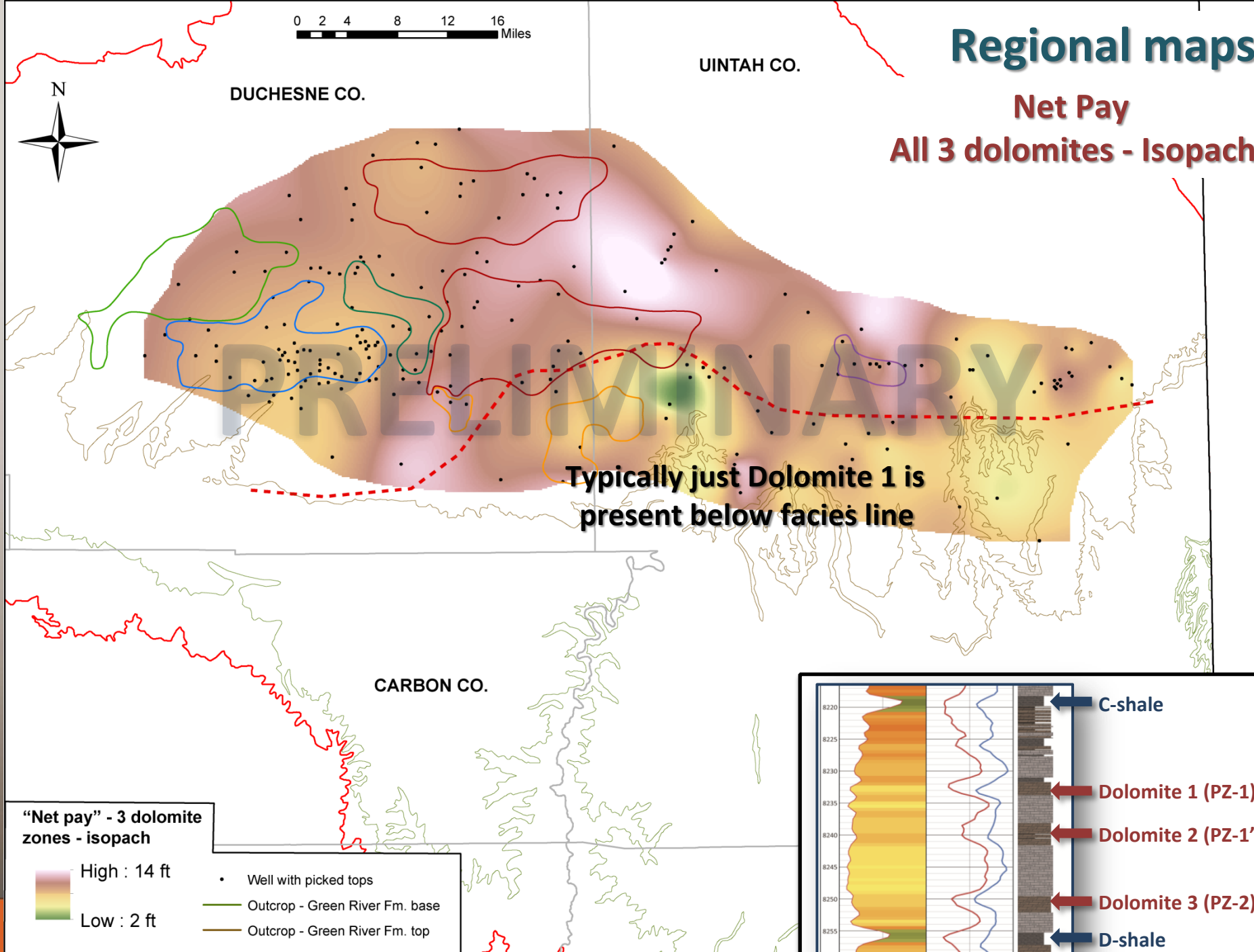
Dolomite 1 (PZ-1) Isopach



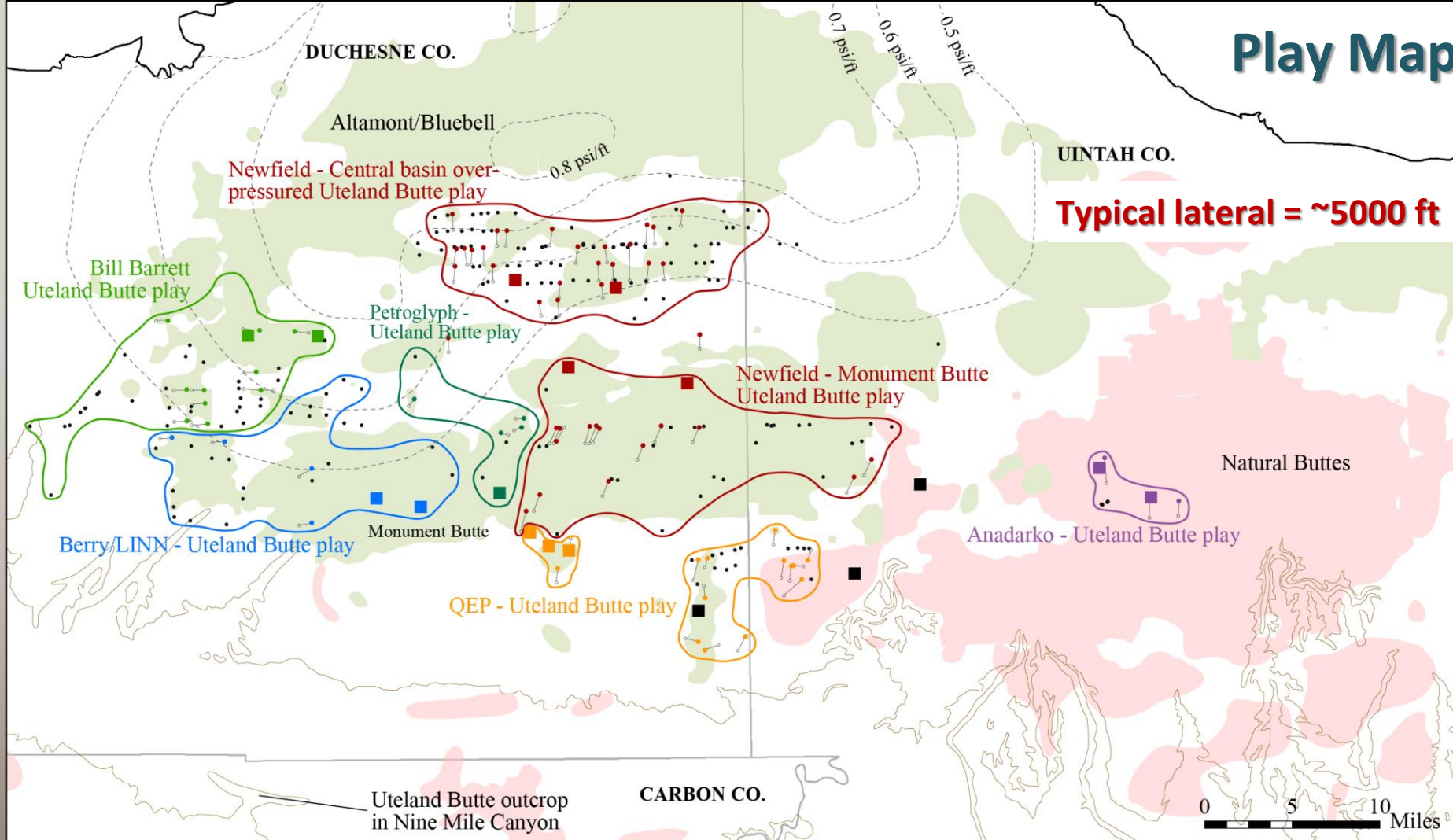
Regional maps

Net Pay

All 3 dolomites - Isopach



Play Map



- Gas field
- Oil field
- Isopressure lines
- Top of GRF outcrop
- Base of GRF outcrop

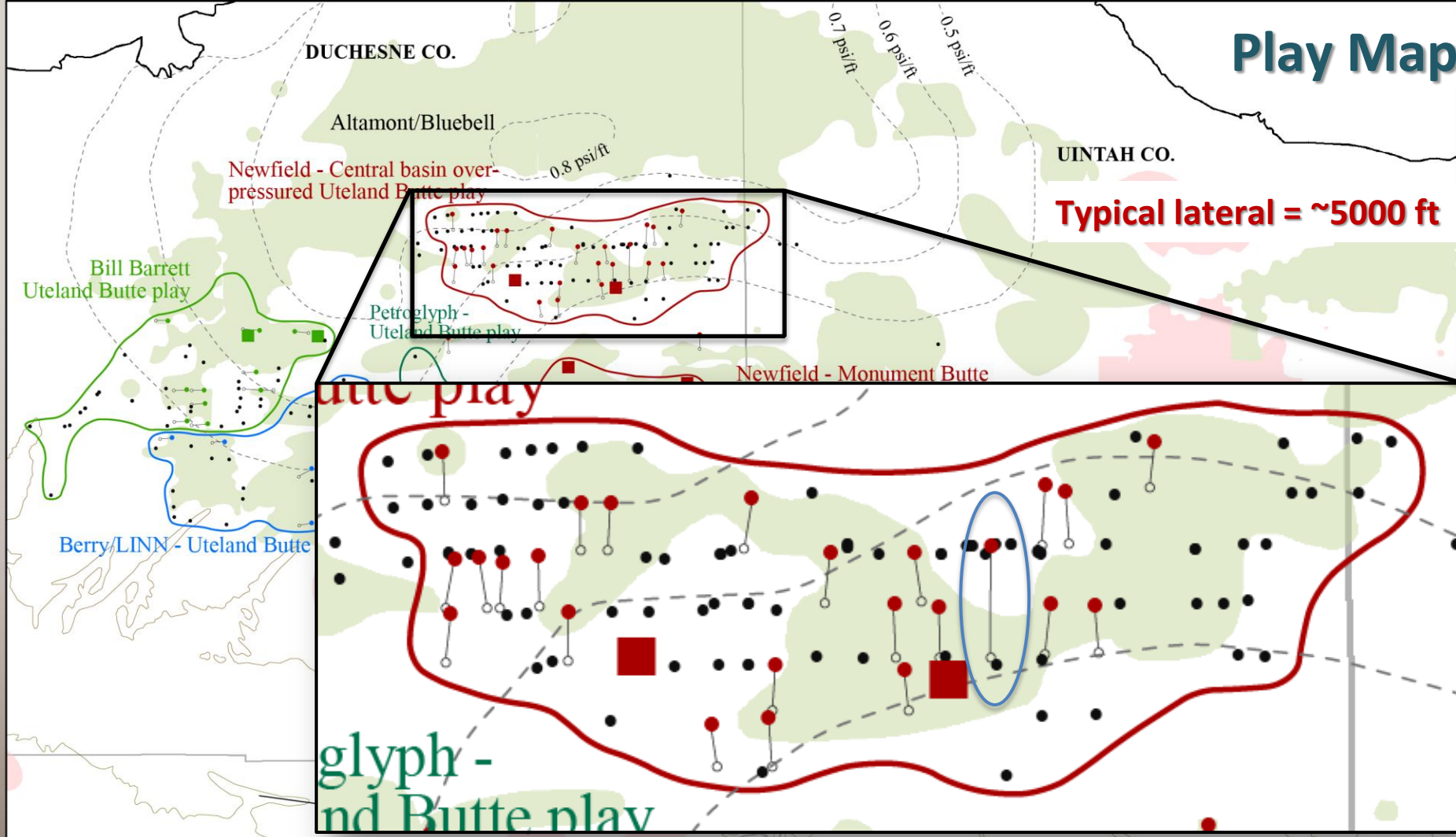
Available cores

- Anadarko
- Berry/LINN
- Bill Barrett
- QEP
- Newfield
- Petroglyph
- Core housed at UGS / USGS

Active/proposed horz. wells

- Active horz. well in Uteland Butte surface = colored circle, bottom hole = gray open circle
- APD horizontal well

Play Map



- Gas field
- Oil field
- Isopressure lines
- Top of GRF outcrop
- Base of GRF outcrop

Available cores

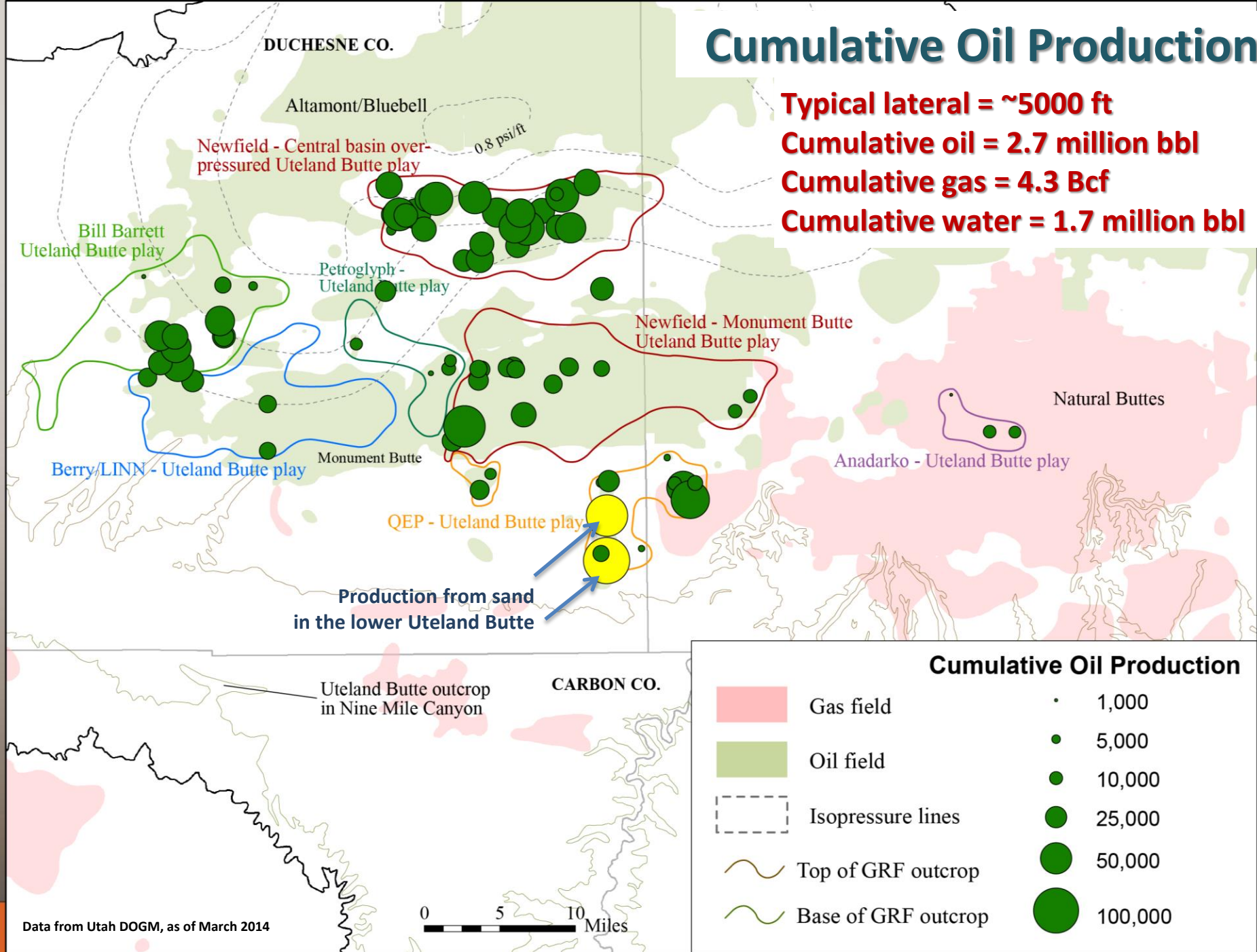
- Anadarko
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Active/proposed horz. wells

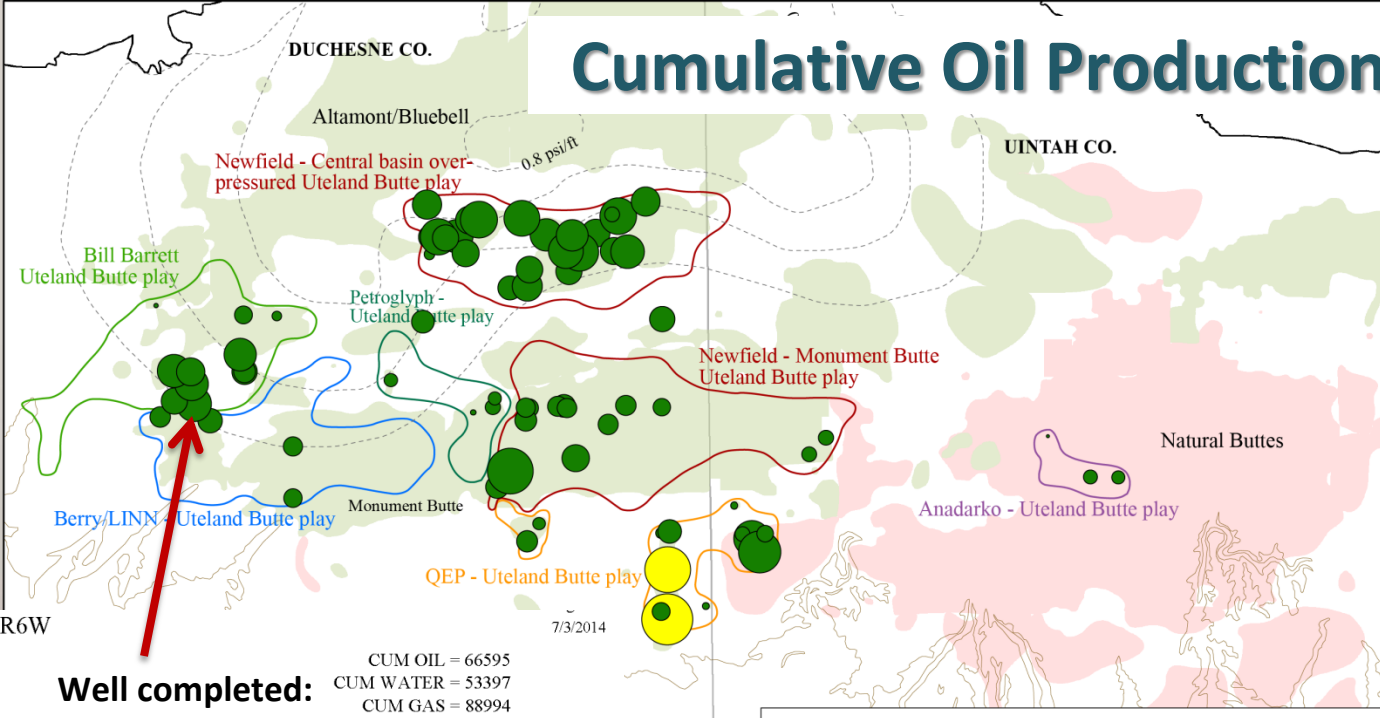
- Active horz. well in Uteland Butte surface = colored circle, bottom hole = gray open circle
- APD horizontal well

Cumulative Oil Production

Typical lateral = ~5000 ft
Cumulative oil = 2.7 million bbl
Cumulative gas = 4.3 Bcf
Cumulative water = 1.7 million bbl



Cumulative Oil Production



#43-013-50575-00-00 SWSW 34-T4S-R6W
LC TRIBAL 13H-33-46
BILL BARRETT CORP
ALTAMONT

Well completed:
11/27/2011

CUM OIL = 66595
CUM WATER = 53397
CUM GAS = 88994

DAYS

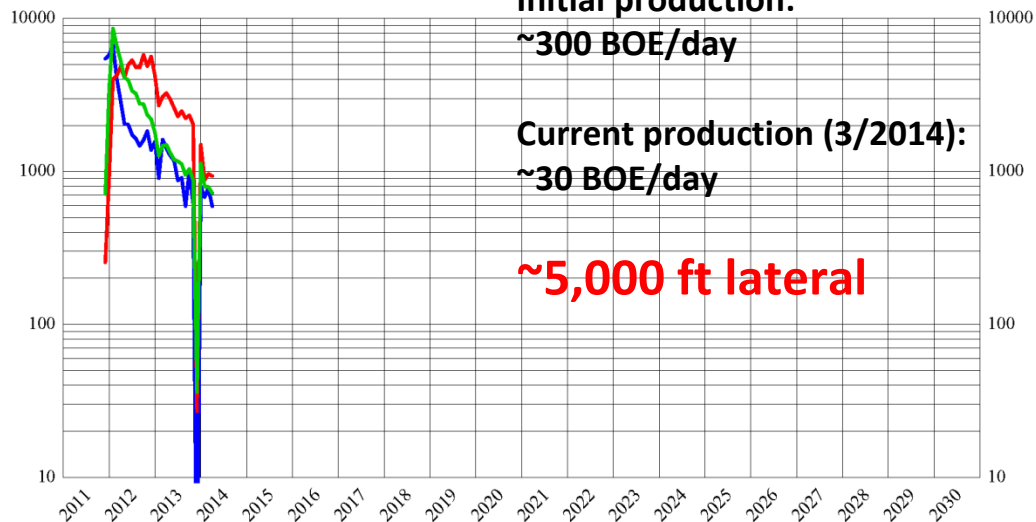


Initial production:
~300 BOE/day

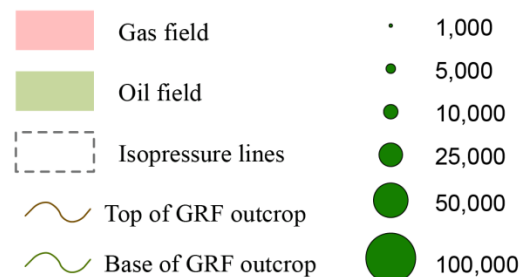
Current production (3/2014):
~30 BOE/day

~5,000 ft lateral

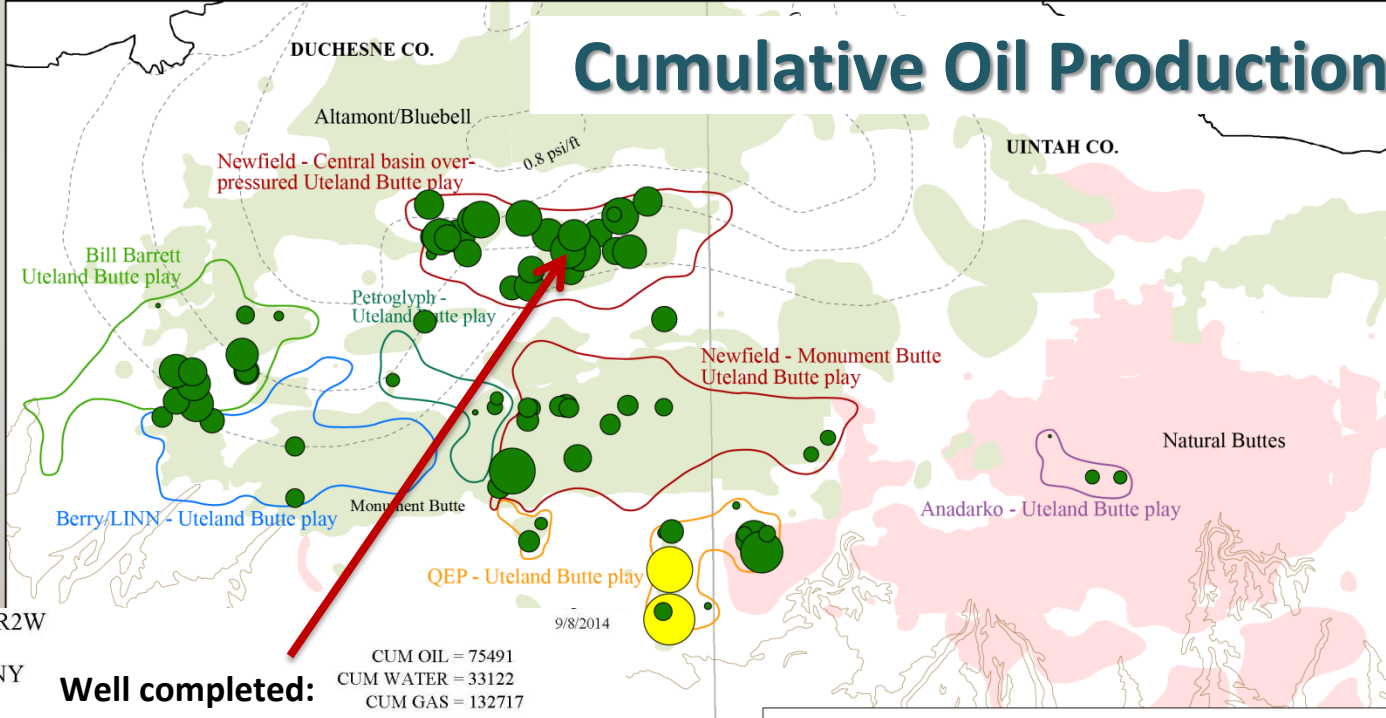
BBLS PER MONTH



Cumulative Oil Production



Cumulative Oil Production



#43-013-51508-00-00 SESW 17-T3S-R2W
PETERSON 3-20-3-2WH
NEWFIELD PRODUCTION COMPANY
NORTH MYTON BENCH

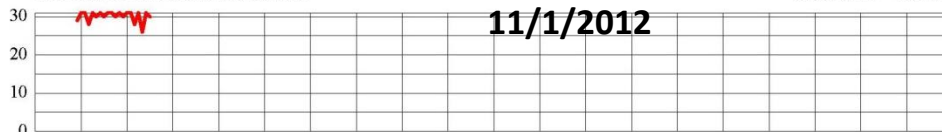
Well completed:
11/1/2012

Initial production:
~760 BOE/day

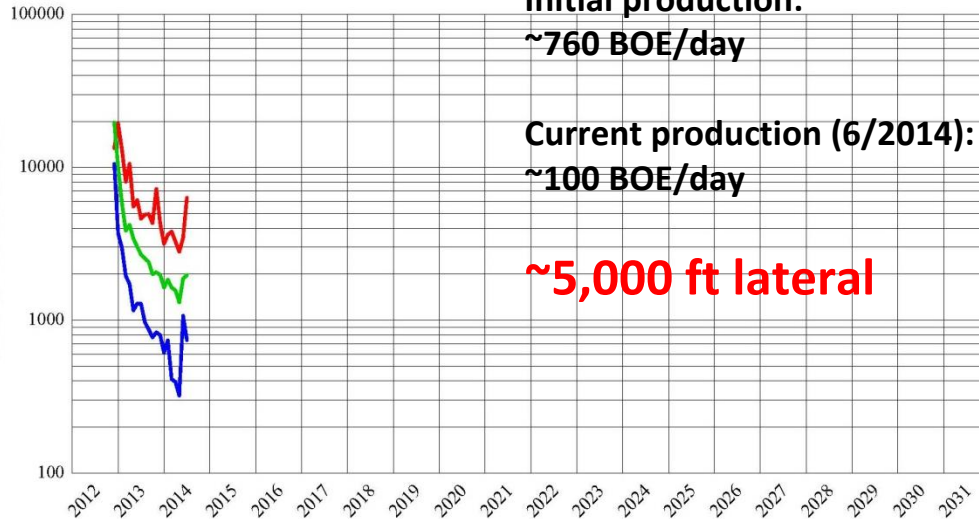
Current production (6/2014):
~100 BOE/day

~5,000 ft lateral

DAYS



BBLS PER MONTH

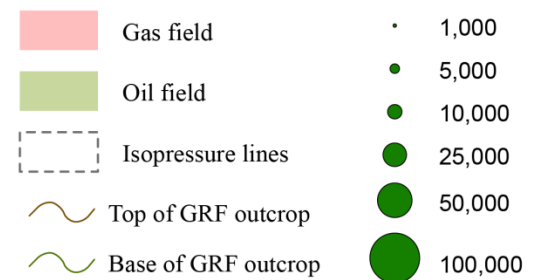


ARBON CO.

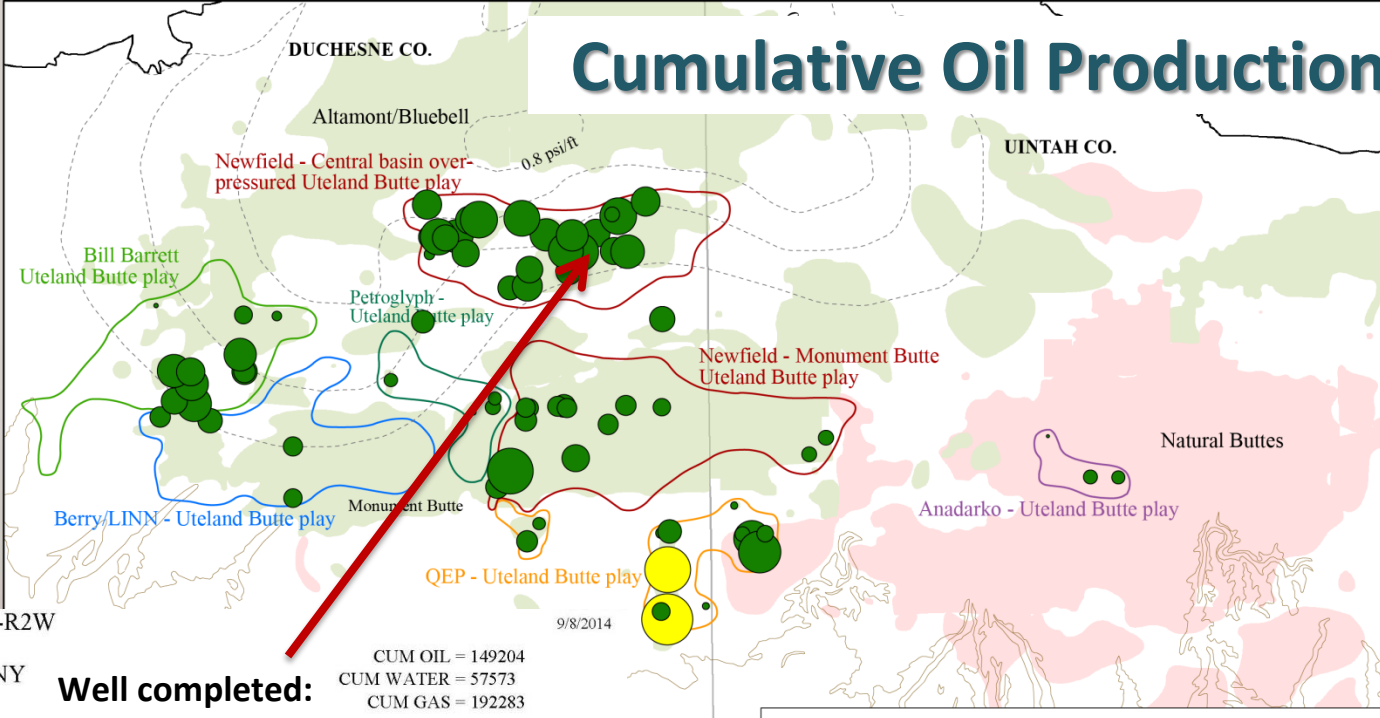
MCF PER MONTH

10 Miles

Cumulative Oil Production



Cumulative Oil Production



#43-013-52106-00-00 SWSW 10-T3S-R2W
Close 4-15-22-3-2WH
NEWFIELD PRODUCTION COMPANY
NORTH MYTON BENCH

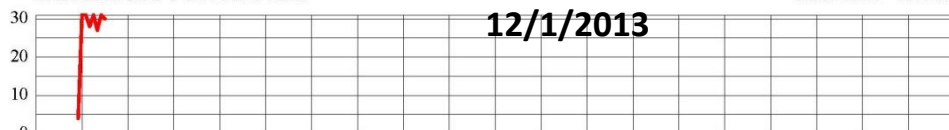
Well completed:
12/1/2013

Initial production:
~1500 BOE/day

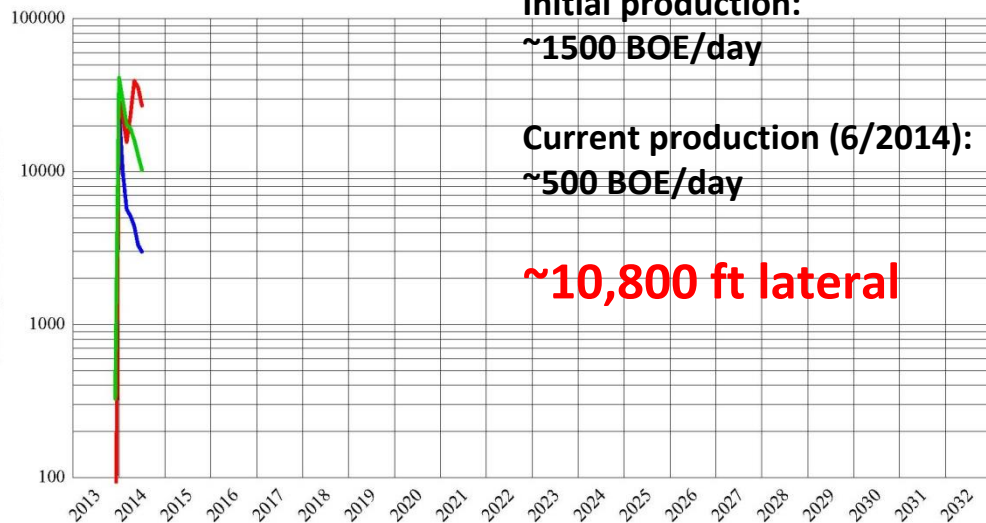
Current production (6/2014):
~500 BOE/day

~10,800 ft lateral

DAYS



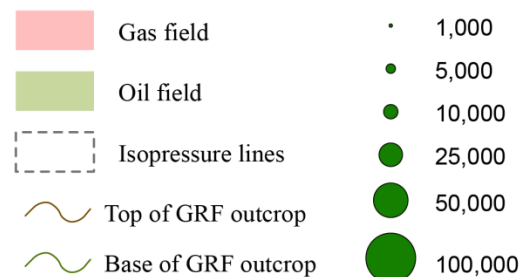
BBLS PER MONTH



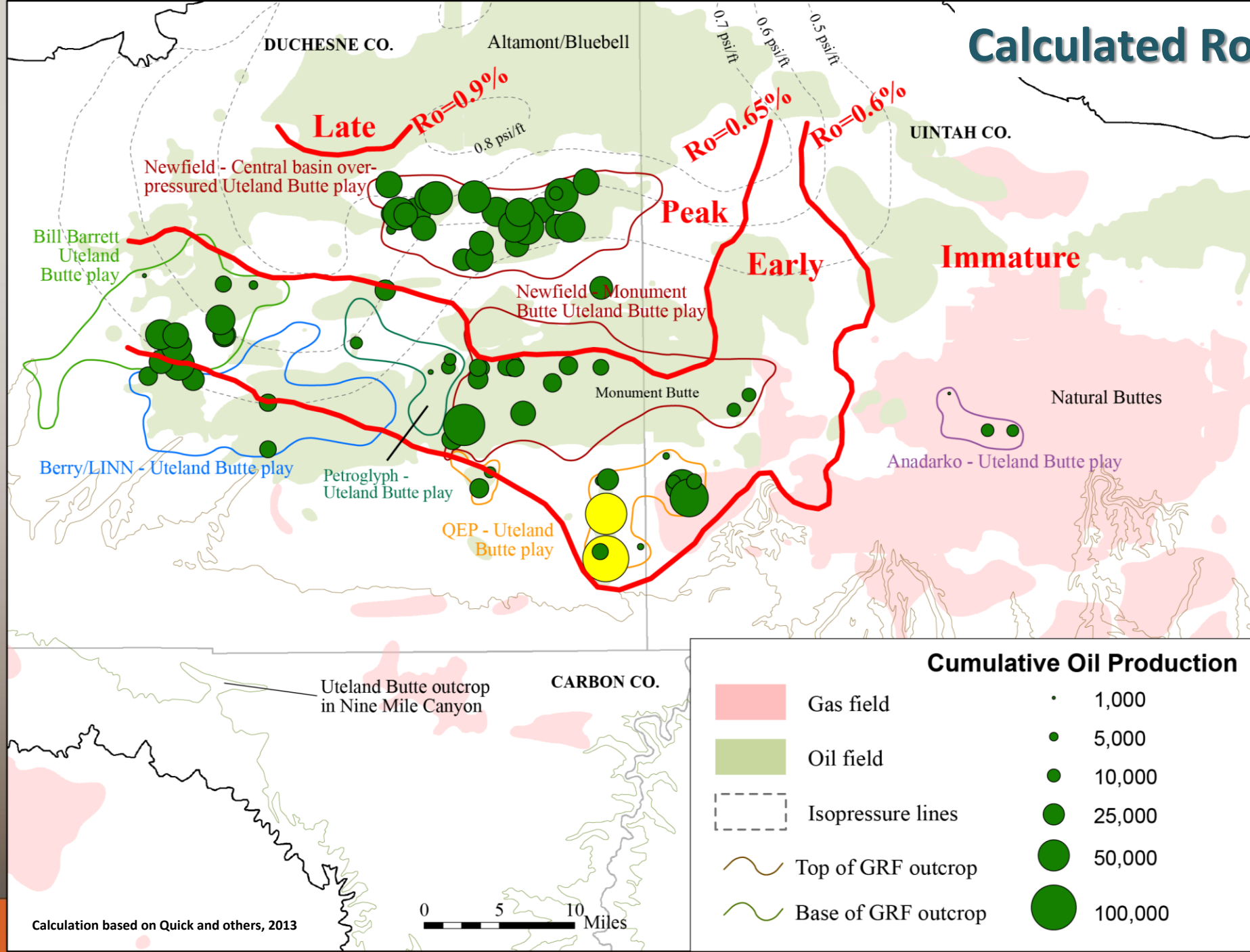
CARBON CO.

MCF PER MONTH

Cumulative Oil Production



Calculated Ro



- **Regional horizontal play in the lower Green River Formation, Uinta Basin**
 - Centered in central Duchesne County
 - Distal facies of Uteland Butte
- **Self sourcing**
 - But, oil could migrate to thermally immature areas (more proximal facies) to the south and east
 - TOC values range between 2 and 5%
- **Tight reservoir**
 - Thin dolomite beds (up to 3): 2-7 ft each; total net pay: 2-14 ft
 - Porosity: 14-26%; permeability: 0.02-0.08 mD
 - Significant diagenesis (chert, etc.)
 - Well completion strategies still being explored (hydro. fracturing, acid)
- **Keys to economic production:**
 - Over-pressured portion of the basin
 - Thicker dolomite beds (maybe?)
 - Long laterals >10,000 ft
 - Natural fractures



- **Additional geologic characterization**
 - Refined regional mapping
 - Outcrop evaluation
 - Facies delineation
 - Petrographic analyses
 - Origin of the dolomite (primary?, diagenetic?) and how it might relate to reservoir quality
- **Geomechanical analysis and well completion strategies**
 - Triaxial testing, fracture toughness, fluid sensitivity
 - Mechanical stratigraphy
 - In-situ stress regimes
 - Collaboration with EGI and TerraTek,
A Schlumberger company
- **Further refine keys to economic production**
 - “Sweet spot” mapping

