

Pecos West Abo Field

New Mexico Oil Conservation Division Spacing Hearing

Mckay Oil

August 23, 2007

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Oil Conservation Division
Case No. _____
Exhibit No. 1

Rock Resources LLC

Objectives

- Address Pecos West Abo Field Well Spacing
- Horizontal Well vs. Vertical Well Spacing
- Well Drainage Area (EUR vs. CUM)
- Mitigation of Surface Disruption
- Proposed Future Development
- Conclusions

Original Gas-In-Place

$$G = \frac{EUR}{RF}$$

G=Original Gas-in-Place

RF= Recovery Factor (.65 for Abo Sandstones)

EUR=Estimated Ultimate Recovery

(Cumulative Produced Gas + Last Year's Production Extended 10 Years)

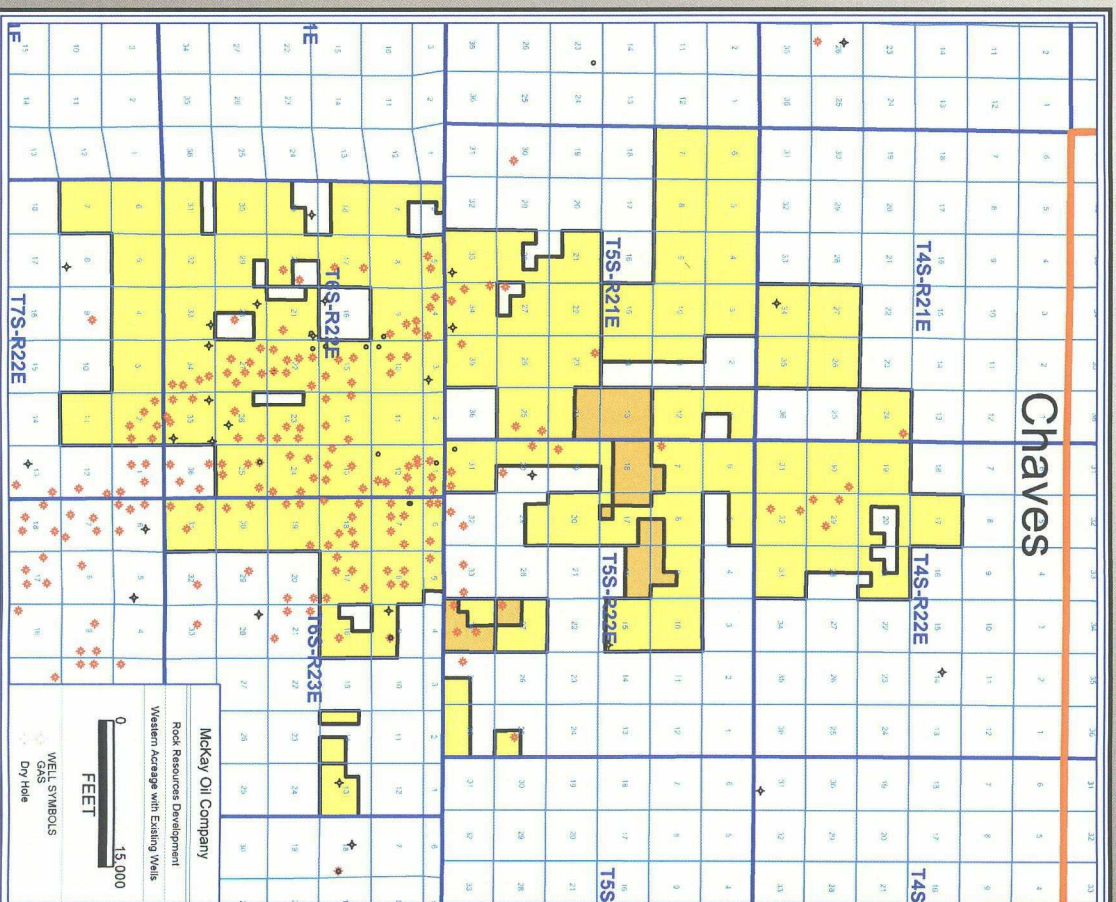
Area of Well Drainage

$$G = 43560 \frac{Ah\phi(1-S_w)}{B_{gi}}$$

$$A = \frac{GB_{gi}}{43560h\phi(1-S_w)}$$

- A = Area of Drainage (in Acres)
- G = Original Gas-In-Place
- B_{gi} = Formation Volume Factor (0.016 for the Abo Sandstones)
- φ = Porosity (Percentage of 100)
- h = Net Pay (Thickness of Gas Crossover)
- S_w = Water Saturation (Used 35% Although Abo Produces Little Water)

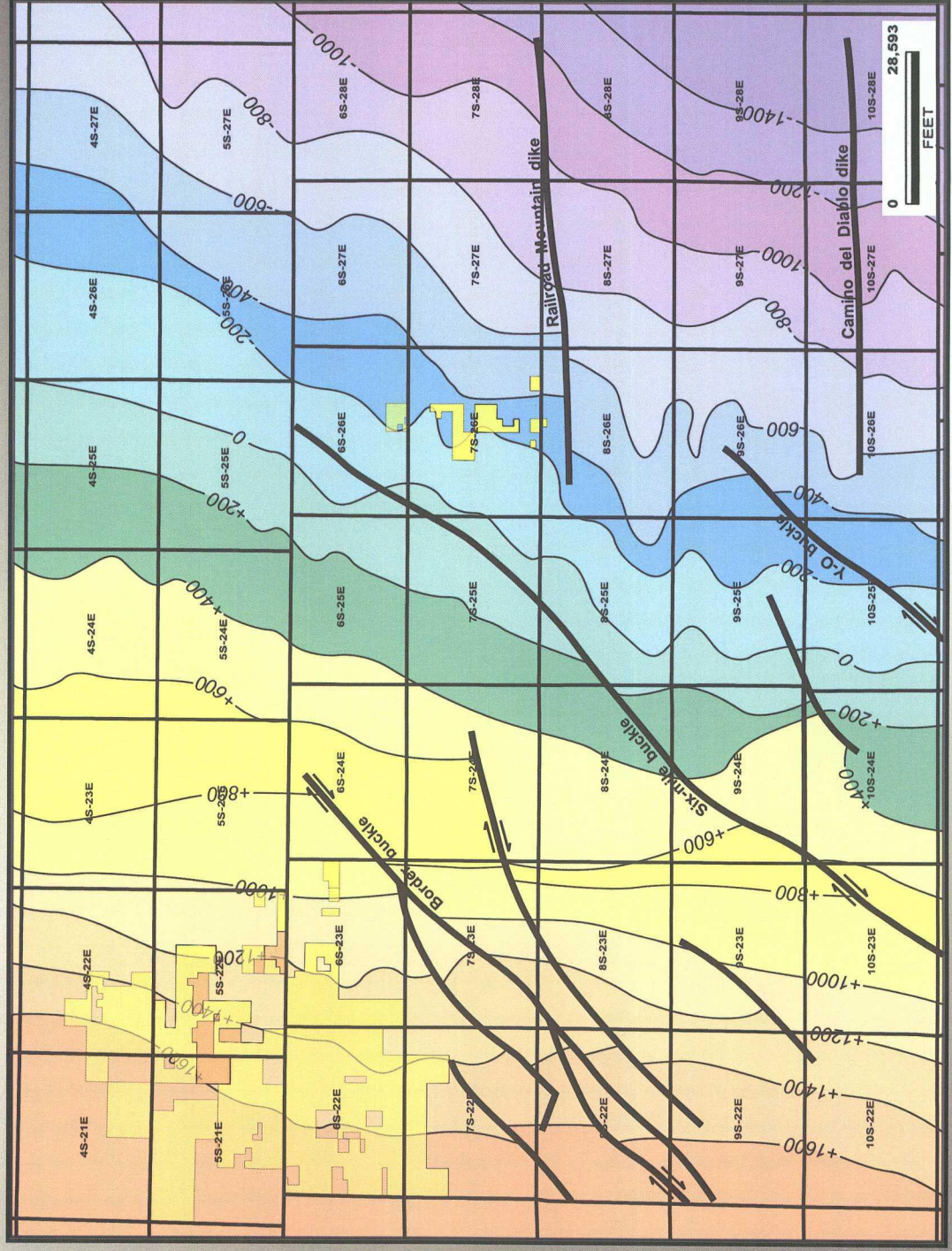
Acreage



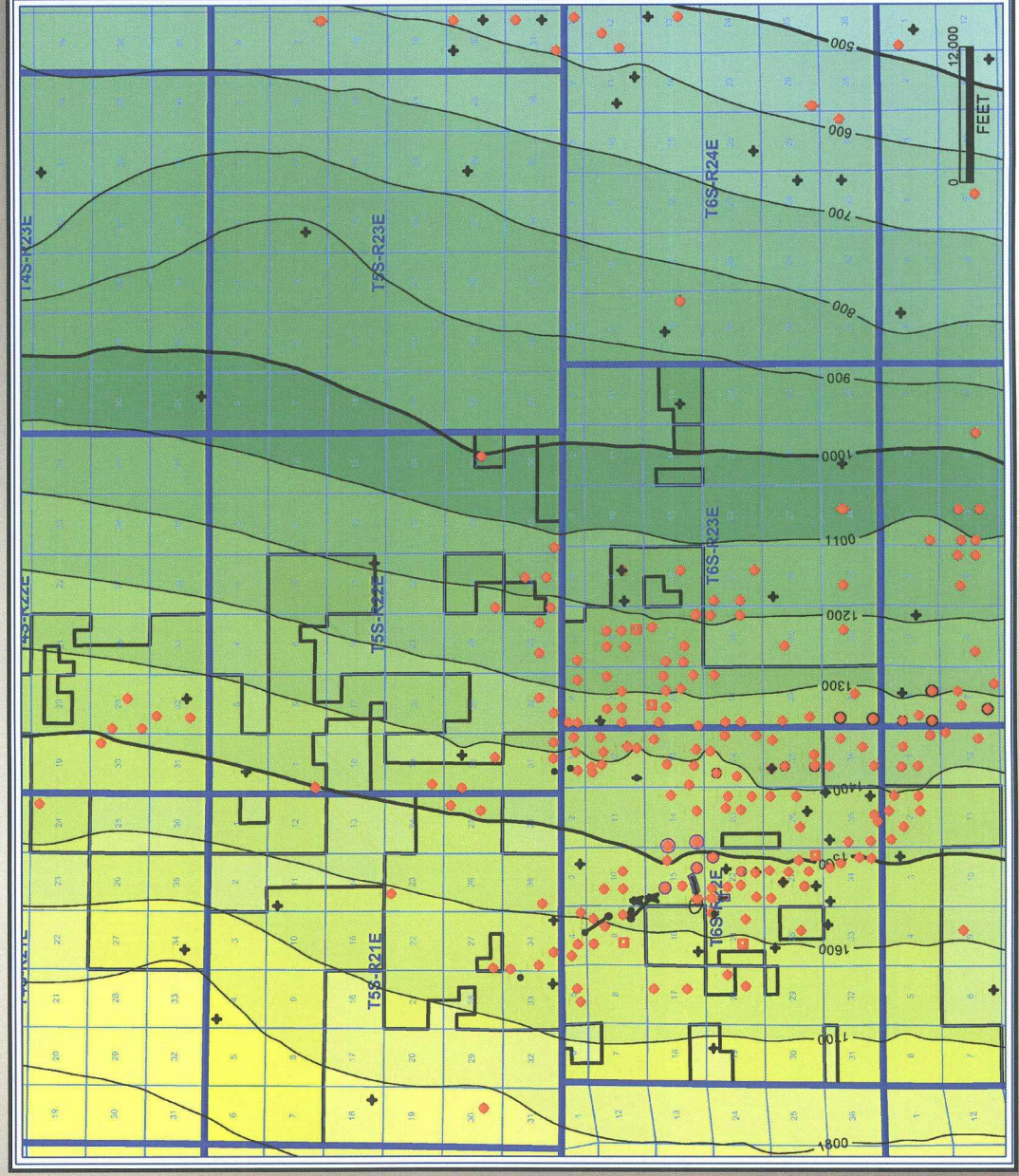
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Structure Map Top of Abo



Abo Structure Western Acreage



Abo Sandstone Core



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Abo Sandstone & Shale Core



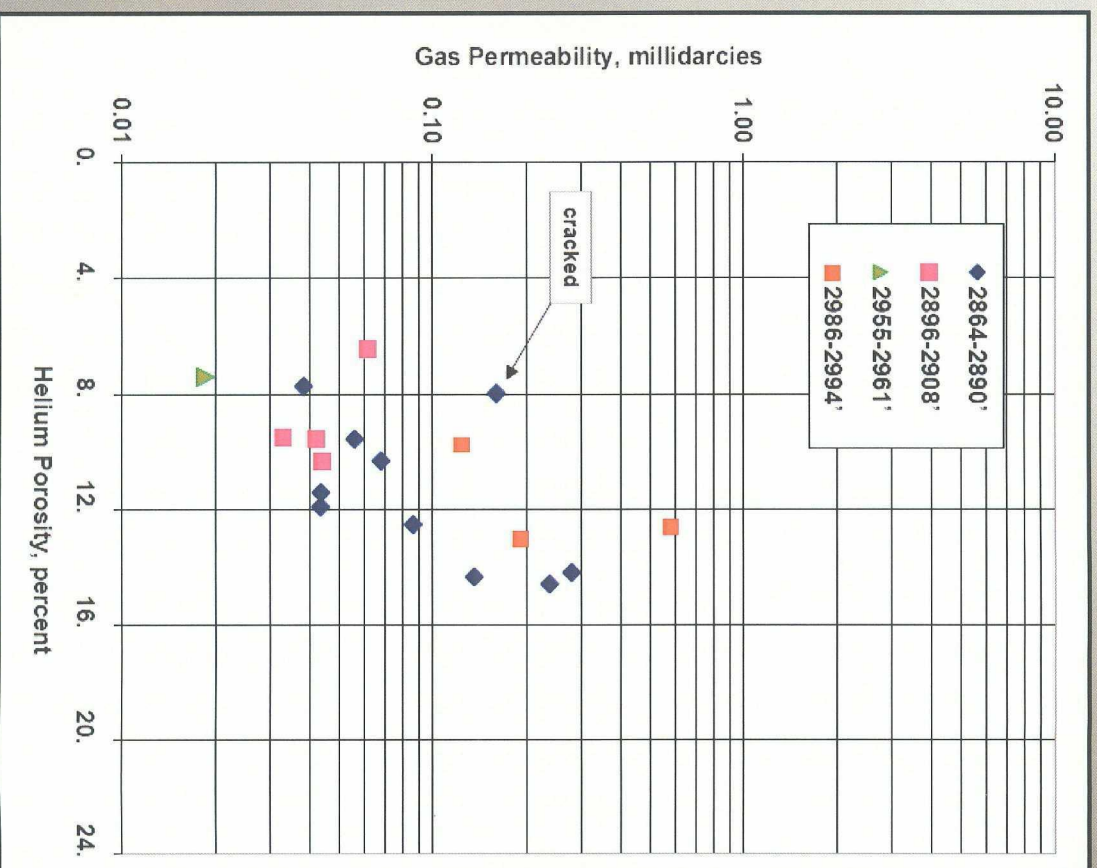
ROCK RESOURCES
South 4 Mile Draw Federal # 7 H Y
CHAVES COUNTY, NEW MEXICO
2,875 To 2,885



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Abo Ss. Porosity Vs. Permeability



Abo Sandstone Parameters

Depth to Reservoir = 2,800 – 4,100 Feet

Range of Sandstone Pay Thickness = 4-35 Ft.

Average Thickness of Sandstone Pay = 22 Ft.

Range of Reservoir Porosity = 8-24%

Average Porosity = 15%

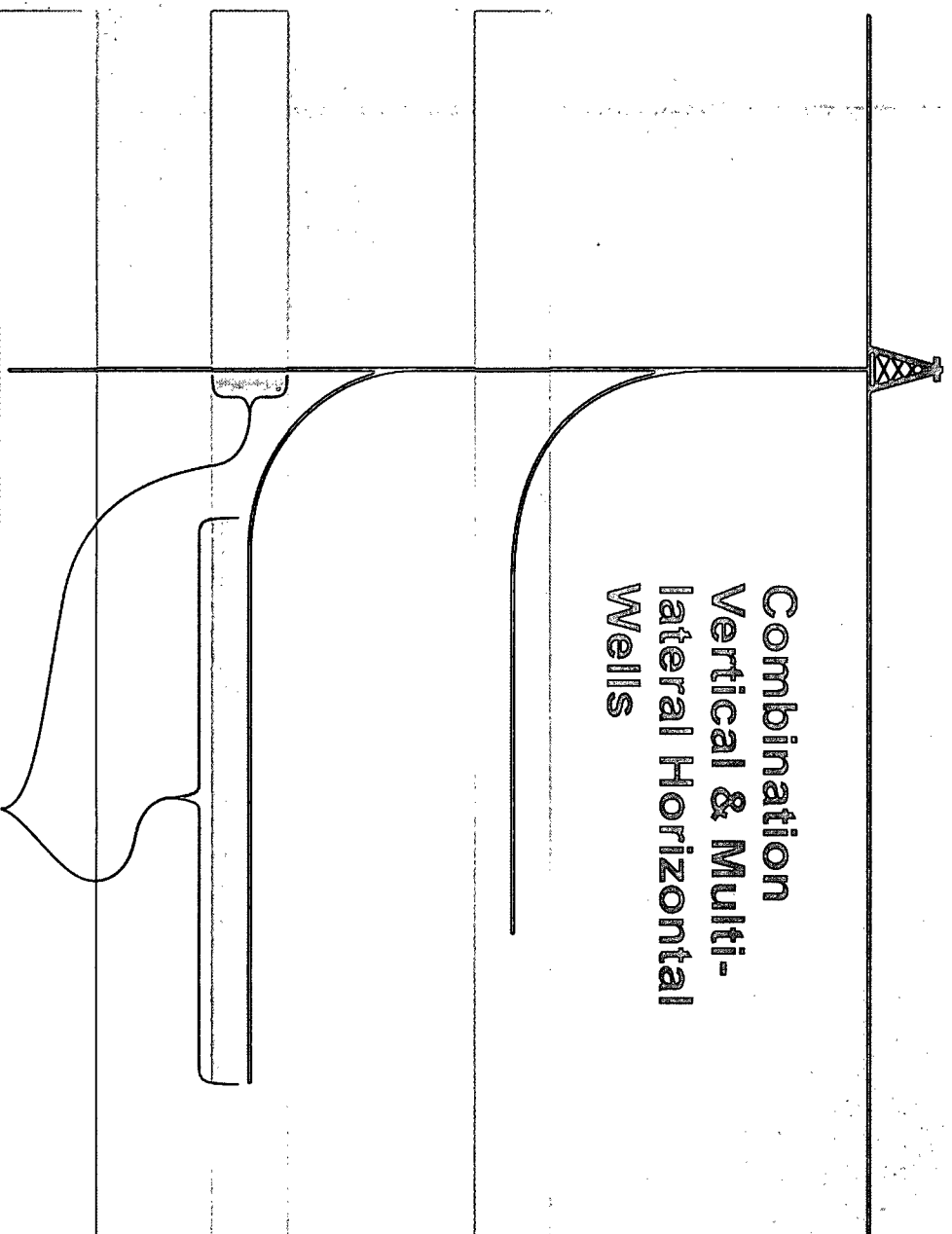
Range of Reservoir Permeability = 0.1-5.0 md

Average Permeability = 2.3 md

Range of Water Saturations = 0-40%

Average Water Saturation (S_w) = 35%

Advantages of Horizontal Drilling



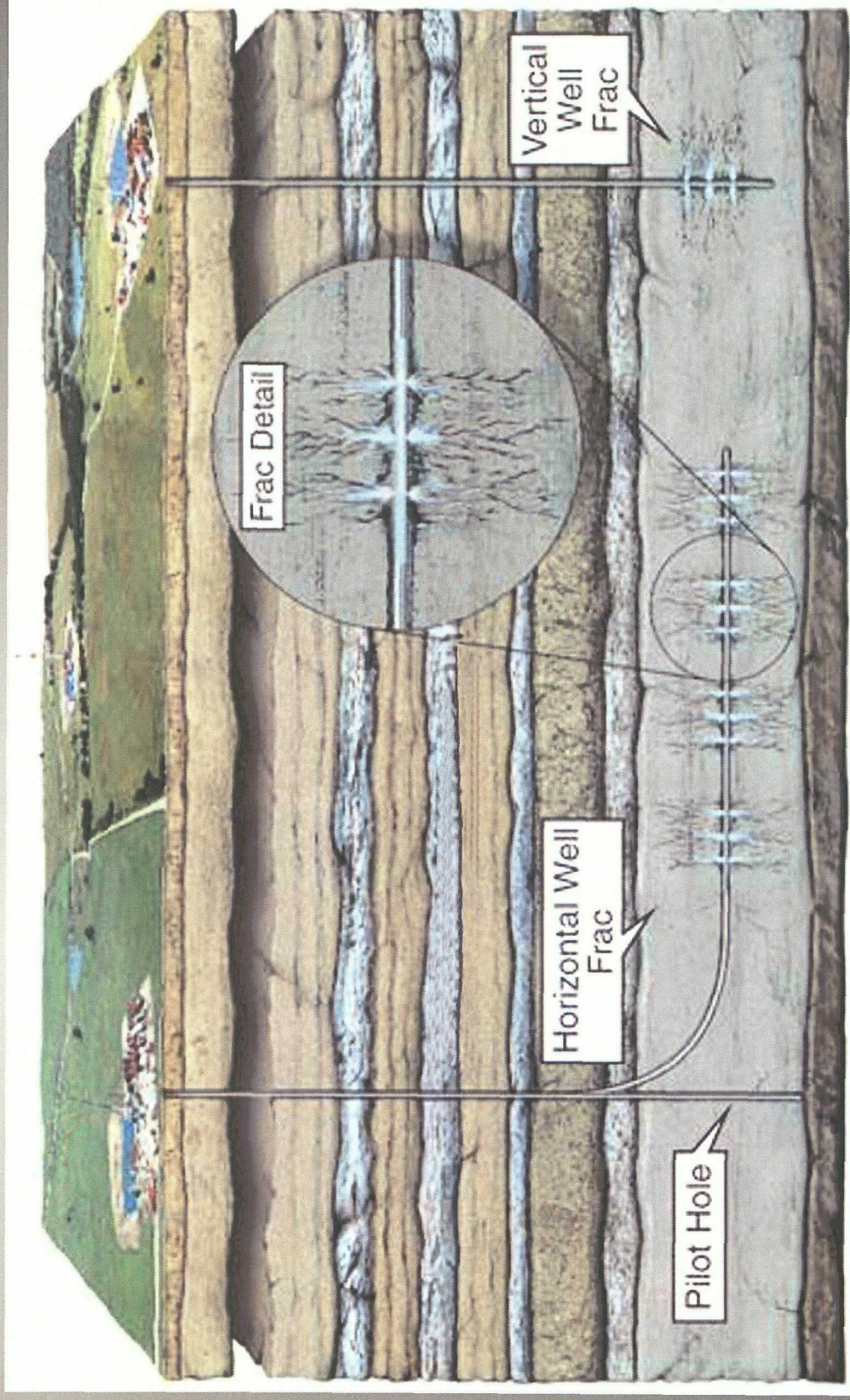
Combination
Vertical & Multi-
lateral Horizontal
Wells

Longer Well Contact
With Pay Zone

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Abo Horizontal Drilling



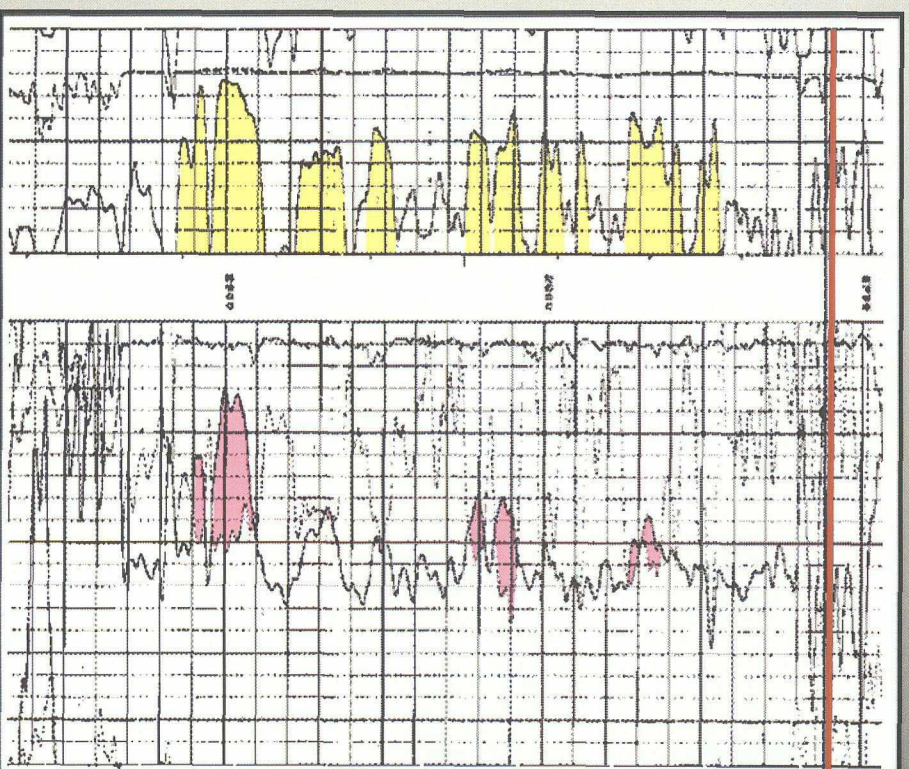
Abo Sandstone Type Log

3000562330

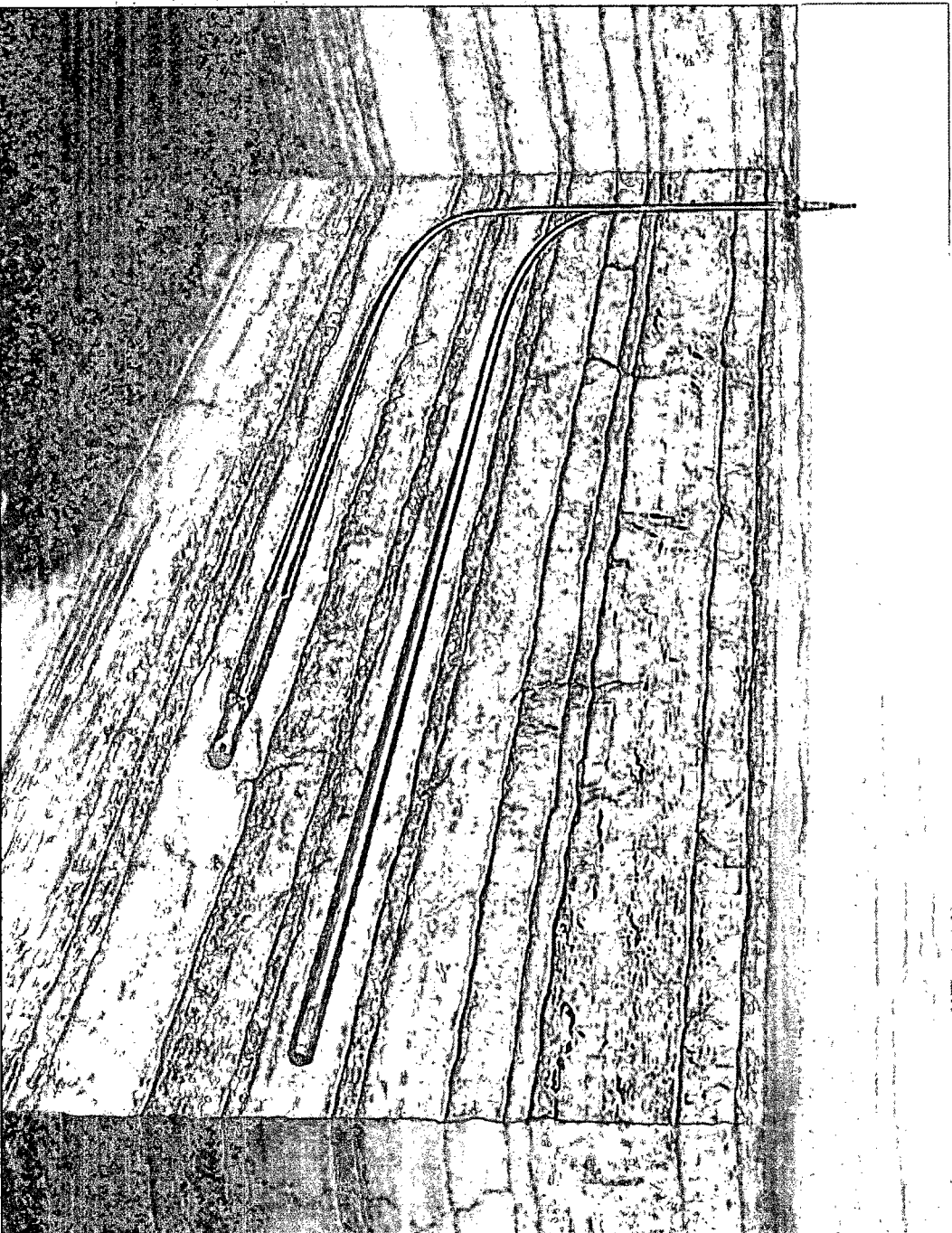
McKay

So Four Mile Draw

T6S-R22E S24



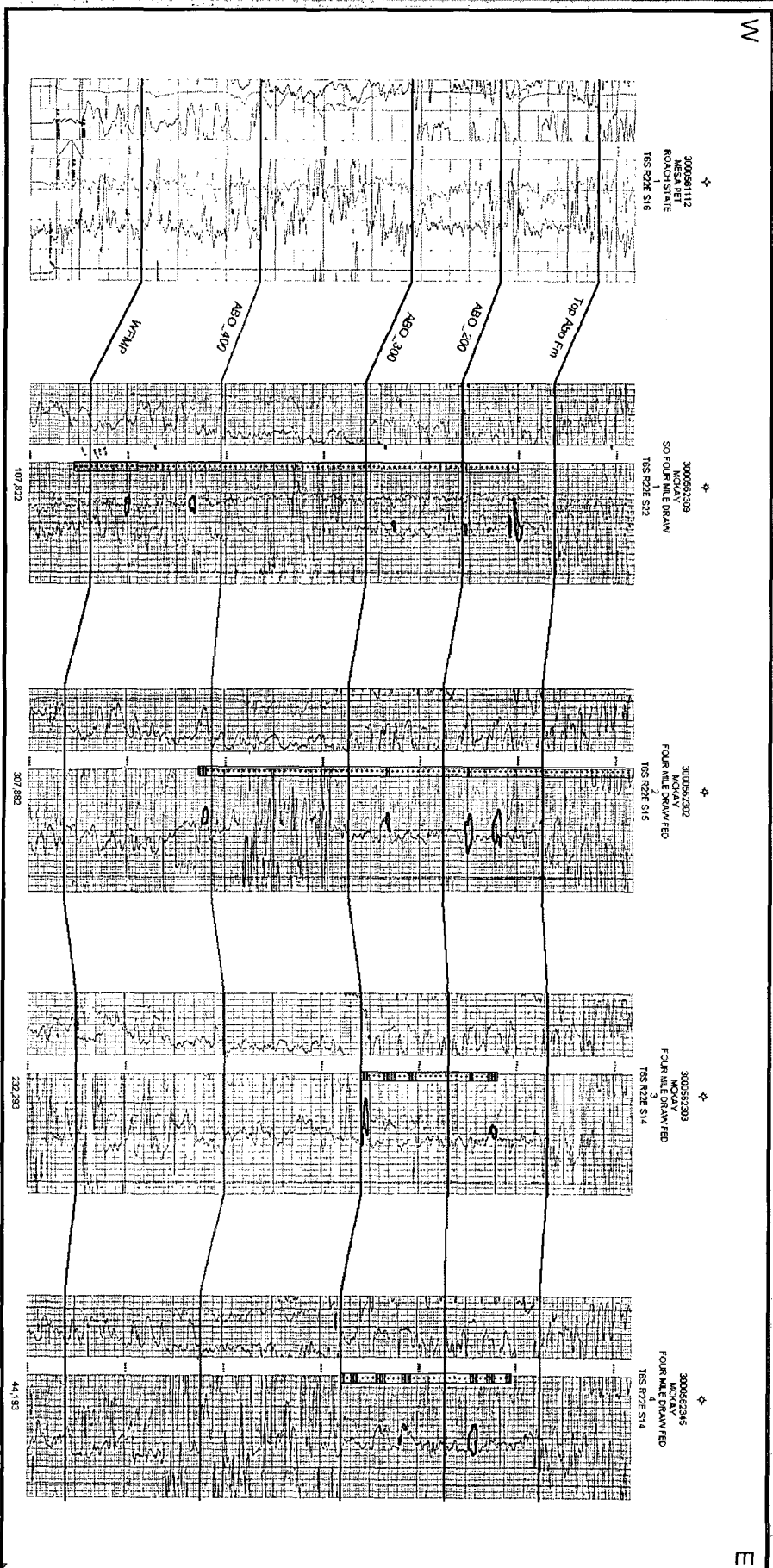
Multilateral Horizontal Wells



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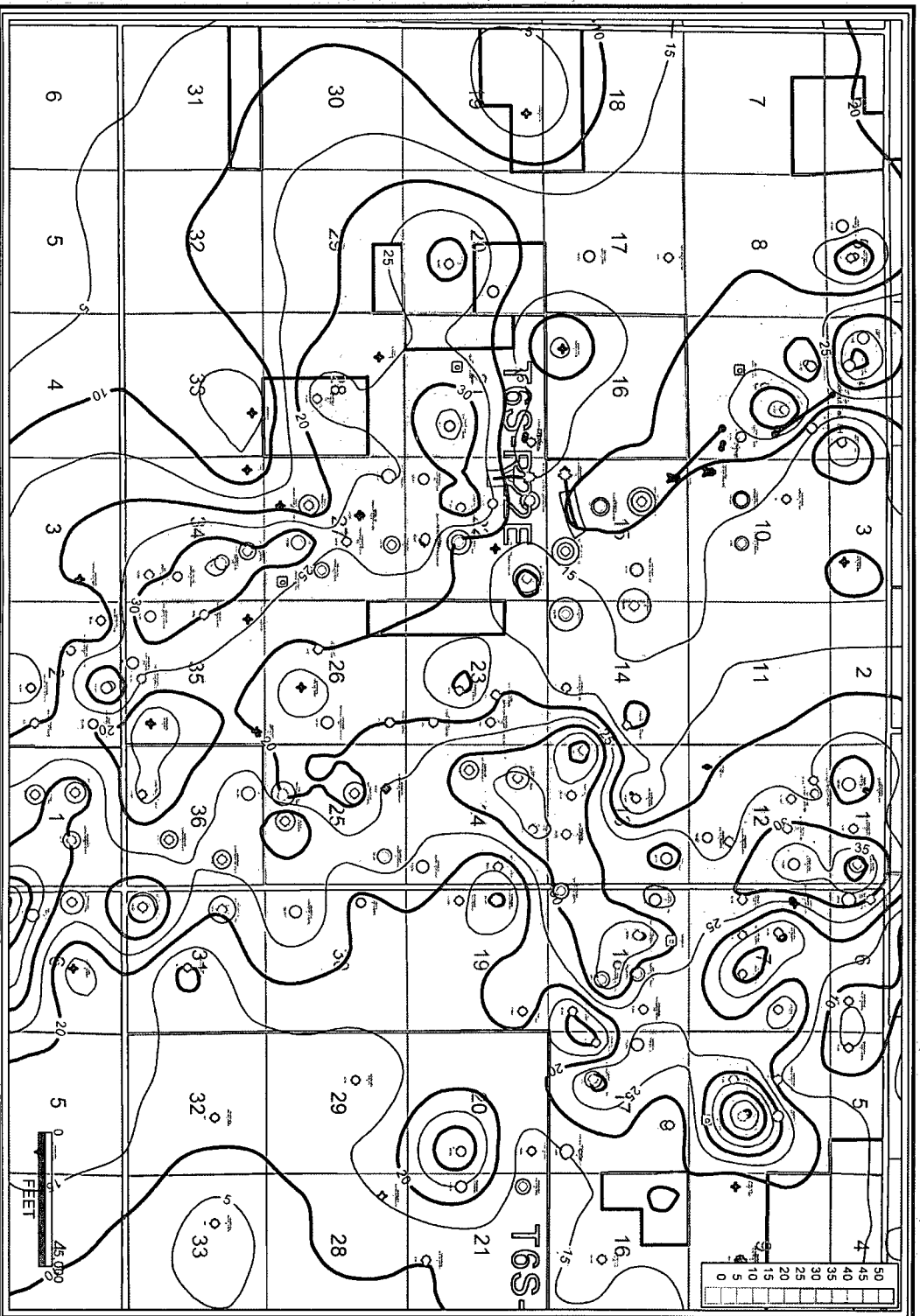
Abo Structural Cross Section



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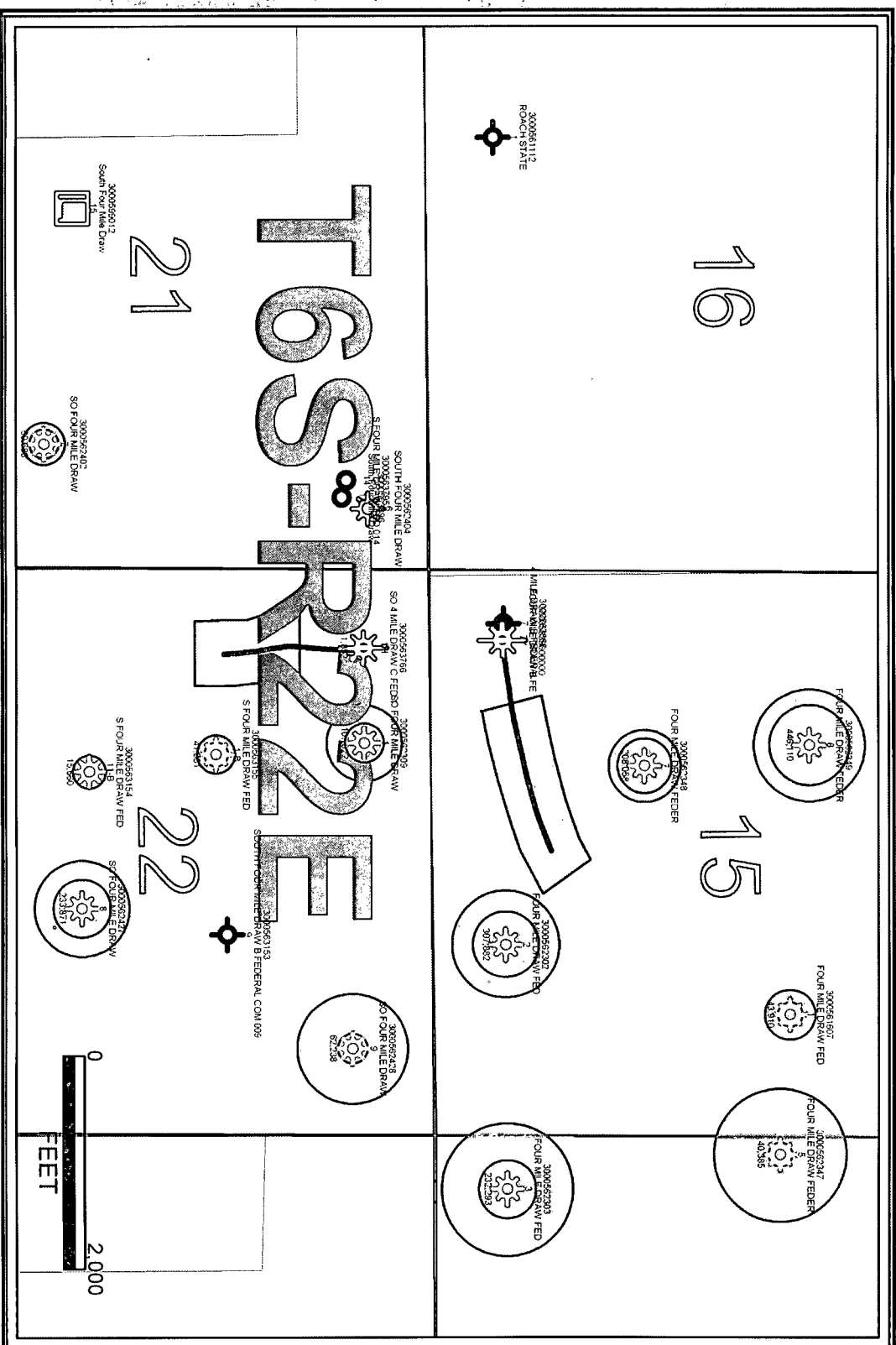
Abo Total Gas Sandstones



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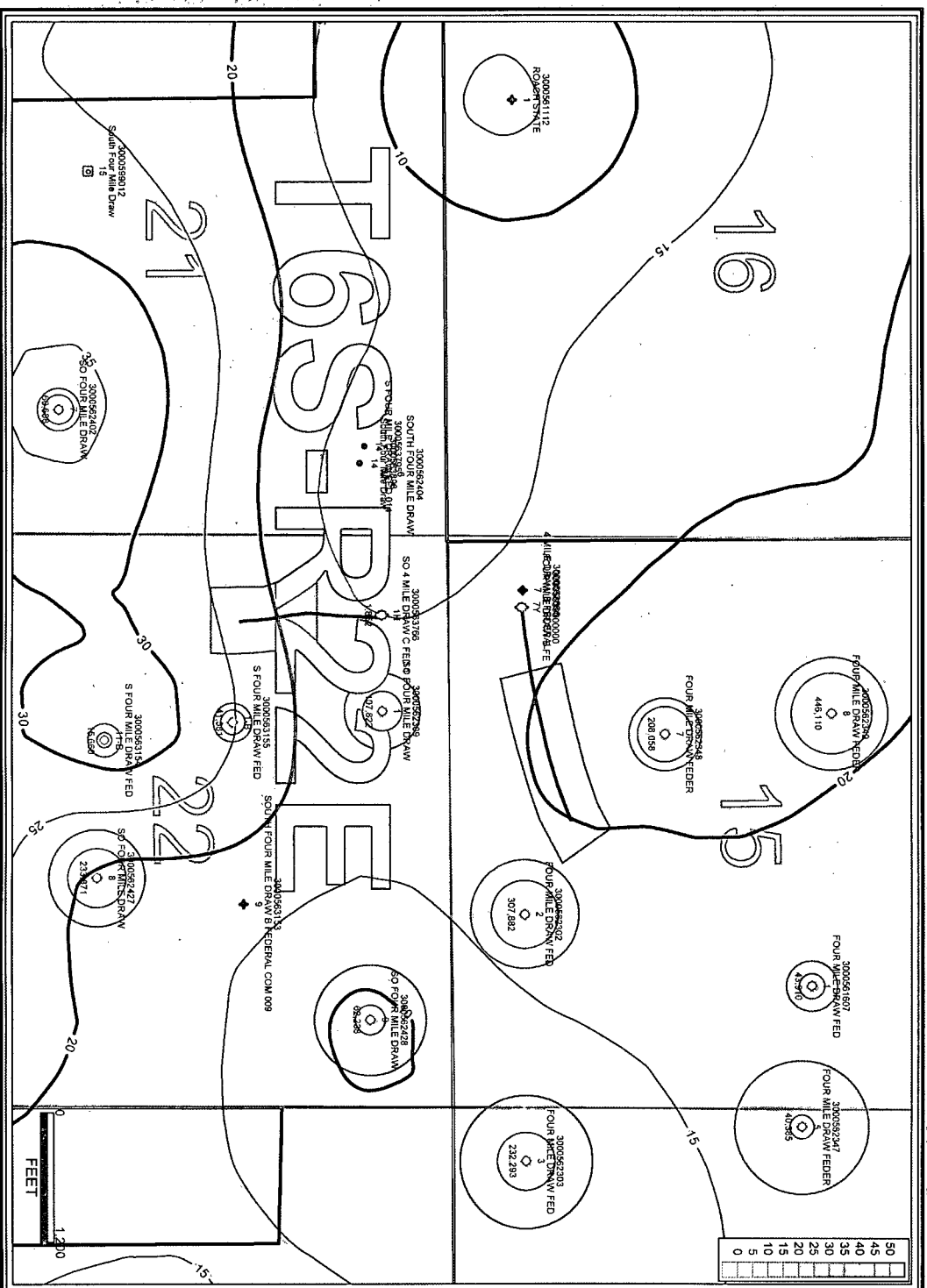
Present Drainage vs. EUR Drainage



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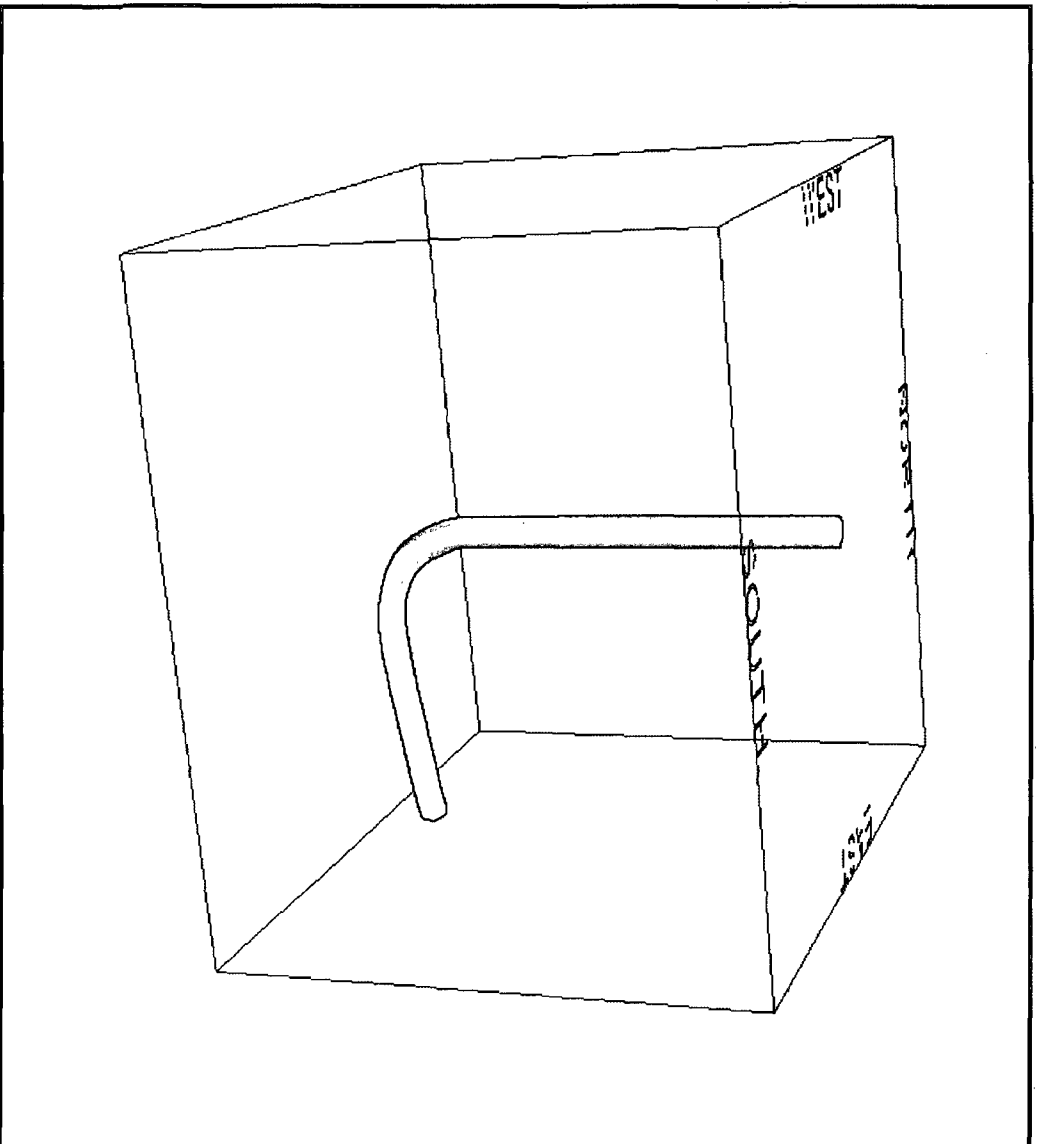
Abo S Thickness vs. EUR



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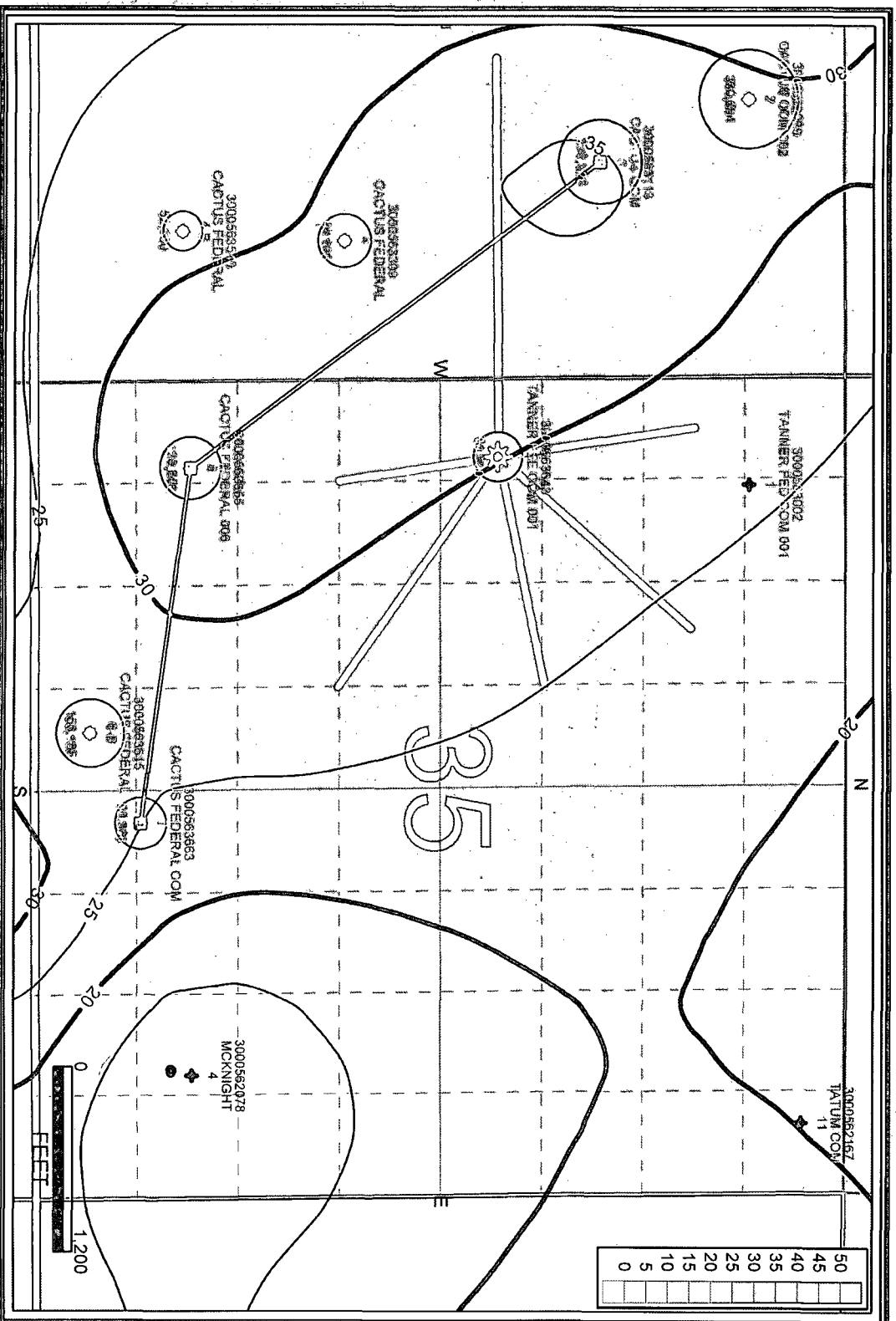
4-Mile Draw B Fed 7Y Horizontal



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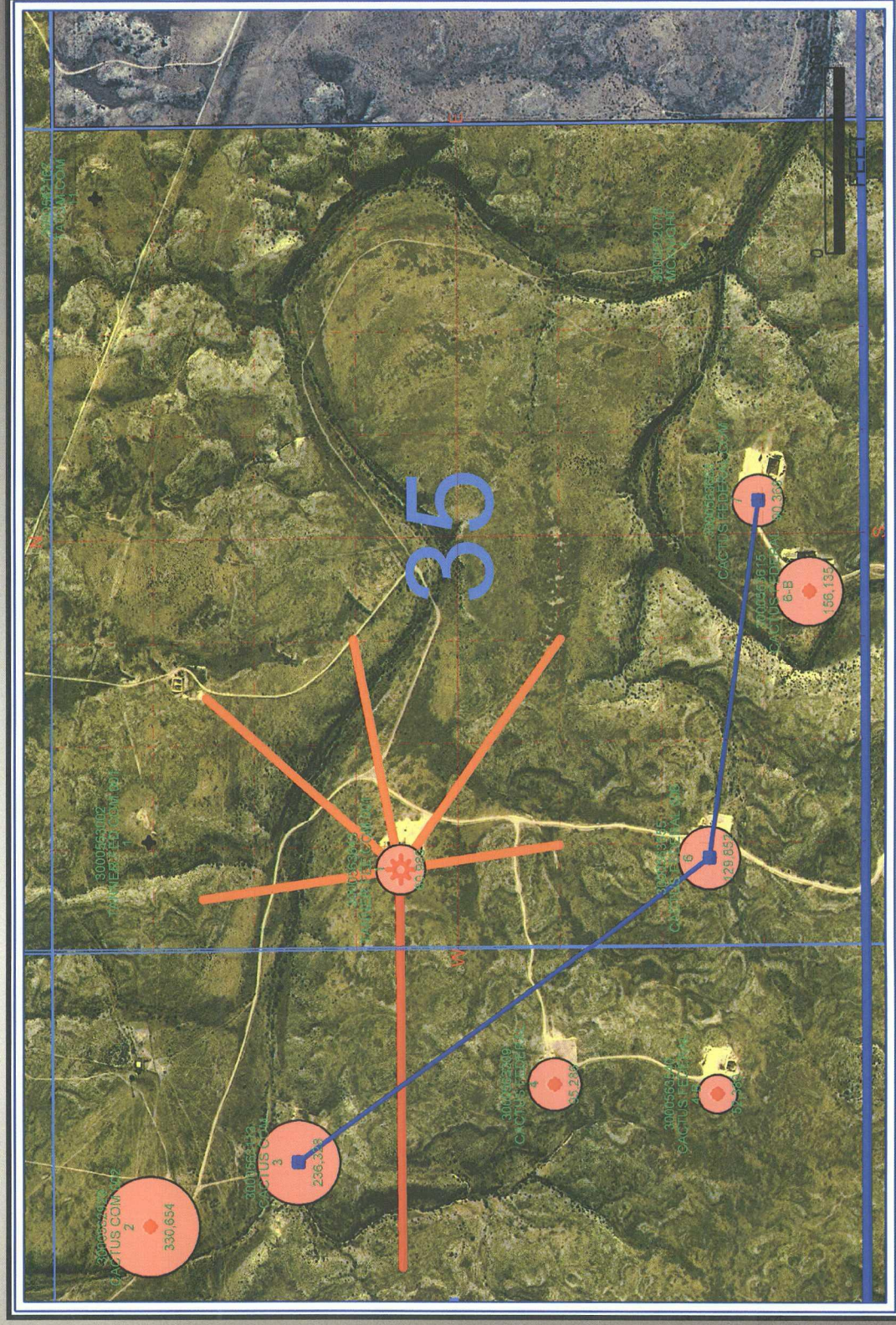
Deviated Locations



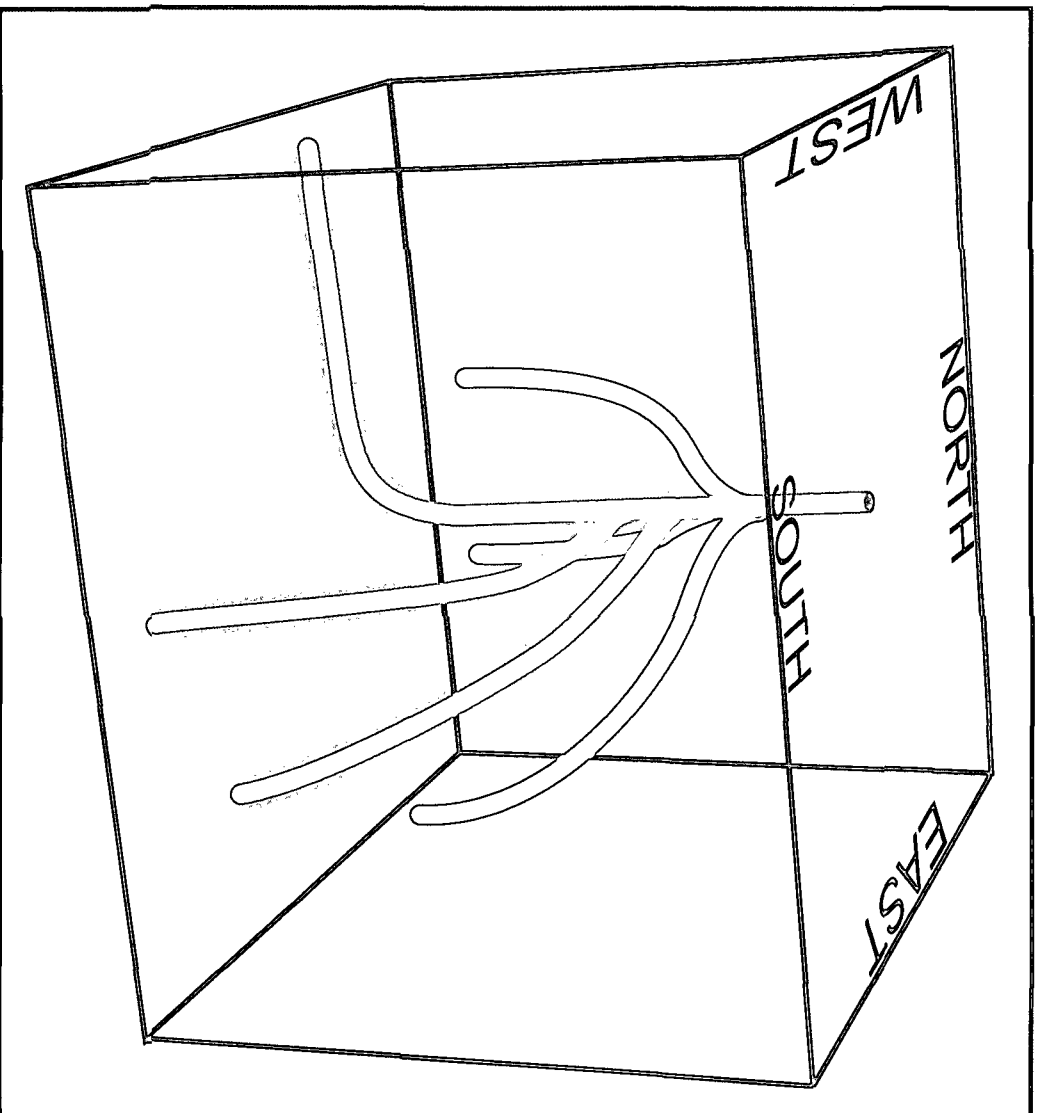
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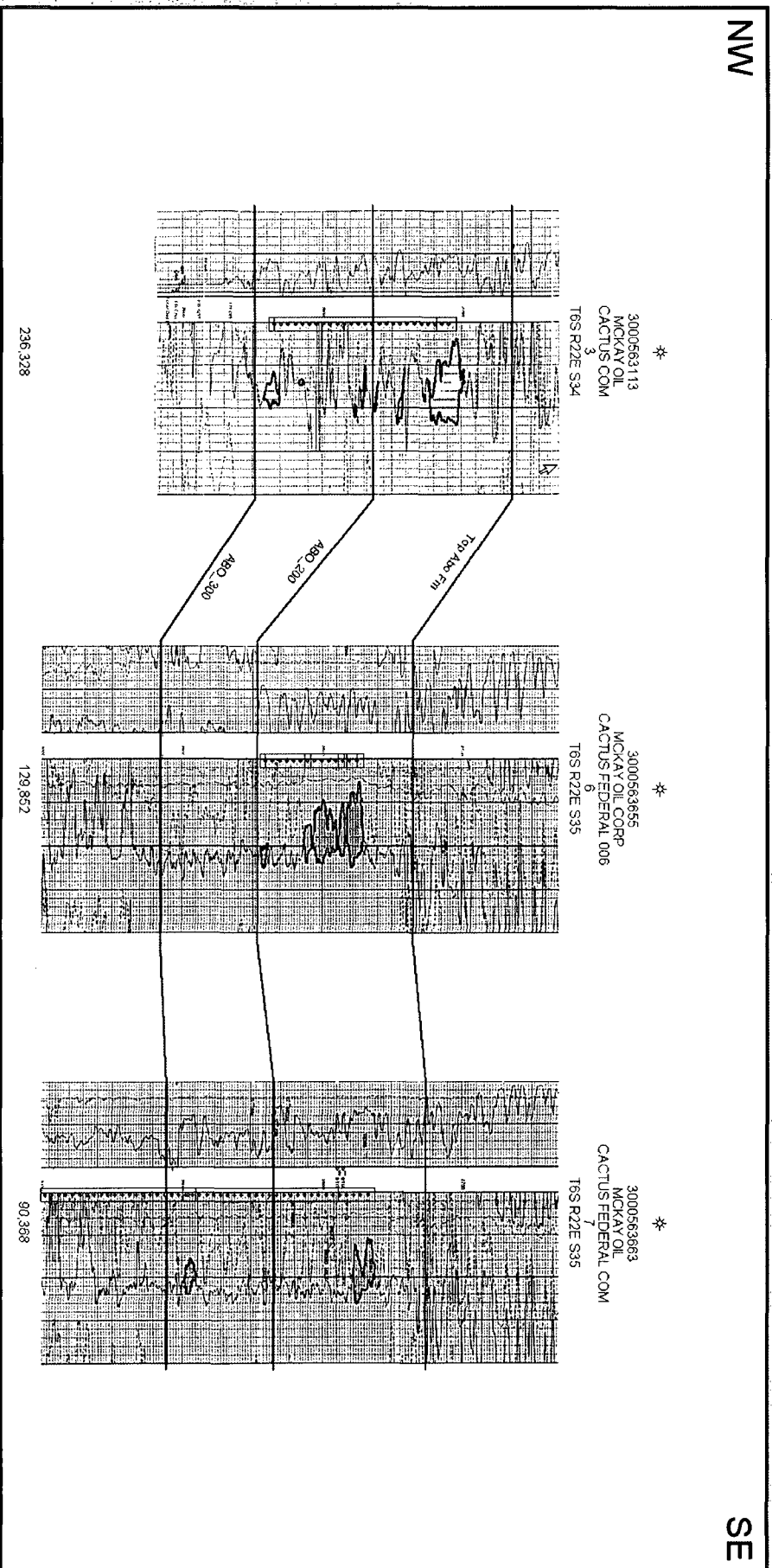
Surface of S Locations



Tanner Fee S-Locations



Cactus Federal 6 Cross Section



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Field Status

- Existing Wells
162 Wells Completed
149 Wells On-Line
- Gathering System
Over 80 Miles of Pipeline with
2 Compressors and 6 Boosters

Development Strategies

- Repair and Increase Efficiency of Gathering System
- Clean Perforations in Producing Wells
- Re-Complete Under-Performing Wells
- Drill New Wells to Improve Gas Recovery
- Down Space to 2 Wells/80 Acres to Increase Efficiency of Gas Recovery

Completion Types

- Limited Entry Fracs of Multiple Sandstone Reservoirs in Vertical Wells
- Limited Entry Re-Fracs of By-Passed Pays
- Staged Fracs along Horizontal Legs
- Simultaneous Staged Fracs of Parallel Horizontal Legs

Conclusions

- 2 Wells/160 Acres do not adequately drain gas from Abo SS reservoirs
- Two Wells/80 Acres would more efficiently recover Gas from the Abo SS reservoirs
- Multi-Laterals from Single Pads would reduce surface disturbance