



Chapter 2

GEOLOGY

Geologists

Wellside



oitation

Sedimentologist



Chapter 2

Where were the hydrocarbons?

- Cherokee Beach Sands
- Shoestring Sands
- Previous Geologic Models



Chapter 2

Where are the hydrocarbons?

What is the current
geologic model?



Chapter 2

Where and in what direction
should I plan my well path?



Chapter 2

Is there a preferential
direction to permeability?



Chapter 2

Is directional permeability a result of depositional systems or fractures or both?



Where are the Hydrocarbons?

Vertical wells require:

- Pre-drill estimate of oil in place
- Log evaluations
- Post-drill estimate of oil in place to select the perforating interval and turn the well over to production.



Where are the Hydrocarbons?

Horizontal well placement requires:

- Input as to where the hydrocarbons are in the reservoir aerially as well as vertically.

What are the best criteria to determine the optimum direction and true vertical depth of the well path?



Geology

The following issues dramatically impact horizontal well orientation and completion design:

- Depositional environment
- Natural fractures
- Wellbore stability



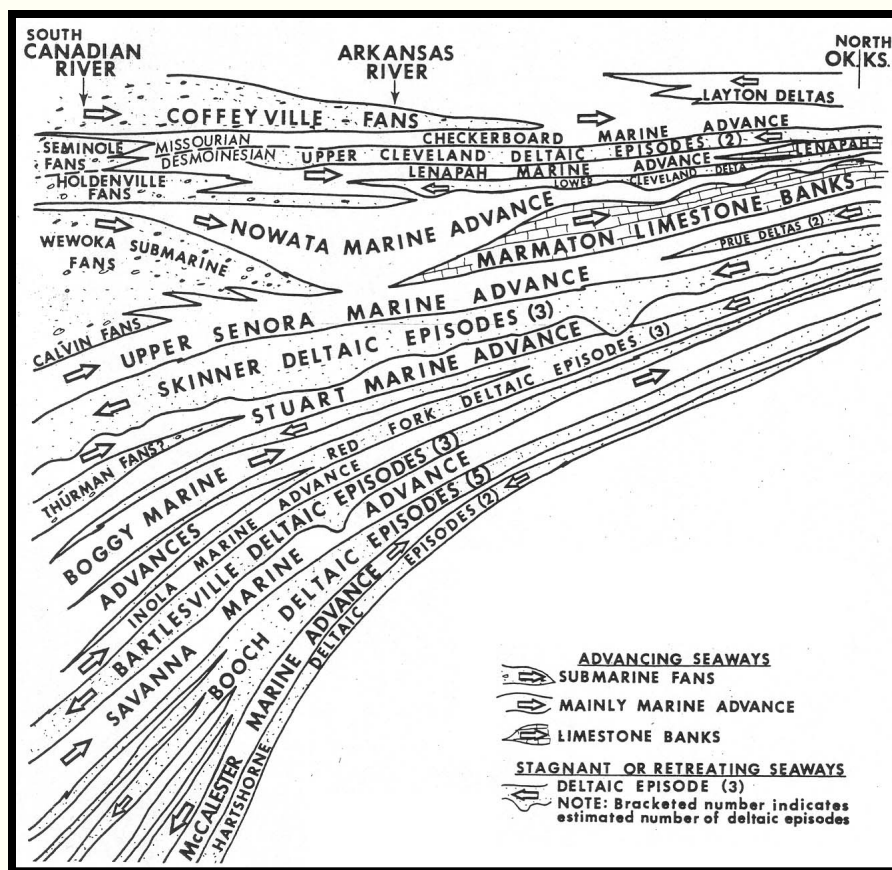
Geology

An accurate description of YOUR field is critical to the success of the horizontal project.

This workshop will concentrate on Pennsylvanian Sandstone Reservoirs.

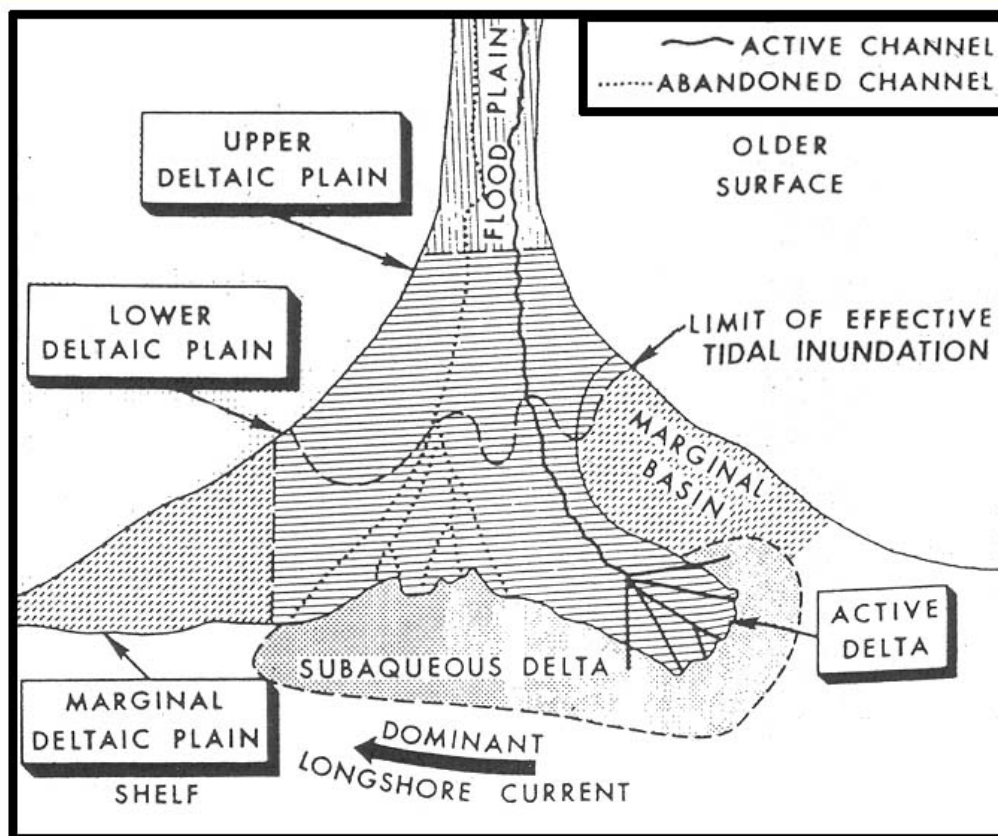


Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Bartlesville Play





Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Bartlesville Play

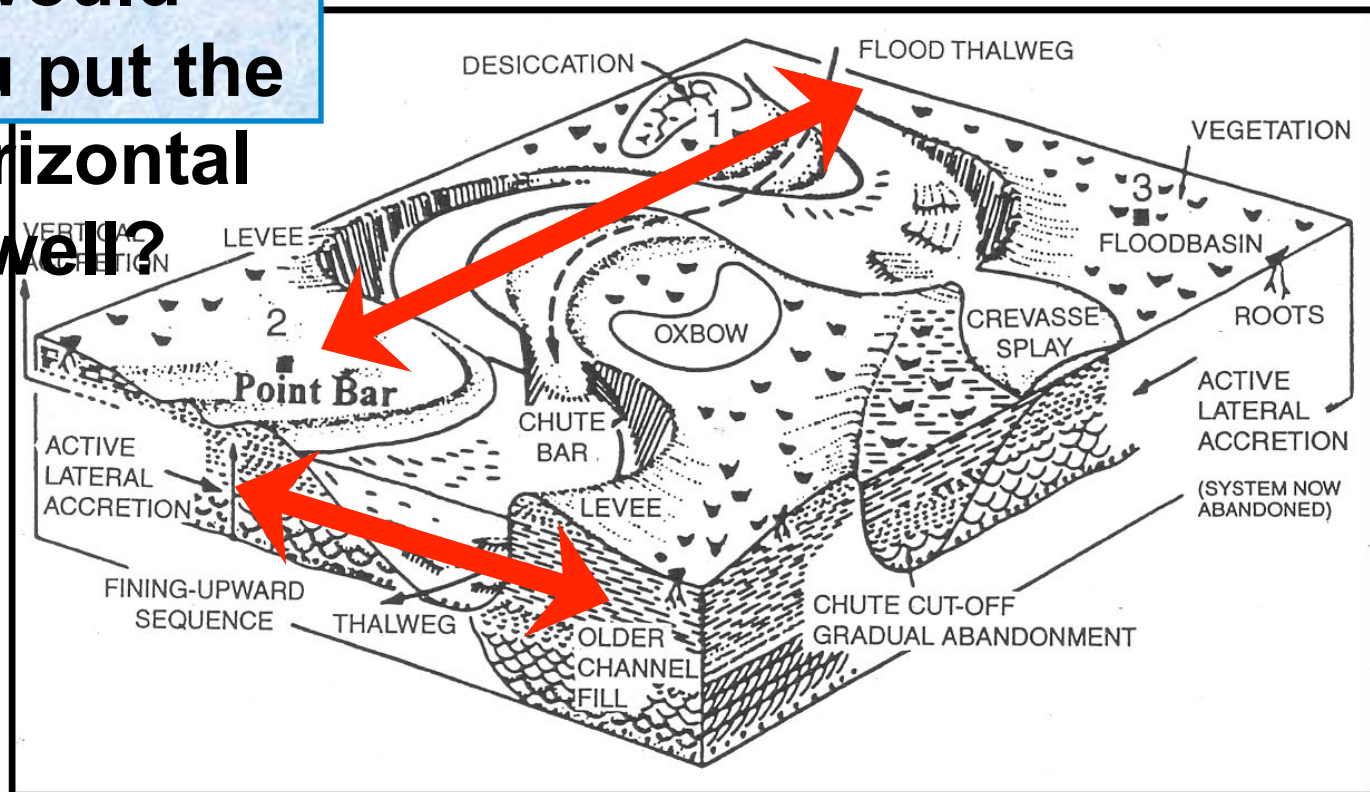


**Where is
your field
in this
system ?**



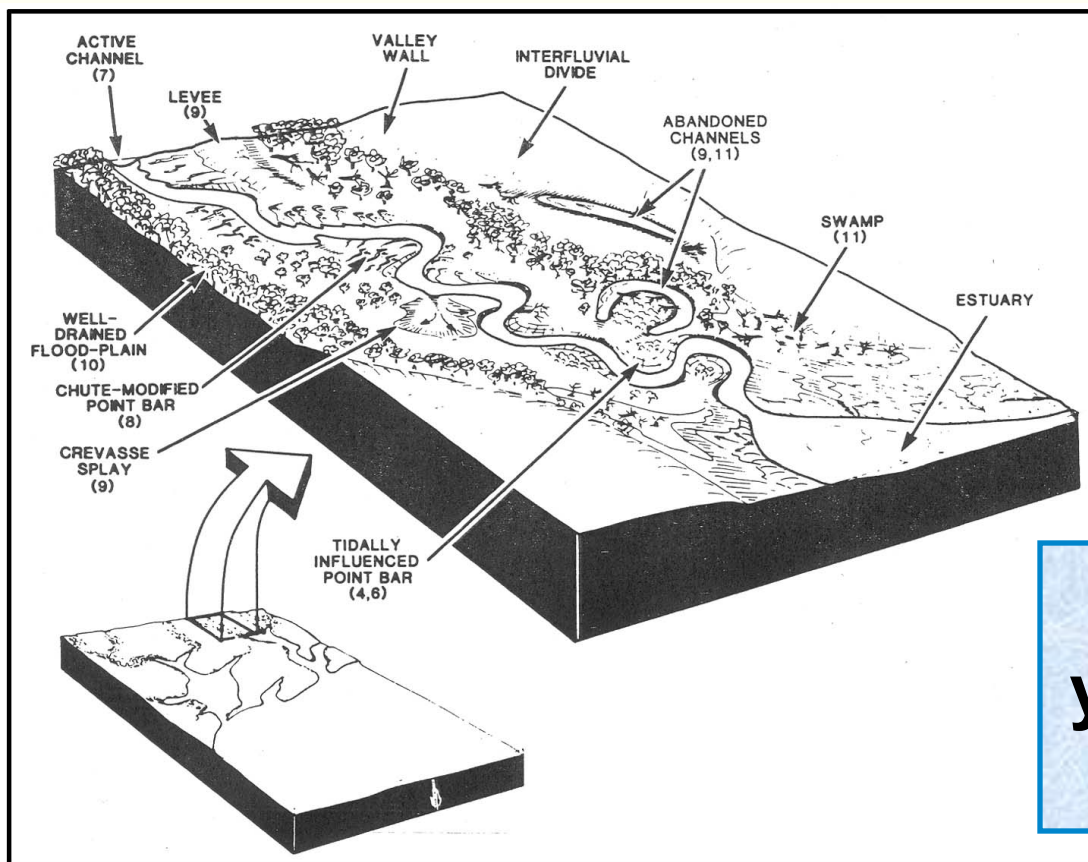
Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Bartlesville Play

Where would you put the horizontal well?





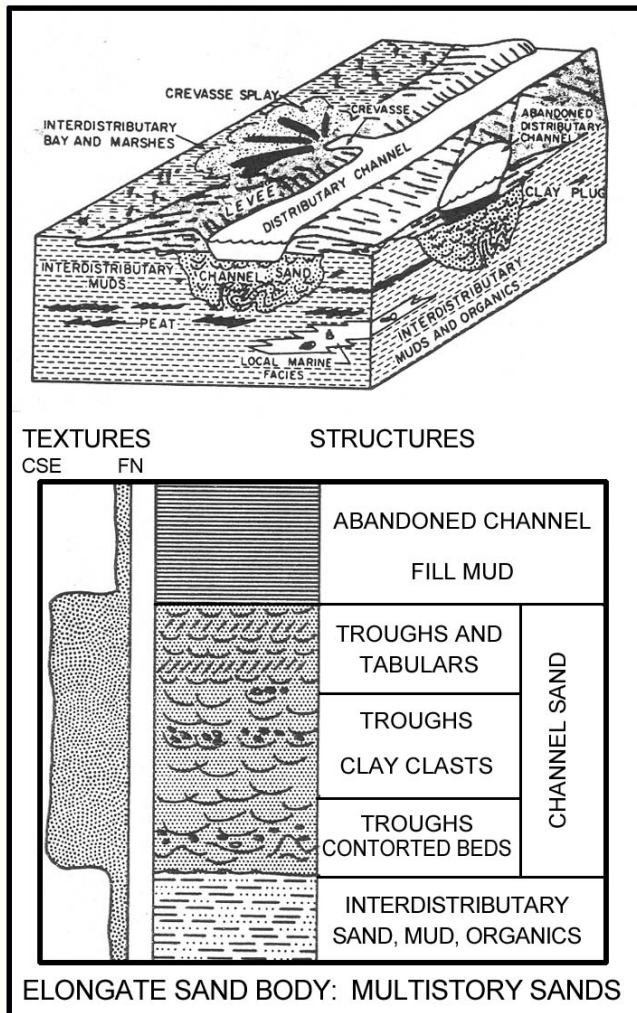
Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Bartlesville Play



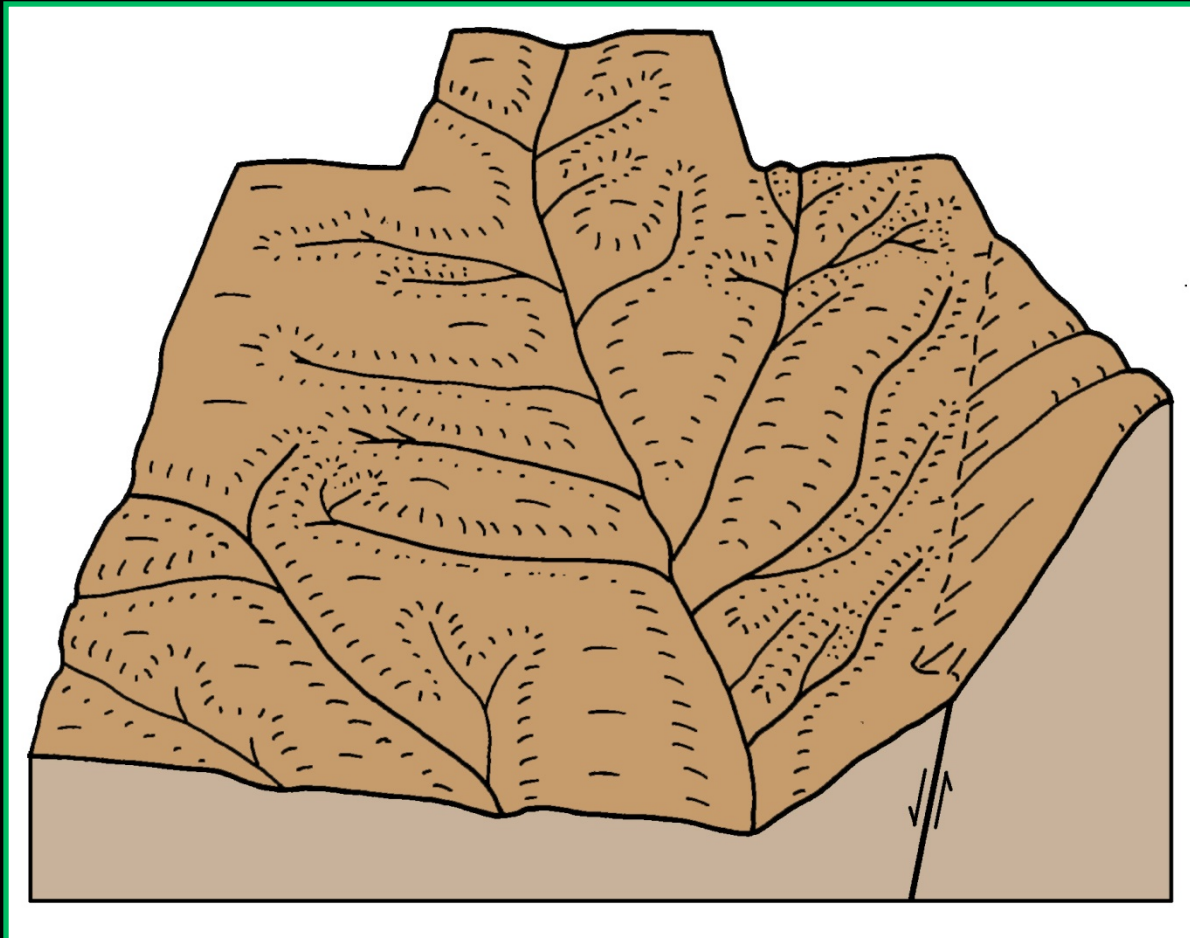
How do
you decide
well
direction?



Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Bartlesville Play

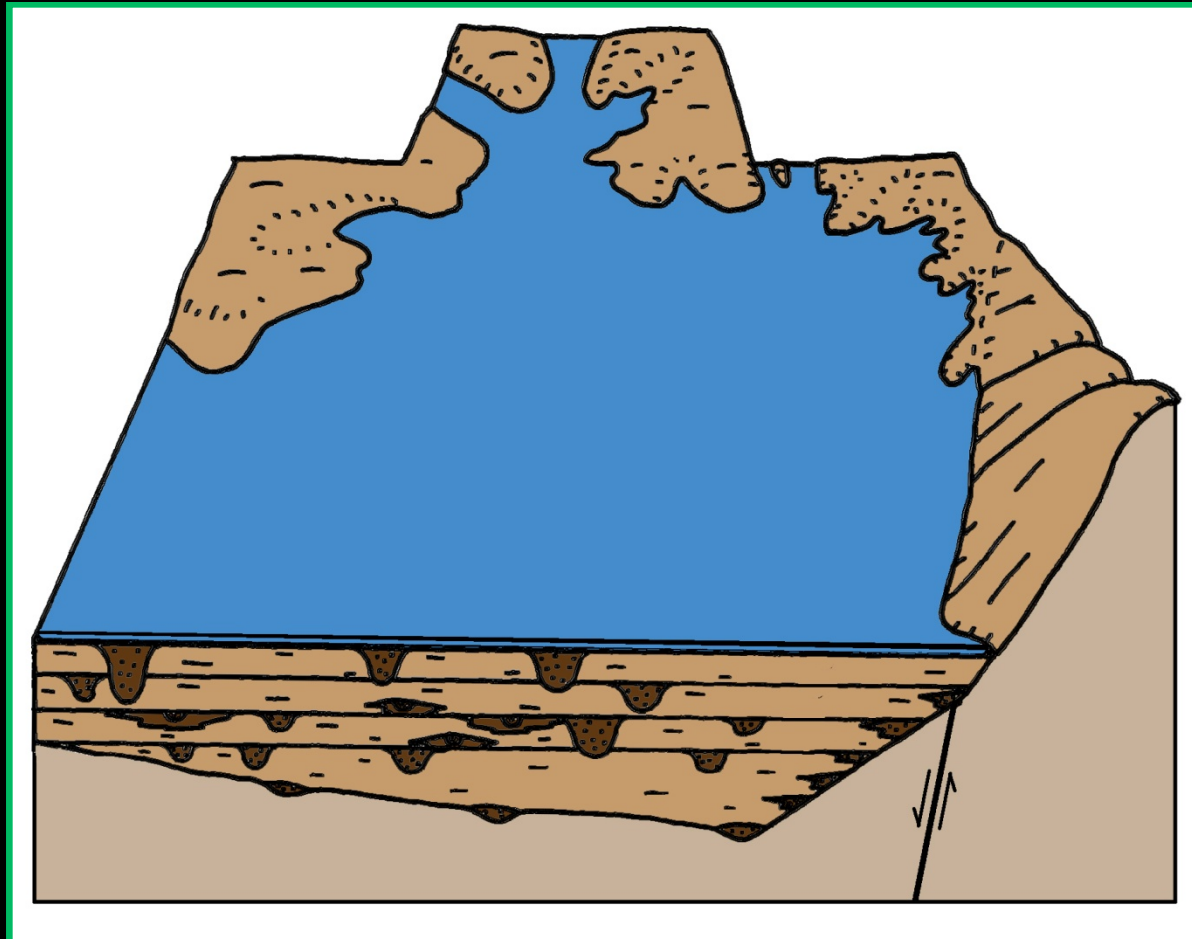


**Should you
drill
parallel or
transverse?**



**Regional Stratigraphy and Oil and Gas Potential of the McLouth Formation
in the Southern Forest City Basin of Northeast Kansas**
Thesis by Carl F. Dietz 1995

Transgression



Regression

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Thesis by Carl F. Dietz 1995

A NEW METHODOLOGY FOR OIL AND GAS EXPLORATION USING REMOTE SENSING DATA AND SURFACE FRACTURE ANALYSIS

Topical Report

August 1995

By
Genliang Guo
Herbert B. Carroll

February 1999

Performed Under Contract No. DE-AC22-94PC91008
(Original Report Number NIPER/BDM-0163)

BDM-Oklahoma, Inc.
Bartlesville, Oklahoma

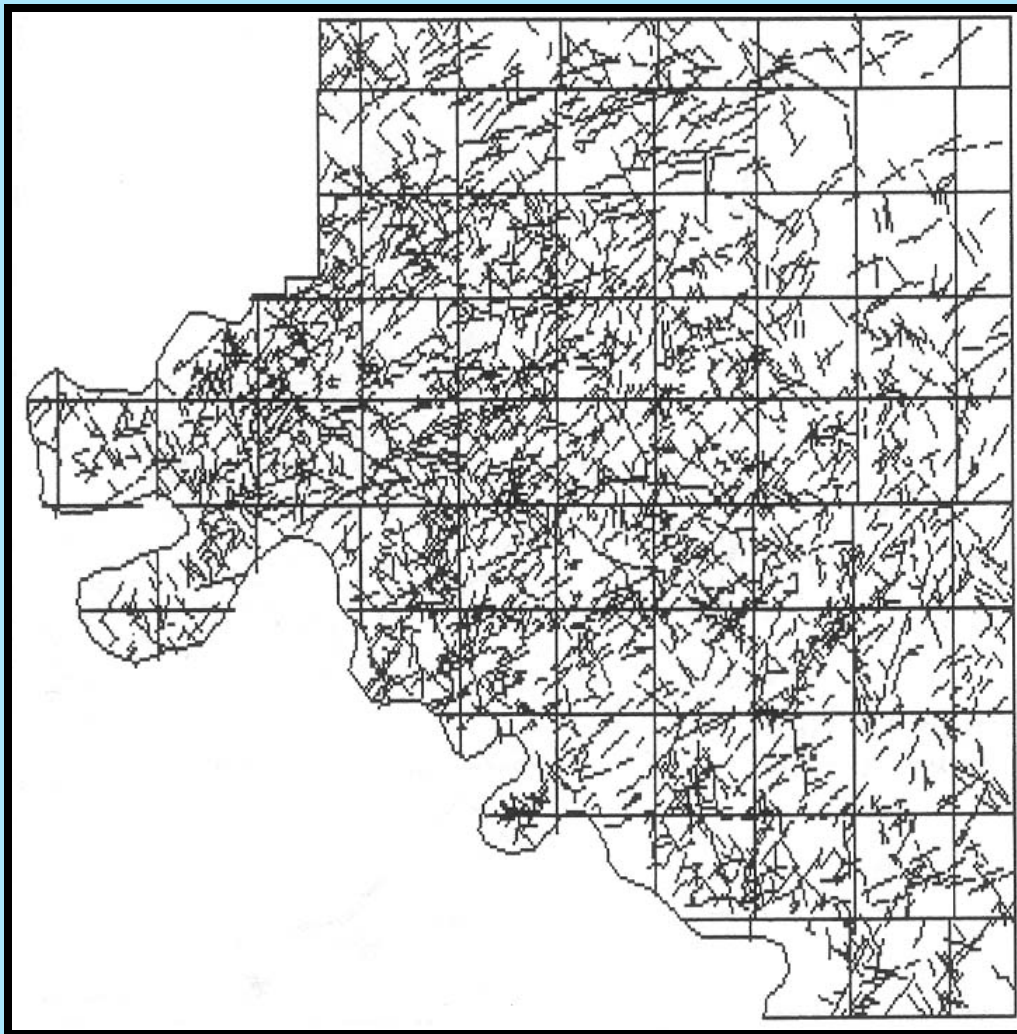


**National Petroleum Technology Office
U.S. DEPARTMENT OF ENERGY
Tulsa, Oklahoma**

FOSSIL FUELS

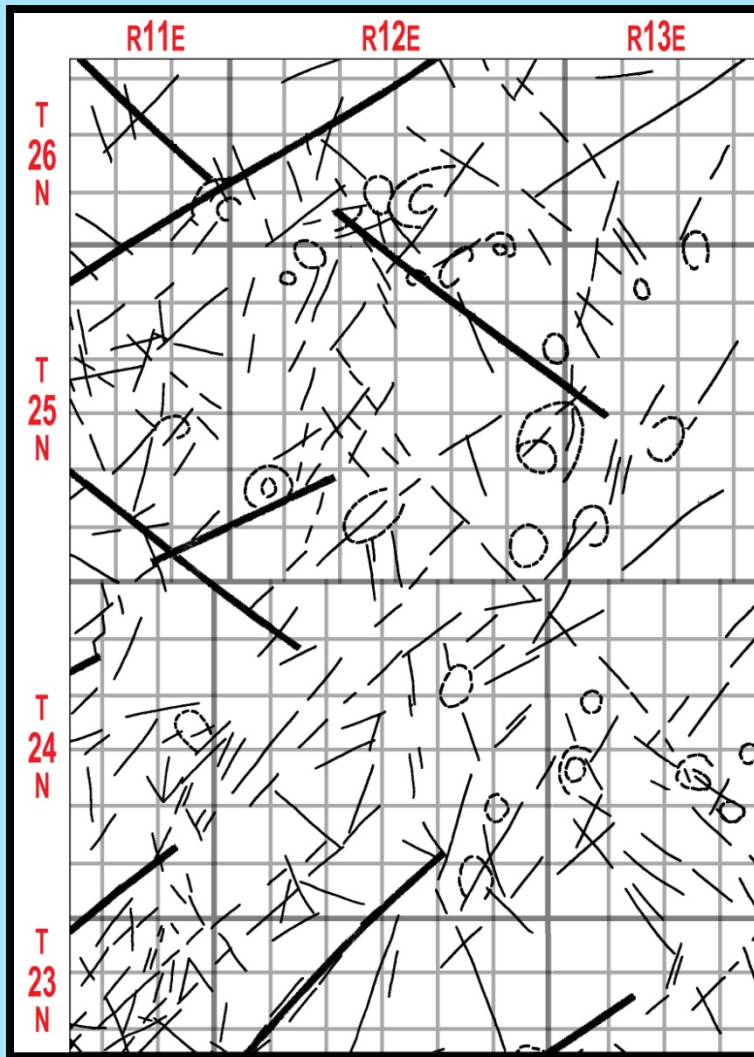


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FOSSIL ENERGY



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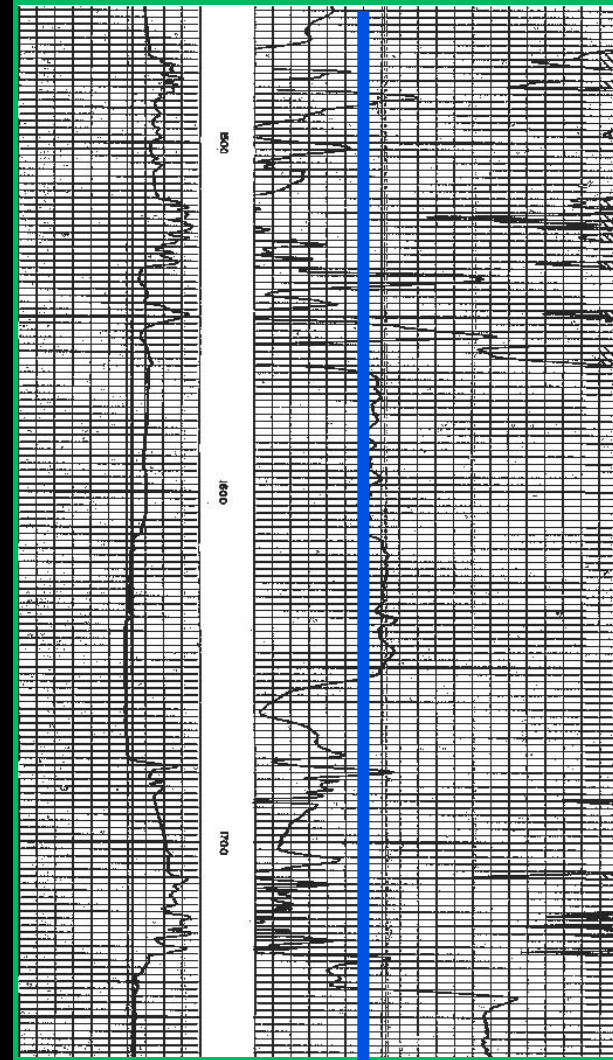
National Petroleum Technology Office
U.S. DEPARTMENT OF ENERGY
Tulsa, Oklahoma

Geologic Interpretations

Rock Mechanics

“Estimating
Compressive Strength
from Travel Time
from Sonic Logs”

by Ken Mason





Rock Mechanics

The answer to the wellbore stability question will determine completion technique:

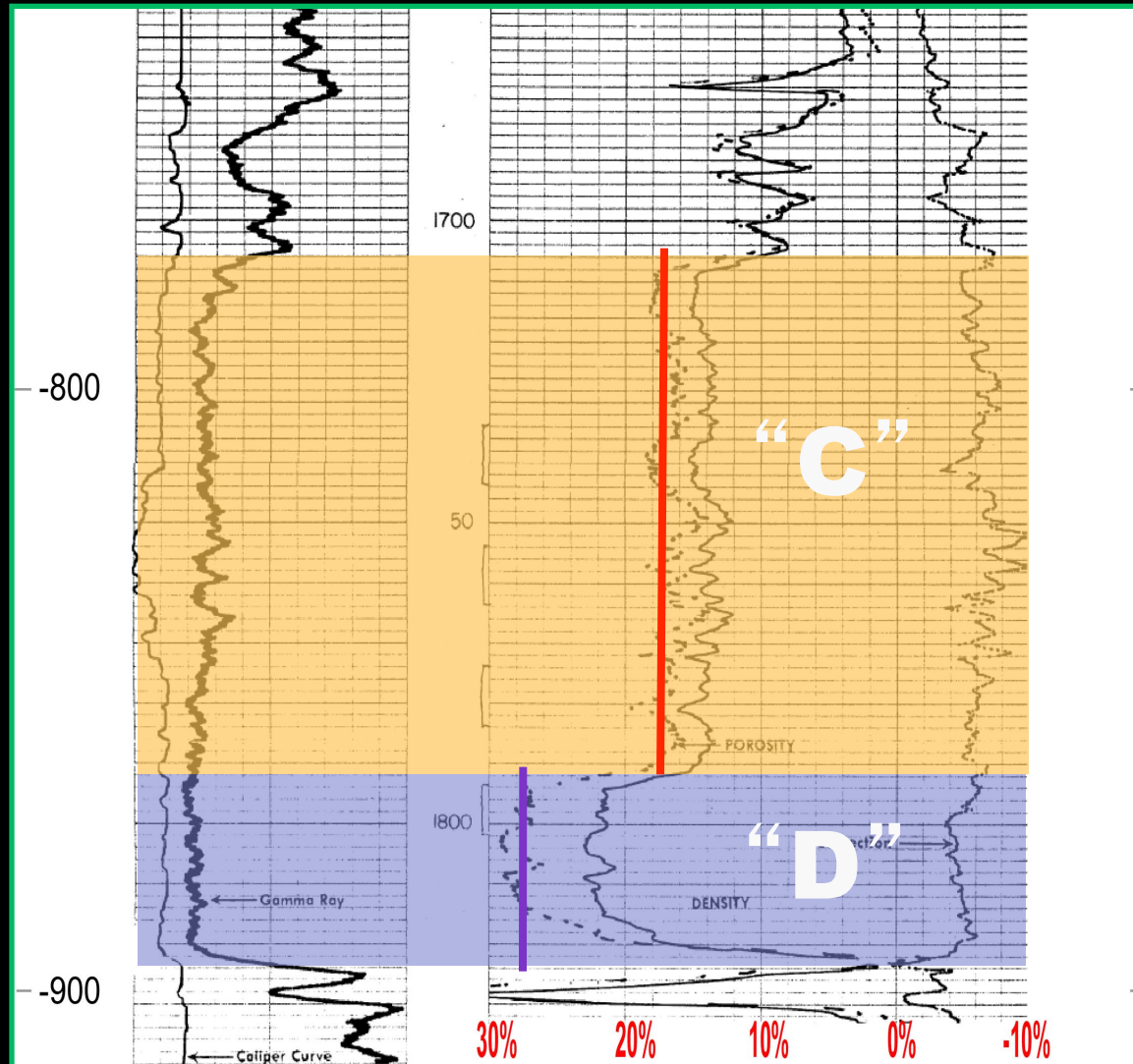
- Open-hole completion
- Slotted liner
- Cemented liner/casing

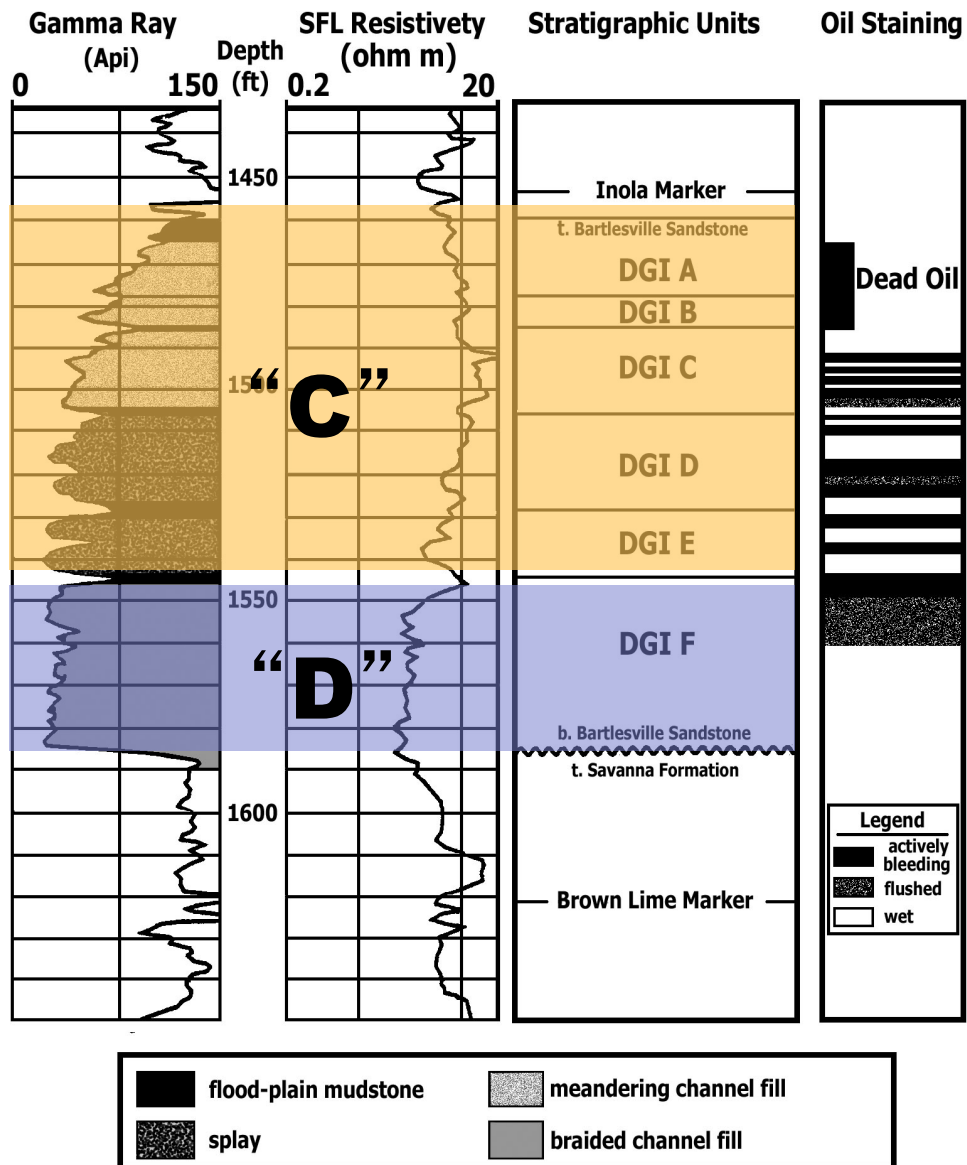


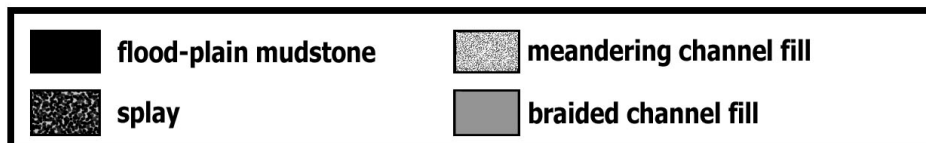
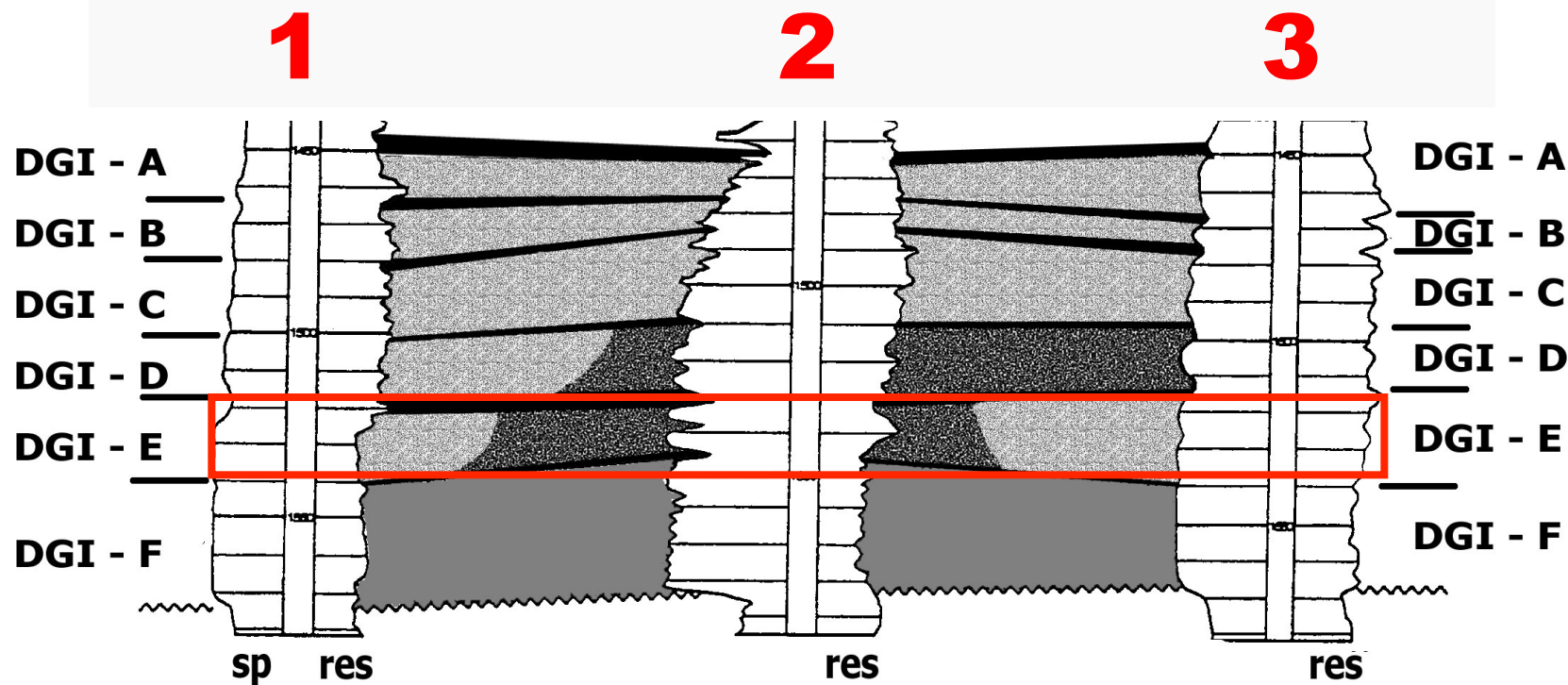
Geology

- Formation dip and strike
- Faults - 3D display
- Reservoir continuity

The Bartlesville “Zones”










**Meandering
Channel-fill Sandstone**


Splay Sandstone


Flood Plain Mudstone

DGI E



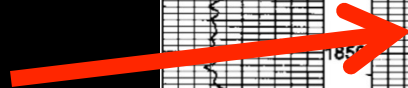
**What does the
Bartlesville
look like on an
induction log?**



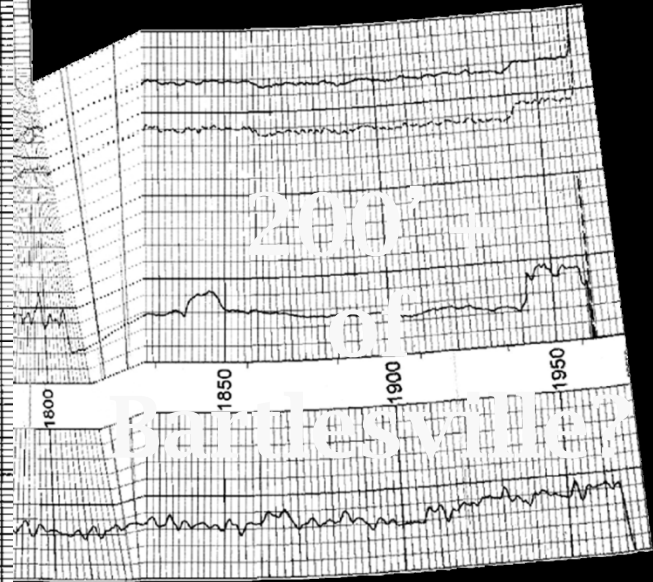
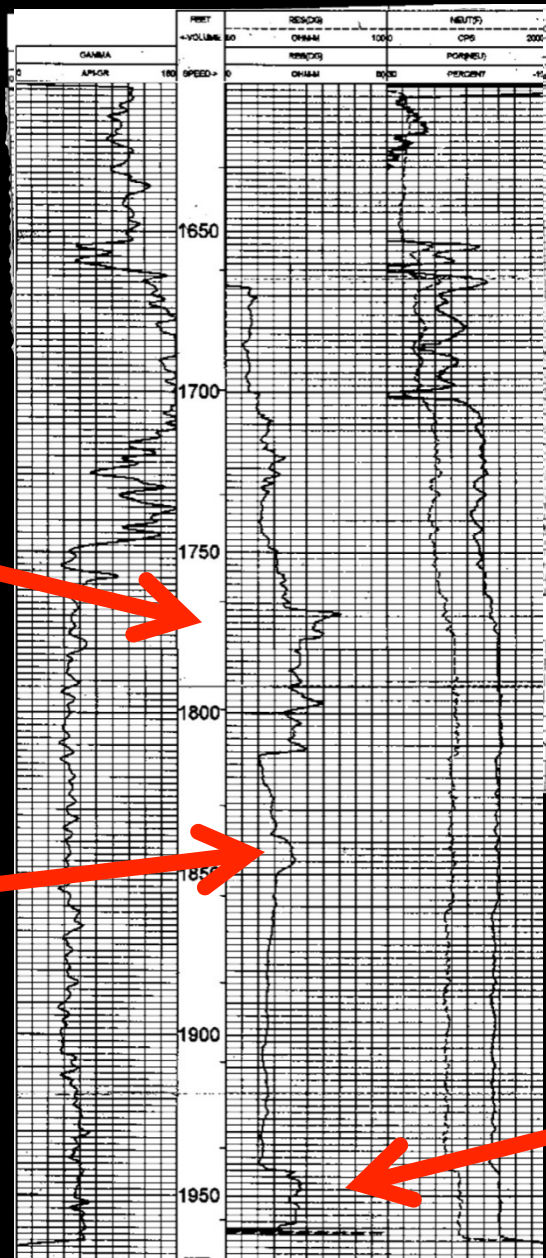
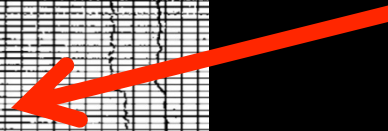
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Here?



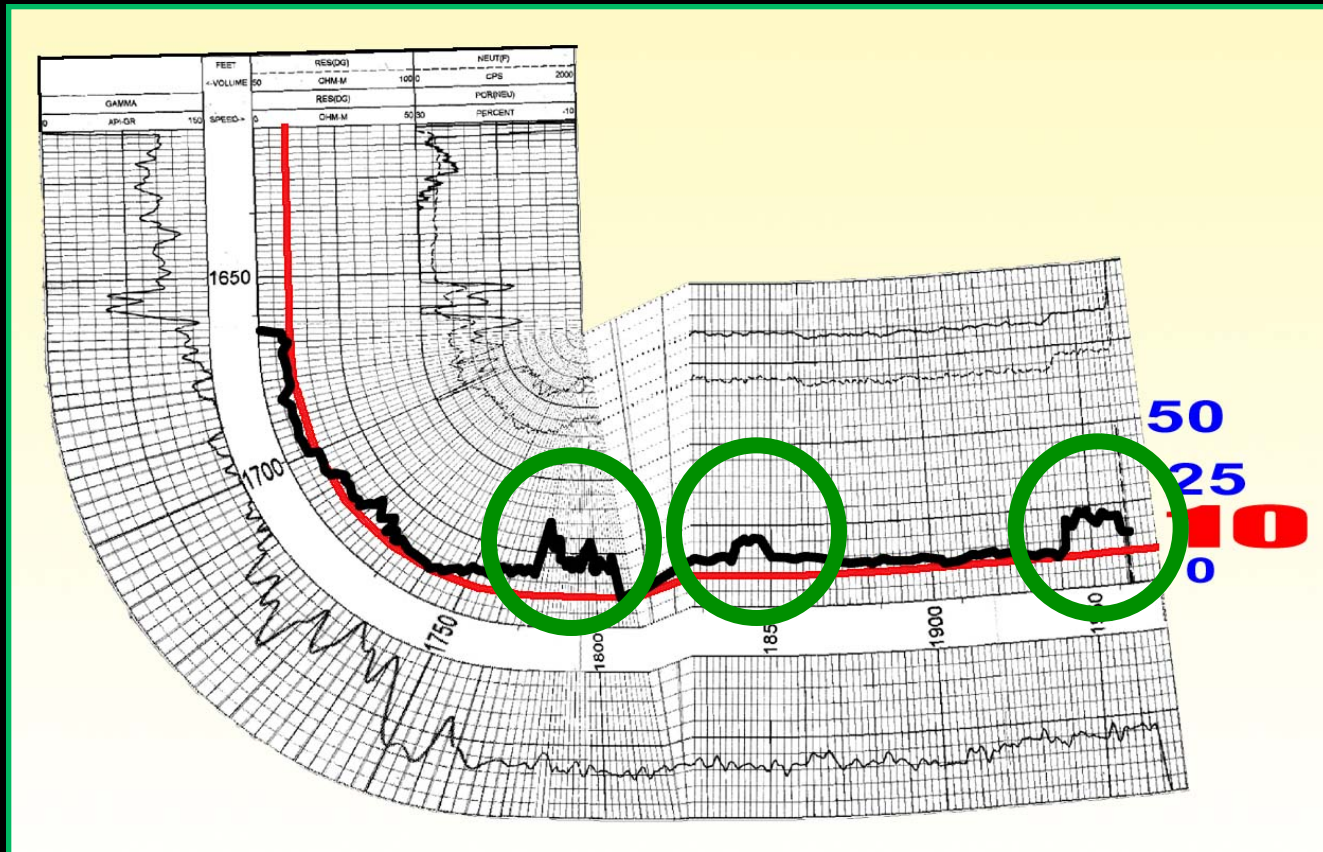
and/or here?





**What does a horizontal
well in the Bartlesville
look like on an
induction log?**

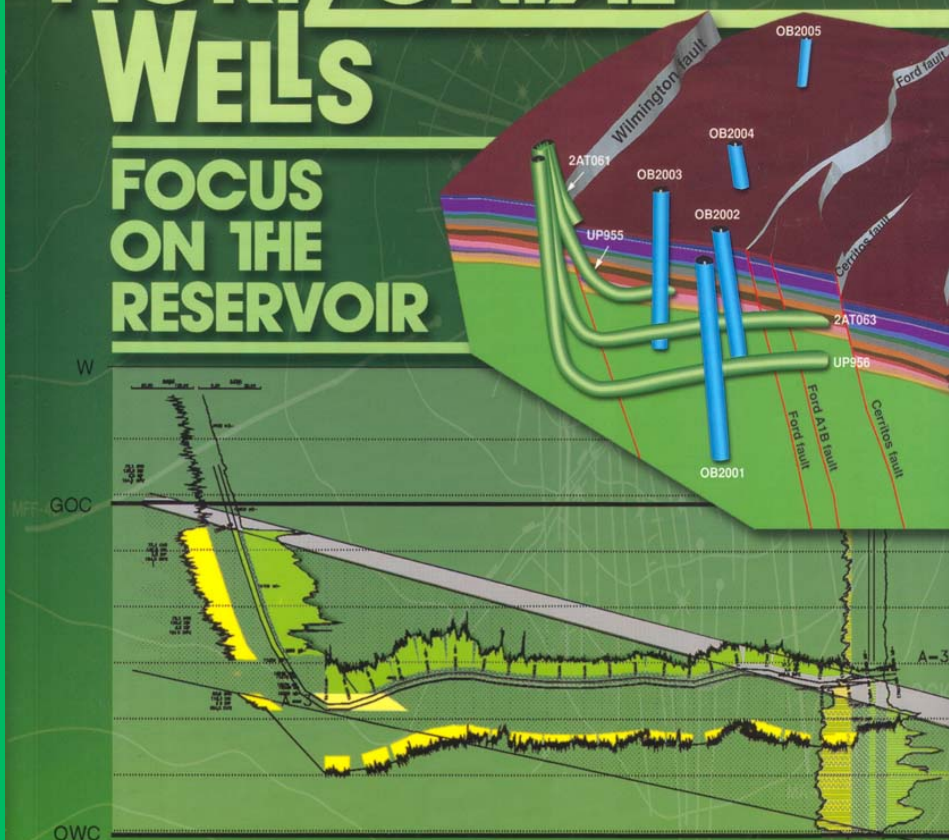
Compartmentalization



AAPG Methods in Exploration Series No. 14

HORIZONTAL WELLS

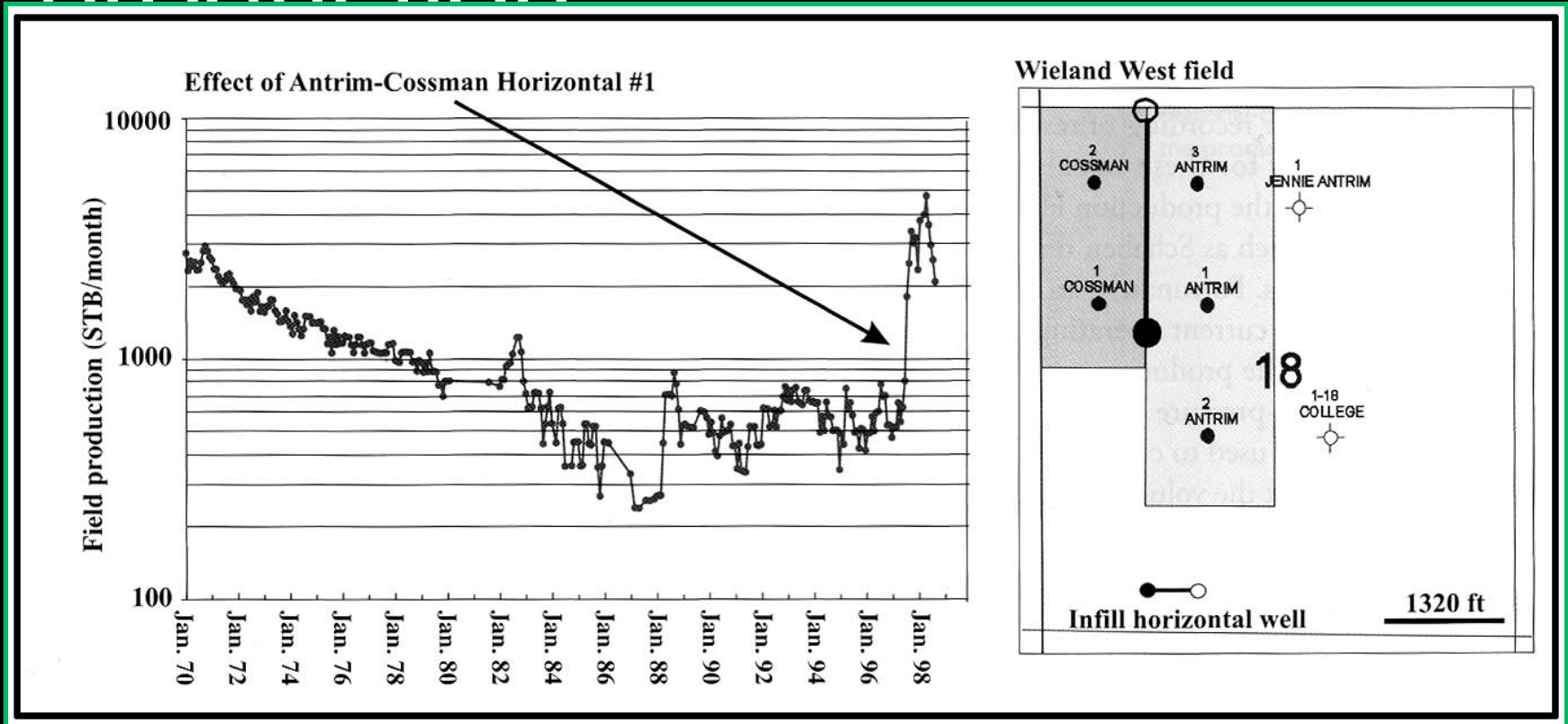
FOCUS ON THE RESERVOIR



Edited by
Timothy R. Carr
Erik P. Mason
Charles T. Feazel



Effect on monthly field production



Location of infill horizontal well and its effect on monthly field production



Geology Conclusion

- Determine target direction and true vertical depth.
- Determine target window based on target thickness, strike and dip.
- Consider lease lines and required legal spacing.
- Consider rock mechanics in the completion design.