

Unconventional Seismic – Hazard Mapping for Shale Gas Plays*

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UNCONVENTIONAL SEISMIC

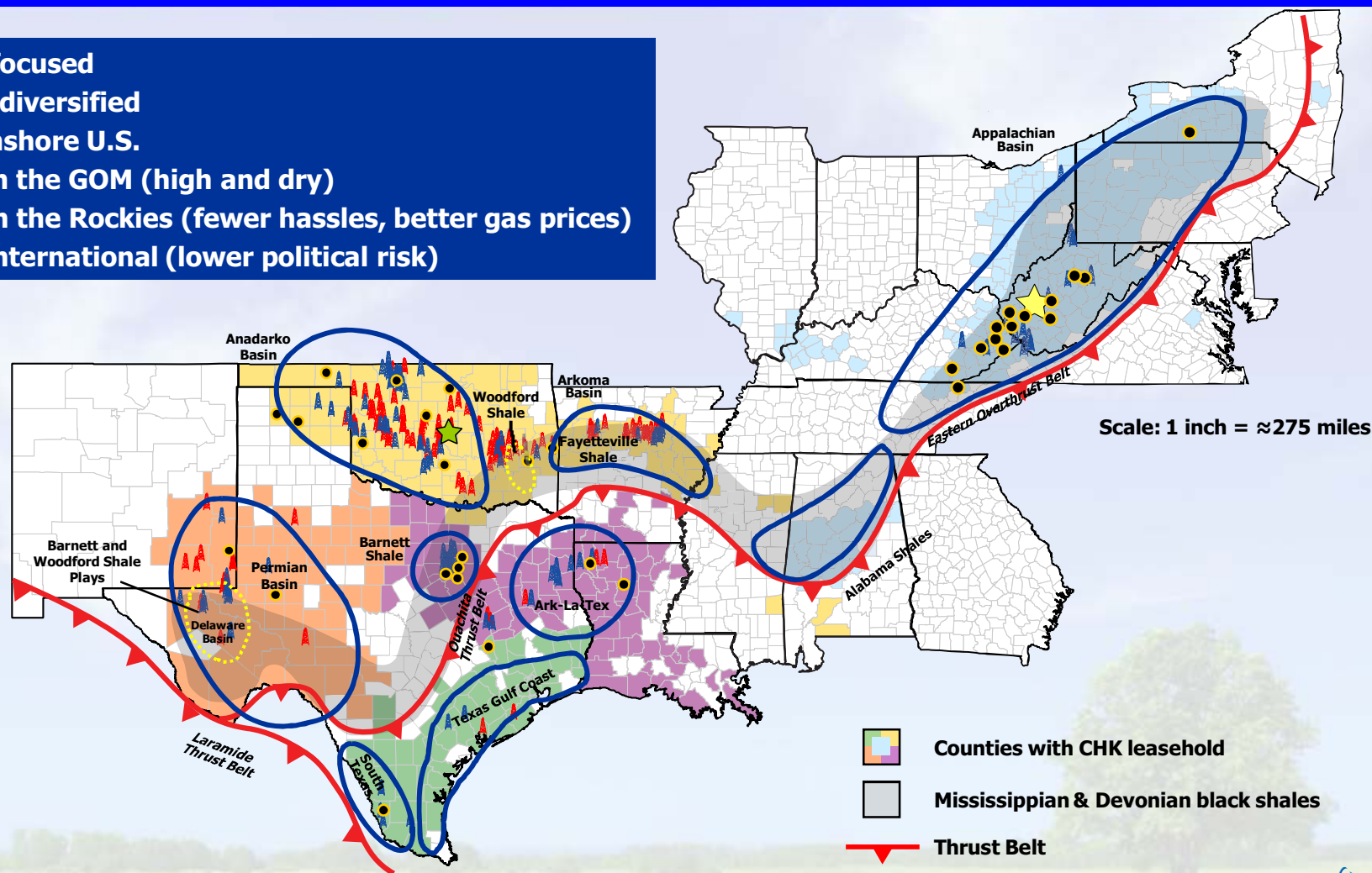


Introduction to CHK

- ❑ **#1 independent producer of U.S. natural gas:** #3 overall including majors
- ❑ **#1 driller in U.S.:** 145 operated rigs, 92 non-operated rigs,
- ❑ **#1 gas resource play:** 33 tcf of risked unproved reserve potential in: i) conventional gas resource, ii) unconventional gas resource, iii) emerging gas resource and iv) Appalachian gas resource plays;
- ❑ **#1 inventory of U.S. onshore leasehold and 3-D seismic:** 13.2 mm net acres of U.S. onshore leasehold and 19.2 mm acres of 3-D seismic

Location of CHK Properties

- ☐ Gas-focused
- ☐ Well-diversified
- ☐ All onshore U.S.
- ☐ Not in the GOM (high and dry)
- ☐ Not in the Rockies (fewer hassles, better gas prices)
- ☐ Not international (lower political risk)



- ★ CHK OKC headquarters
- ★ CHK Eastern Division Headquarters
- CHK/CNR field offices
- ▲ CHK operated rigs (145)
- ▲ CHK non-operated rigs (92)

Three Primary Drivers in the Exploration & Exploitation of Future U.S. Oil & Gas

1. Directional drilling technology

- Expose more reservoir rock to the wellbore
- Ideal in fractured & low permeability reservoirs
- Approximately 50% of wells CHK will drill in 2008 are horizontal

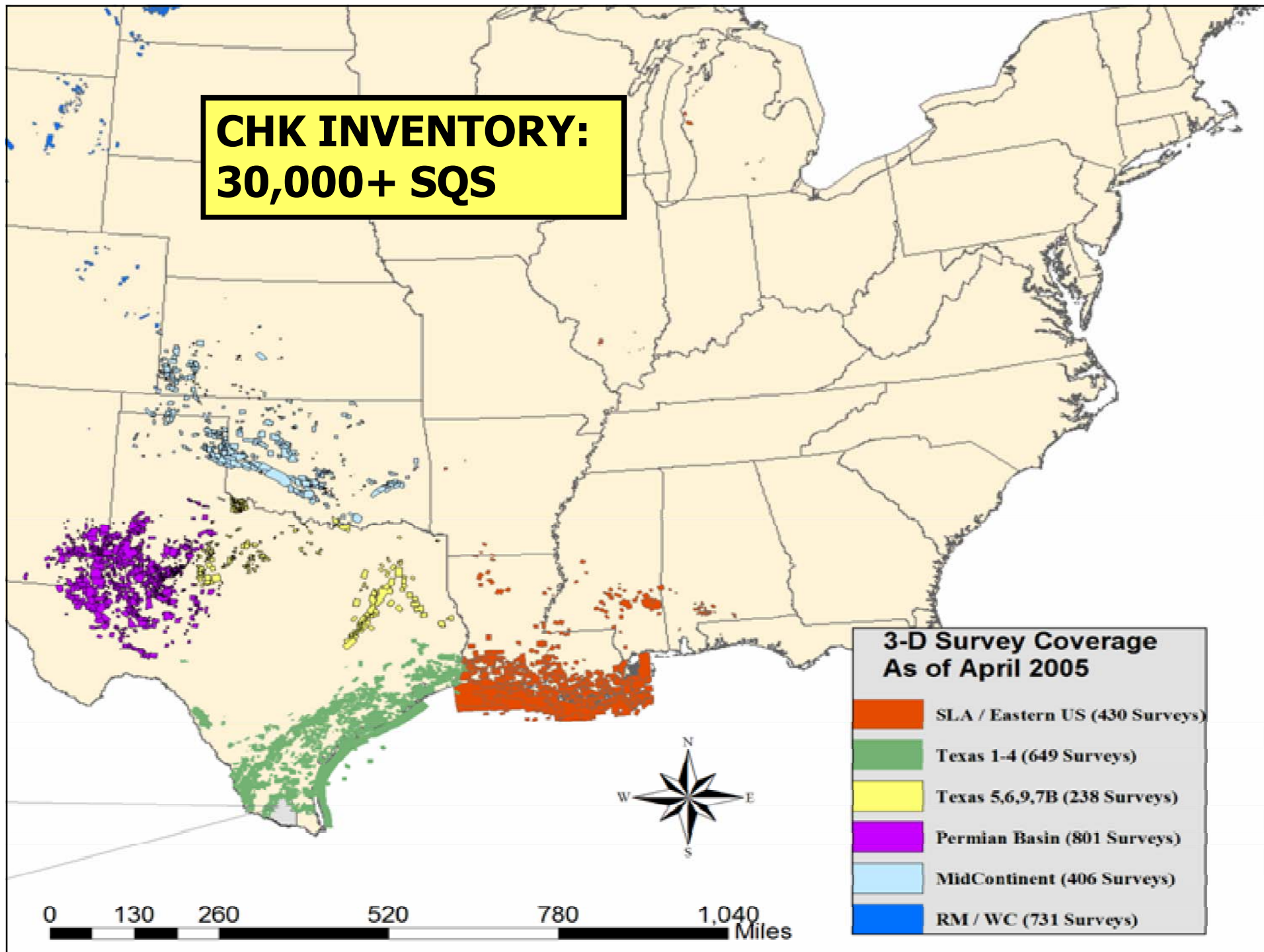
2. Unconventional reservoirs

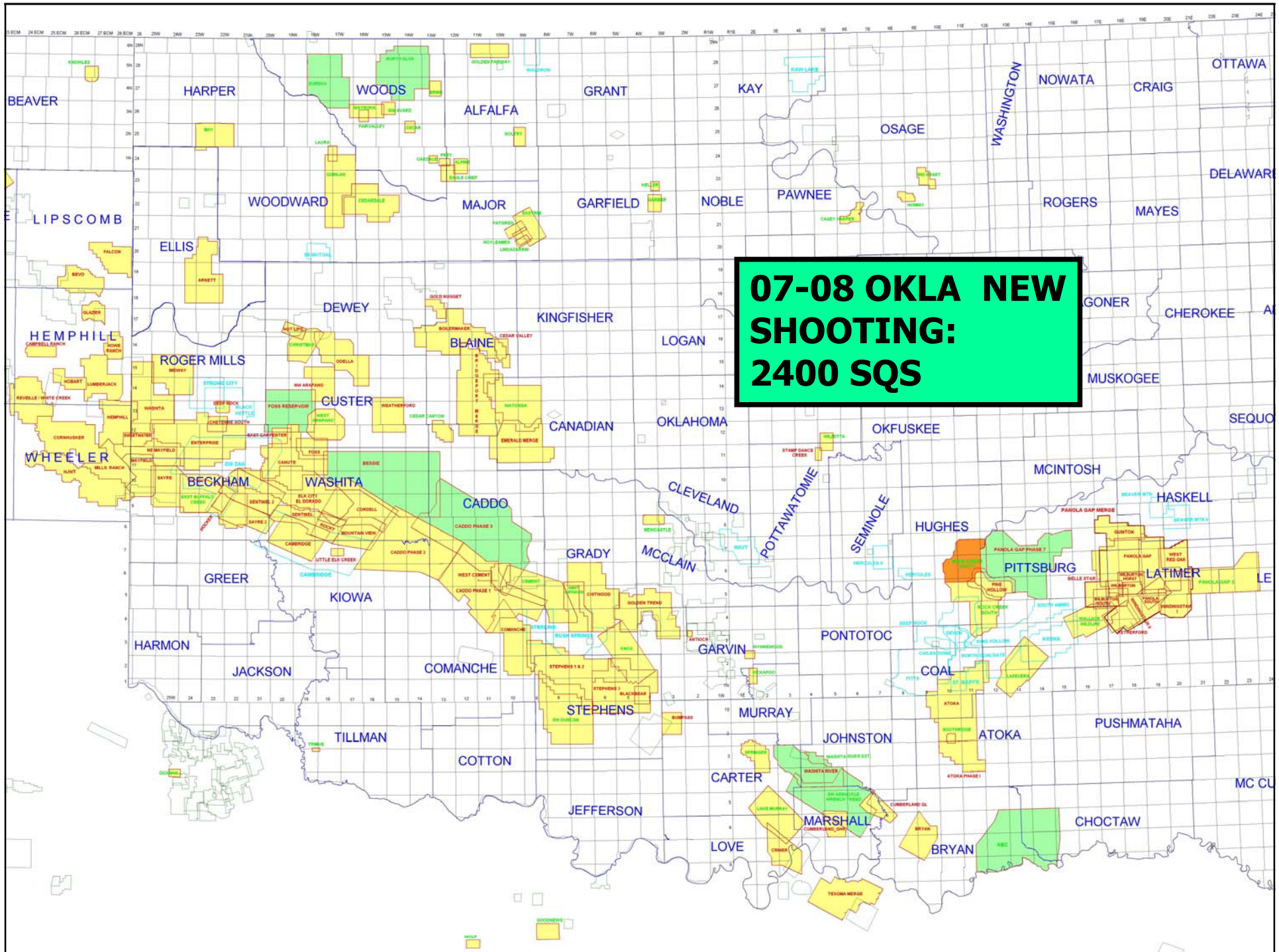
- Fractured reservoirs
- Low porosity reservoirs
- Low permeability shale reservoirs (source rock)

3. 3-Dimensional seismic data

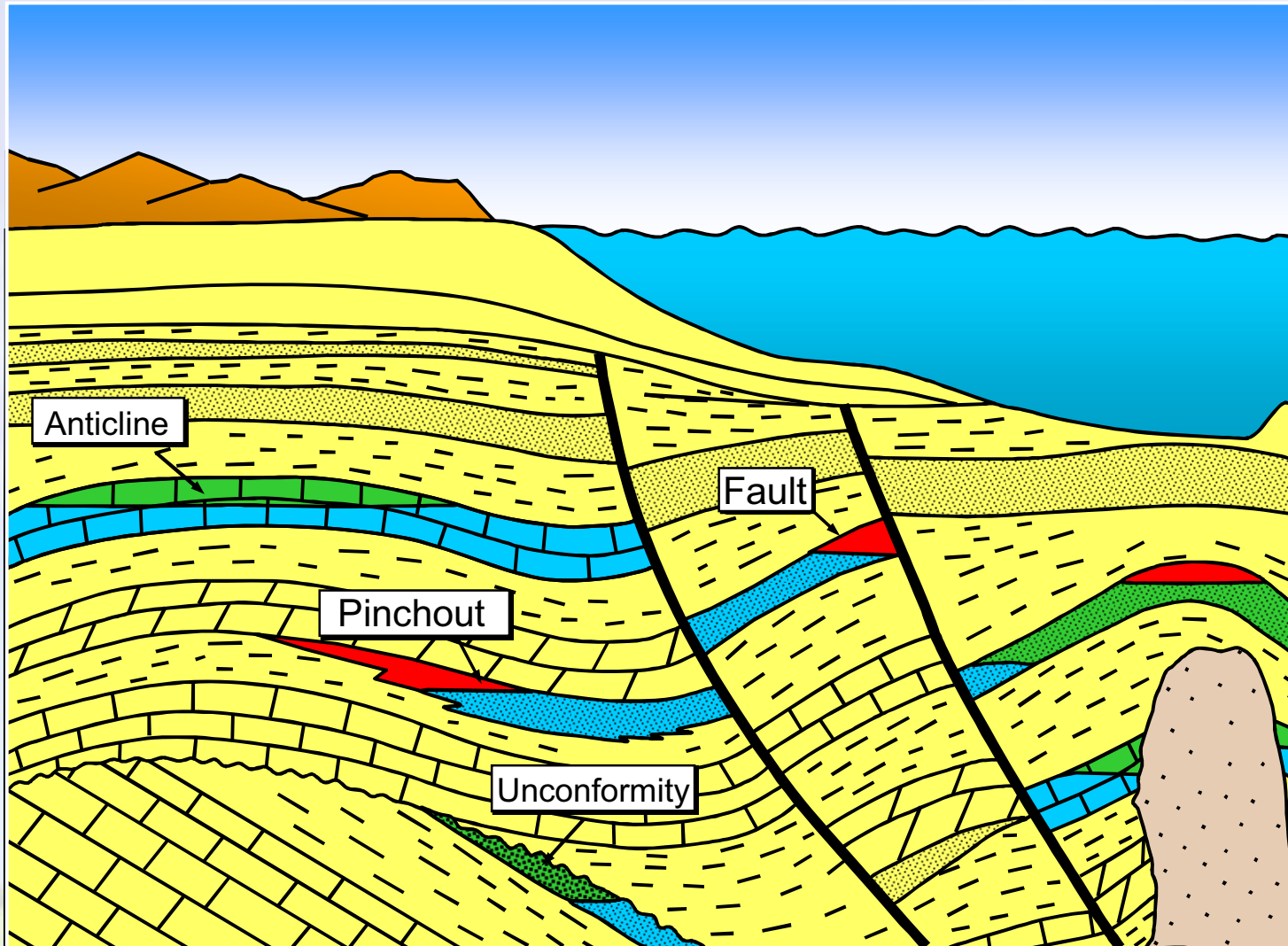
- Best exploration tool around; ideal for both structural & stratigraphic plays
- Also an excellent exploitation tool

**CHK INVENTORY:
30,000+ SQS**

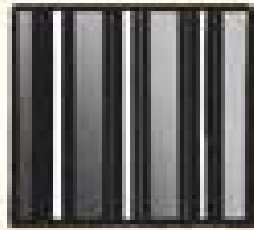




Hydrocarbon Trap Types

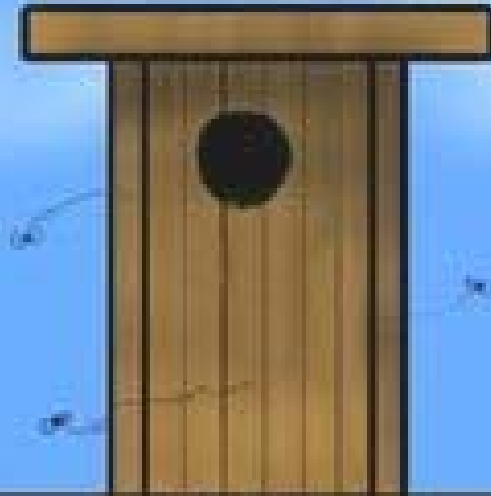


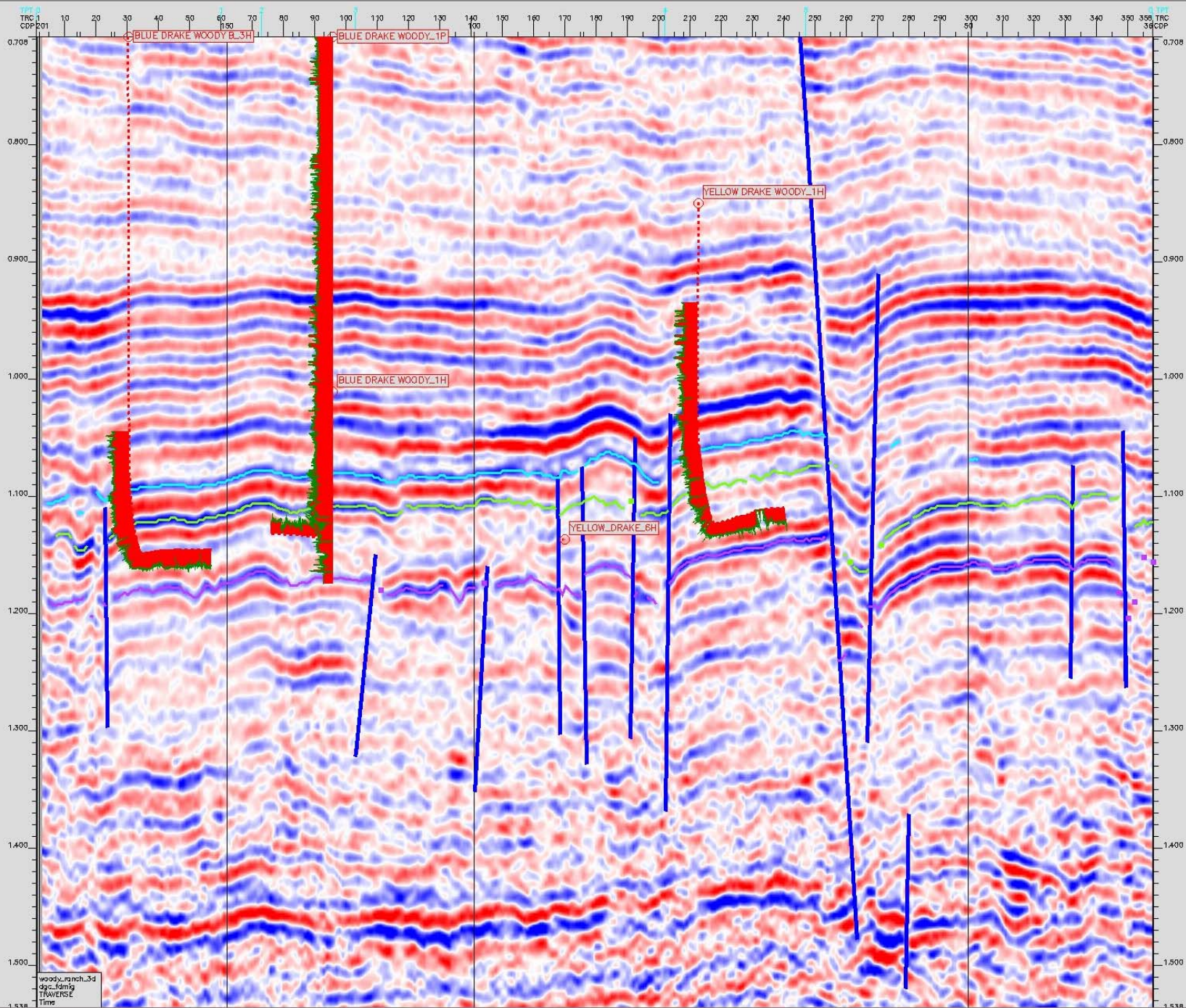
American Petroleum Institute, 1986

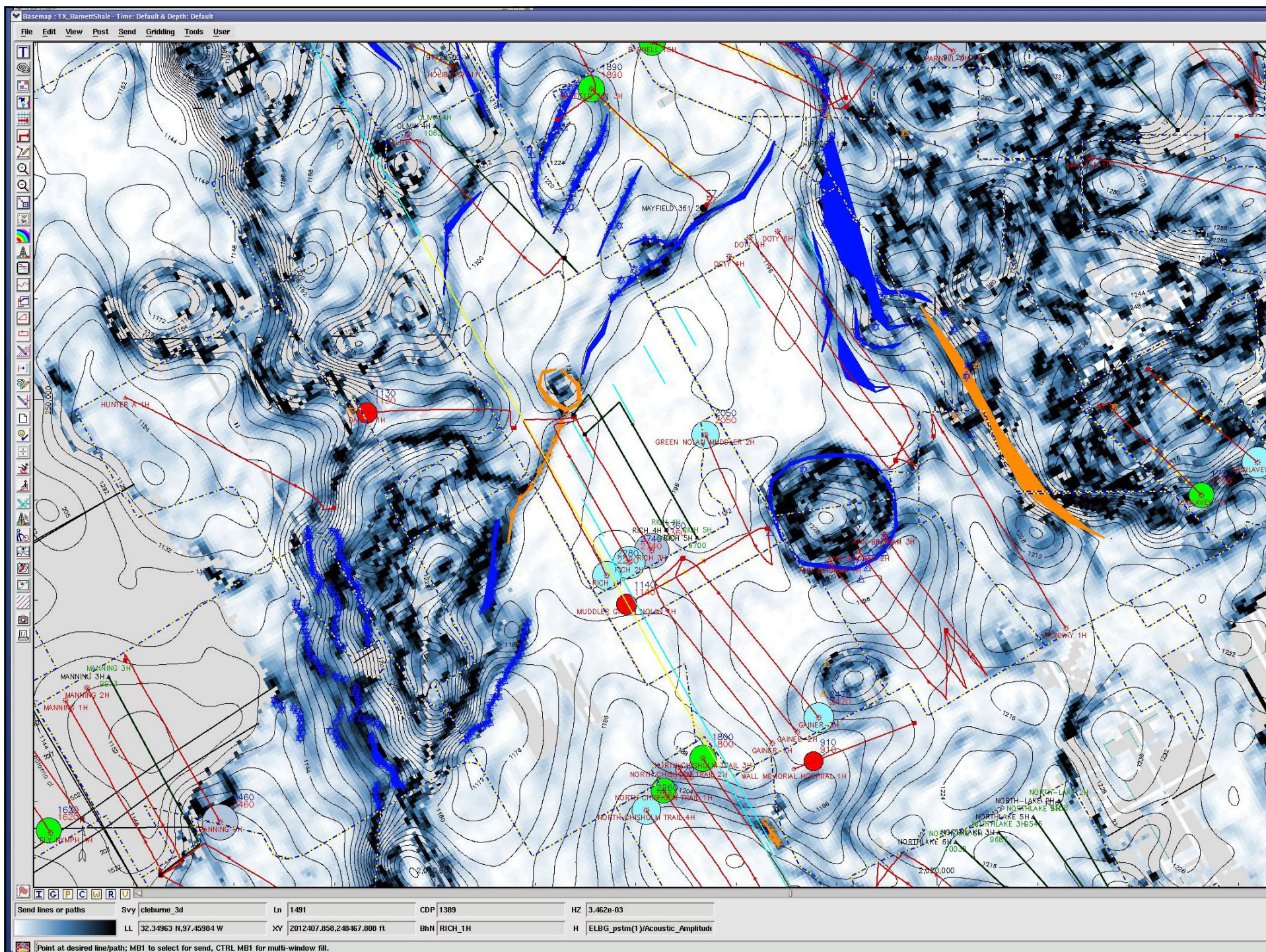


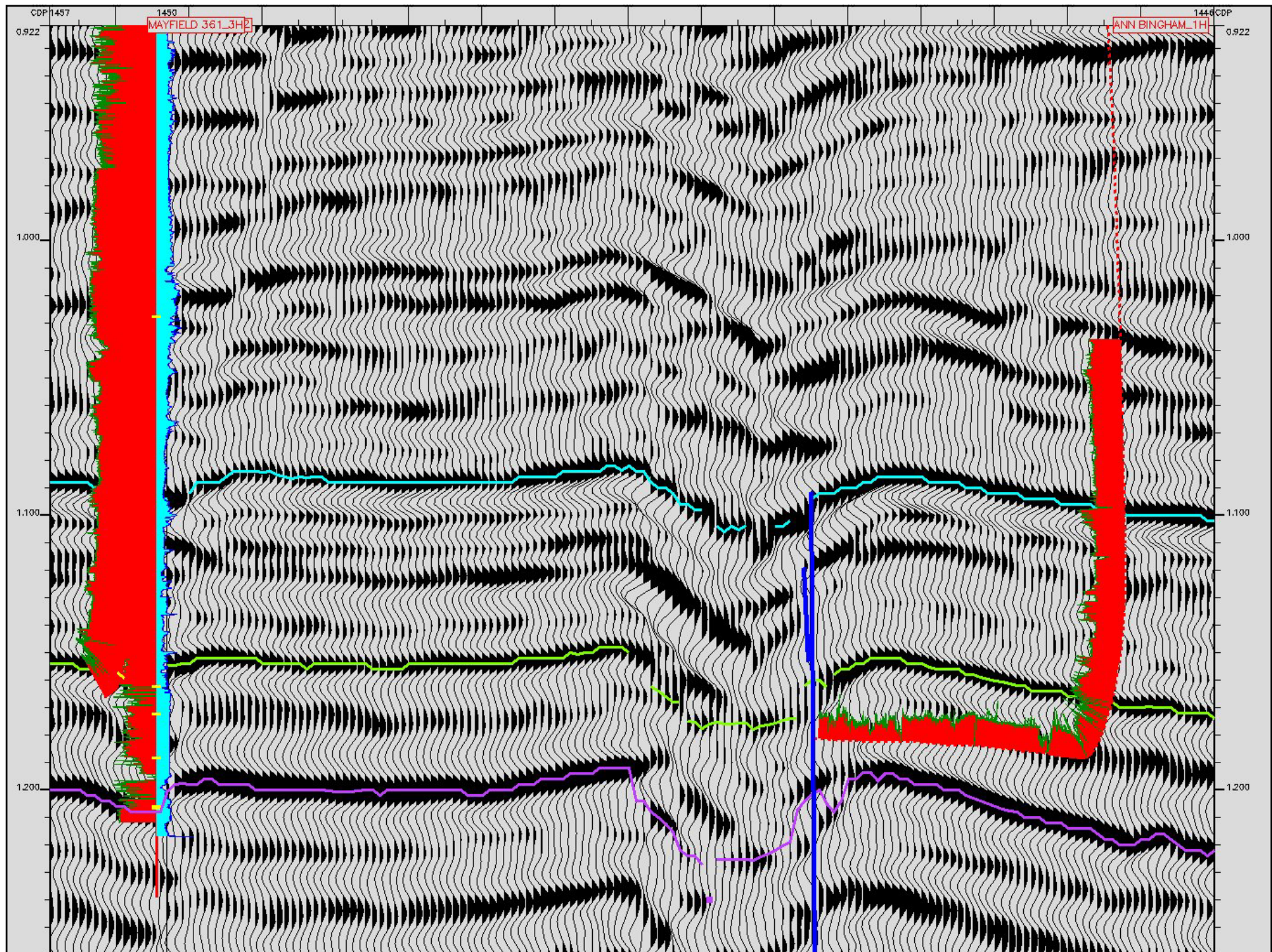
SPE

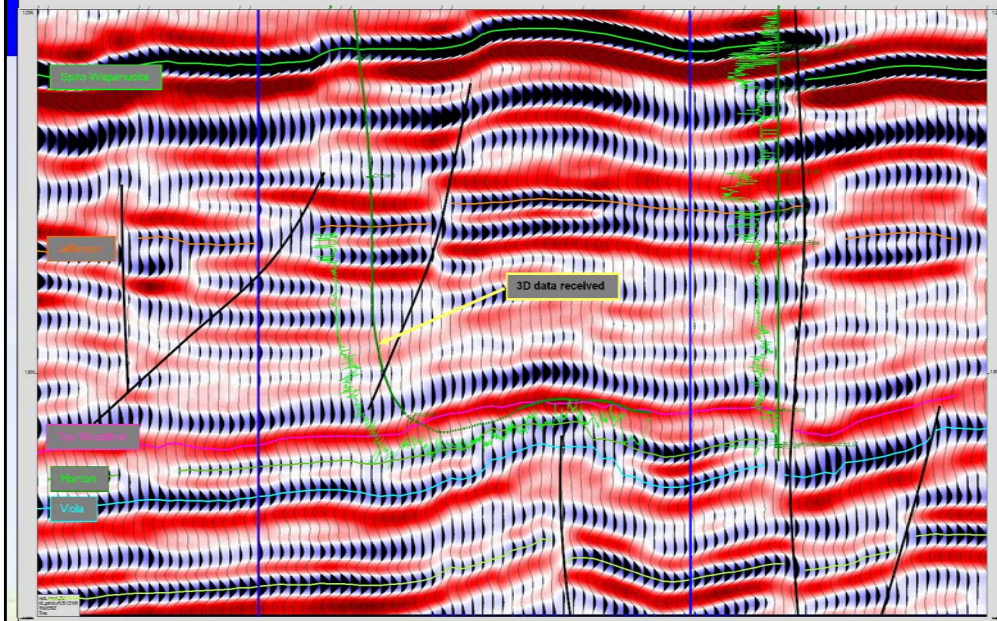
WHY 3D??







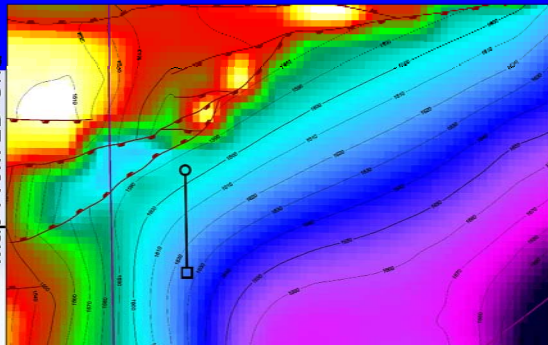




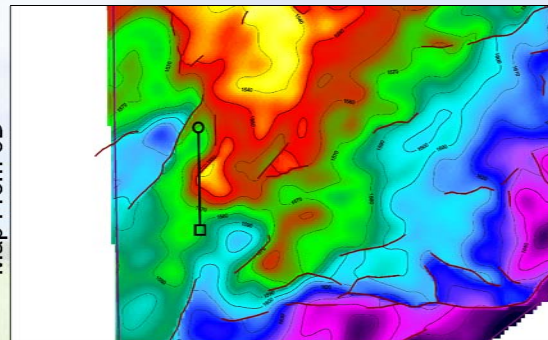
Chesapeake
ENERGY

This well is the CHK Freas 1-2H, a well that was planned and was spud using a map generated from sparse 2D seismic control. The seismic data came in just before the well reached the top of the Woodford, and the plan was altered to accommodate the “hump” that never showed up on the 2D data. This well is one of our better wells in the area producing around 3.5 million a day and has an EUR calculated at 6 BCF.

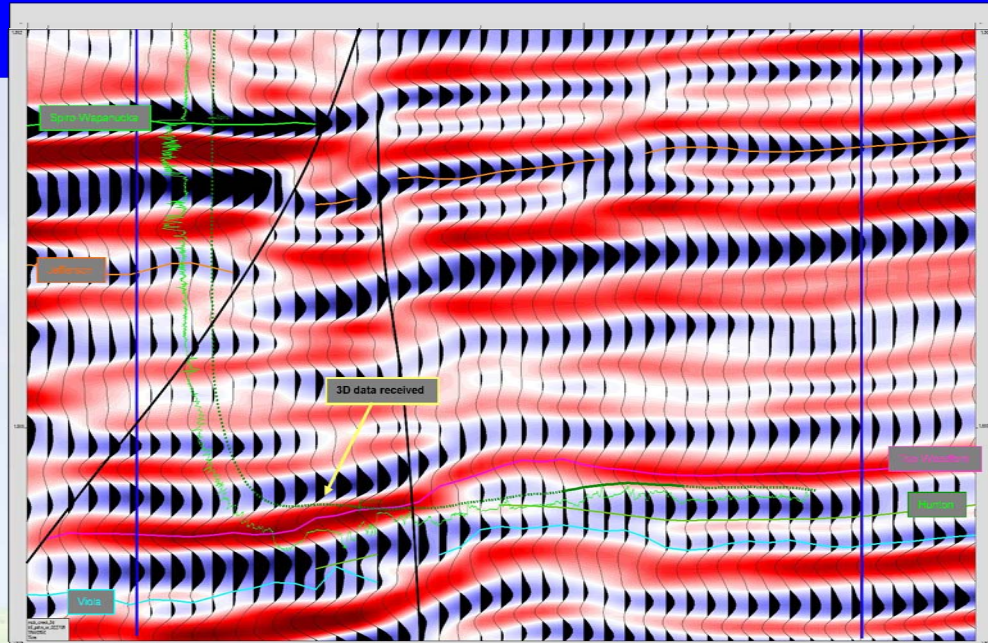
Map From 2D Grid



Map From 3D



This is the map for the Freas 1-2H

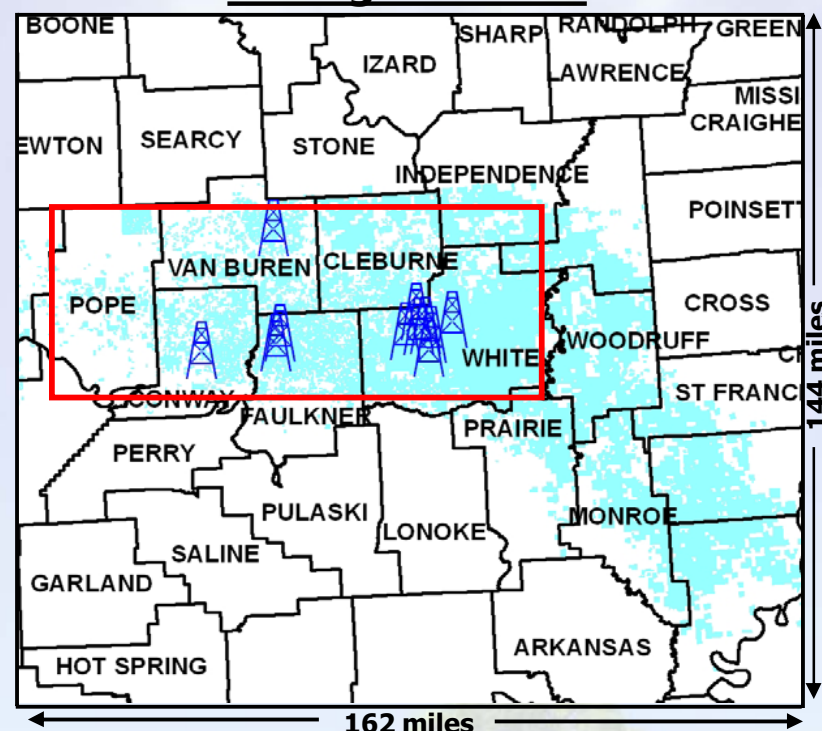
Chesapeake
ENERGY

This well is the Donald Loftis 1-4H. Like the Fres 1-2H well before, it was planned off of a map made from a 2D seismic grid. When the well was first planned, the 2D data did not show the dip change going into the fault. When we kicked off to try and land in the Woodford, we actually landed shallow in the Lower Caney. Once the 3D was in, we were able to quickly get the well into the Woodford and accommodate the fault/"hump" farther out. We stayed in the Woodford for the entire horizontal portion of this well.




Fayetteville Shale

- ❑ **Second-largest leasehold owner in the Core area of the play with approximately 585,000 net acres**
- ❑ **Decreasing costs through engineering and operational improvements**
- ❑ **11-rig program currently, will at least double in the years ahead**
- ❑ **Favorable drilling results and production performance during 2007 increased our reserve expectations to 2.0 bcfe per well from 1.6 bcfe**
- ❑ **Net production has doubled over the past three months to >100 mmcfe/day**

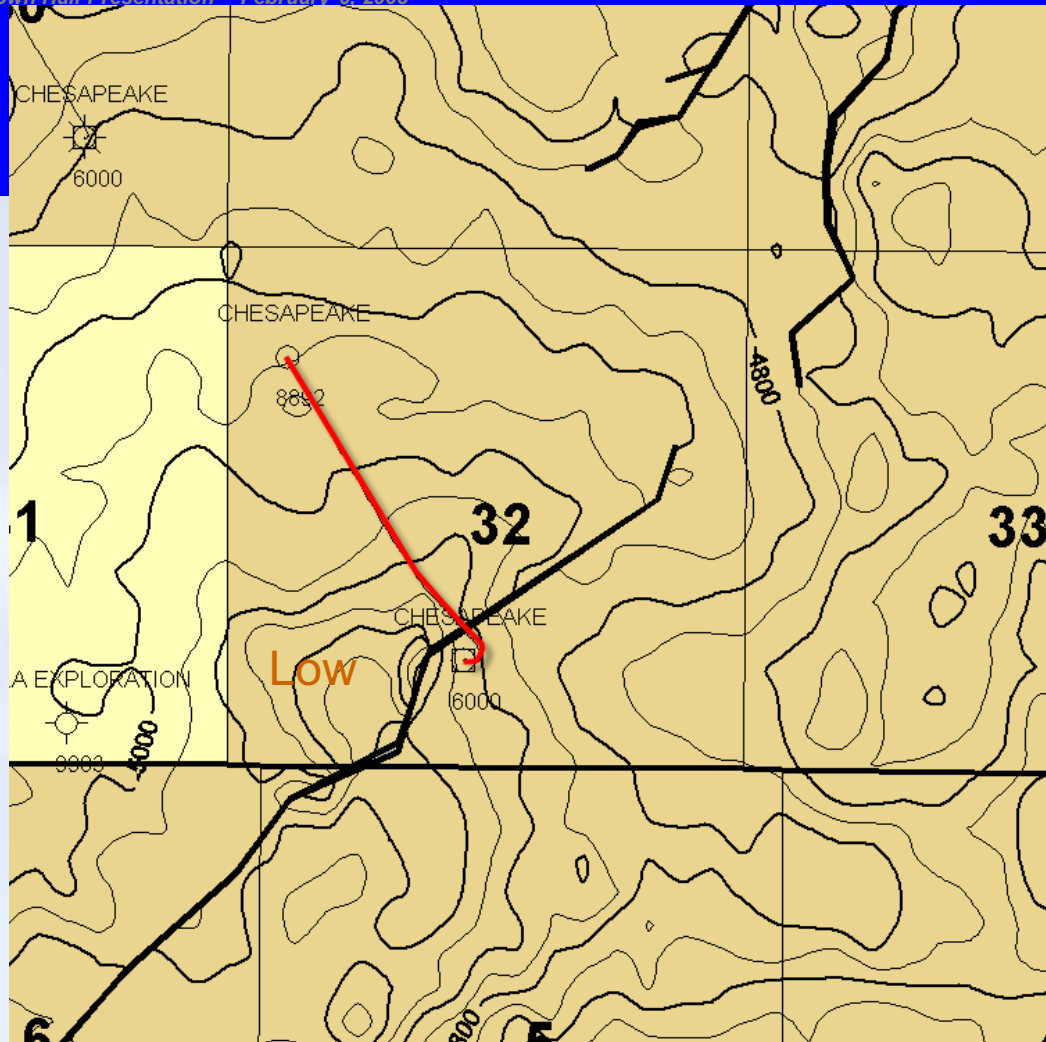
Acreage Position



Active Rigs

-  CHK Operated
-  CHK Leasehold
-  Fayetteville Core Outline

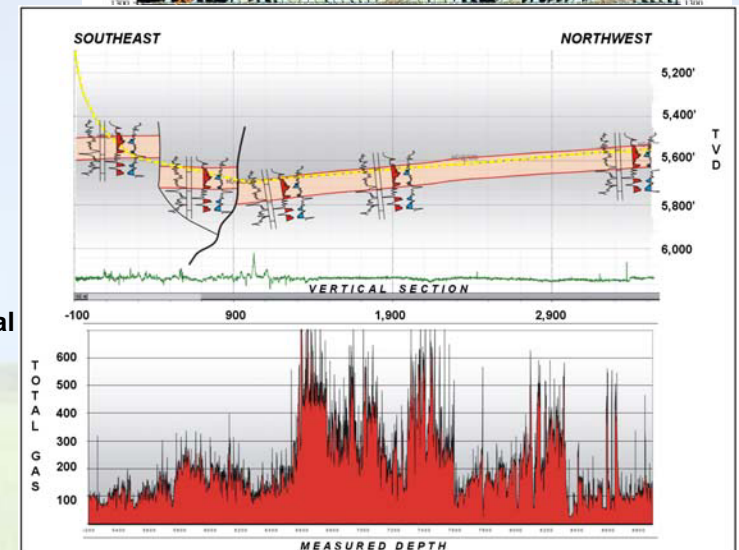
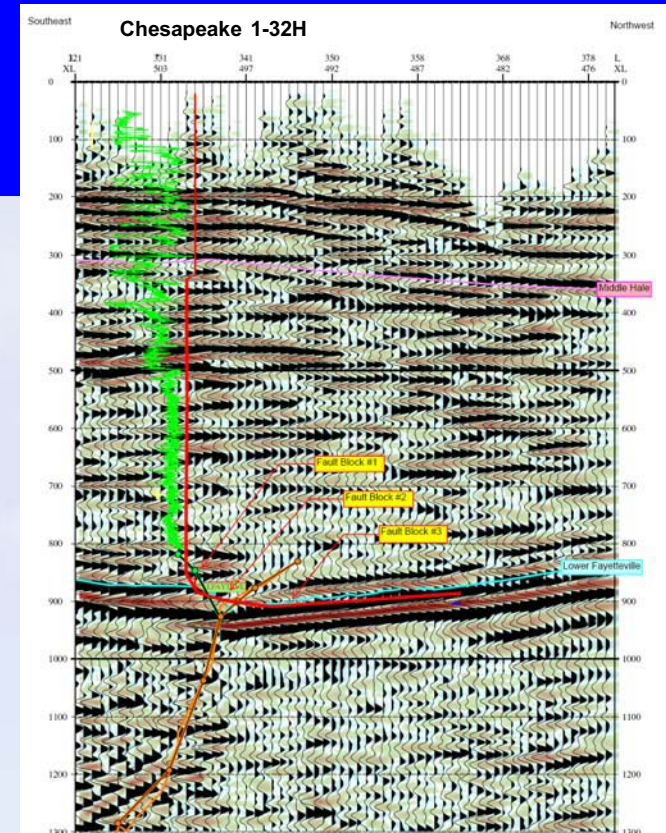
Rapidly growing production in an increasingly prolific shale play

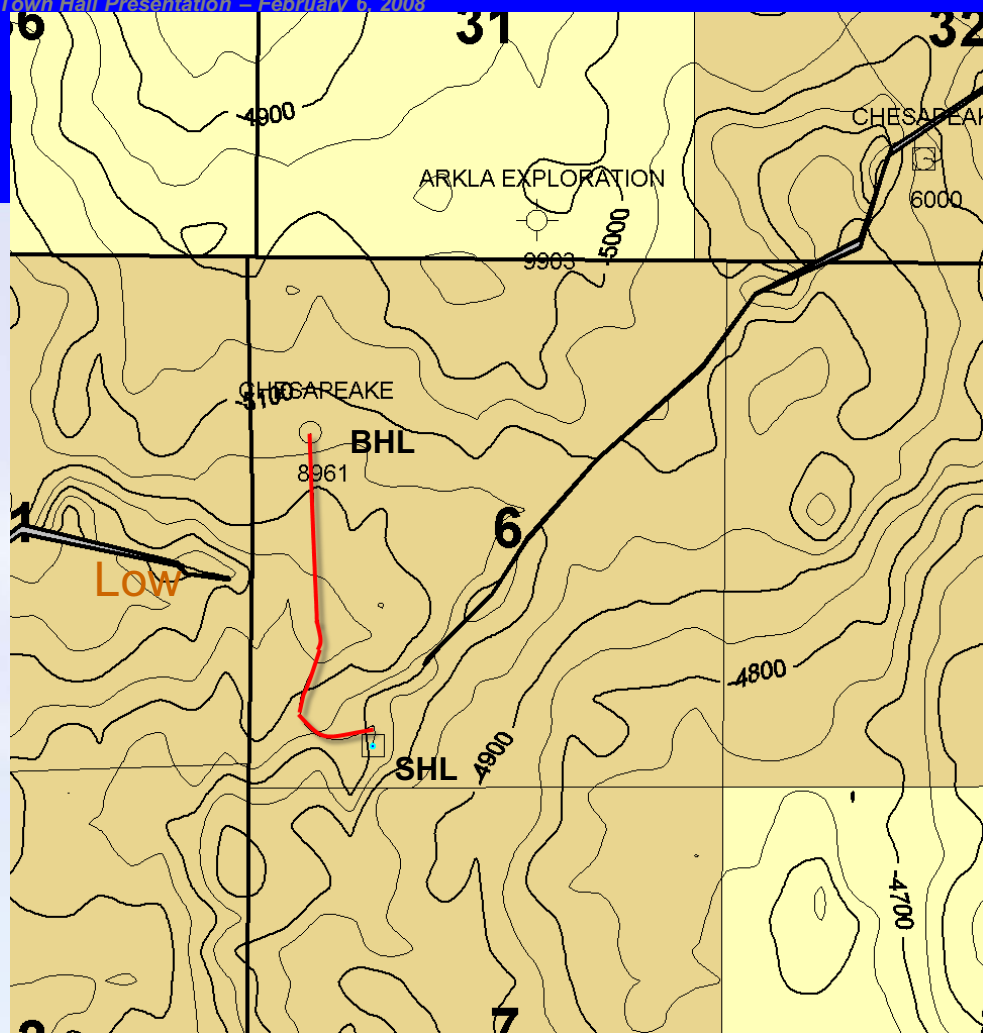


Structure map of the top of the lower Fayetteville from 3D seismic and subsurface data; contour interval is 50'

Middle Right--TerraVu interpretation across the Chesapeake 1-32H landing and lateral section depicting the normal and subsequent reverse fault crossed during the landing. Clips of the correlation log are placed along the lateral path to illustrate the correlation.

Lower Right--Compressed mud log showing total gas readings along the landing and lateral.

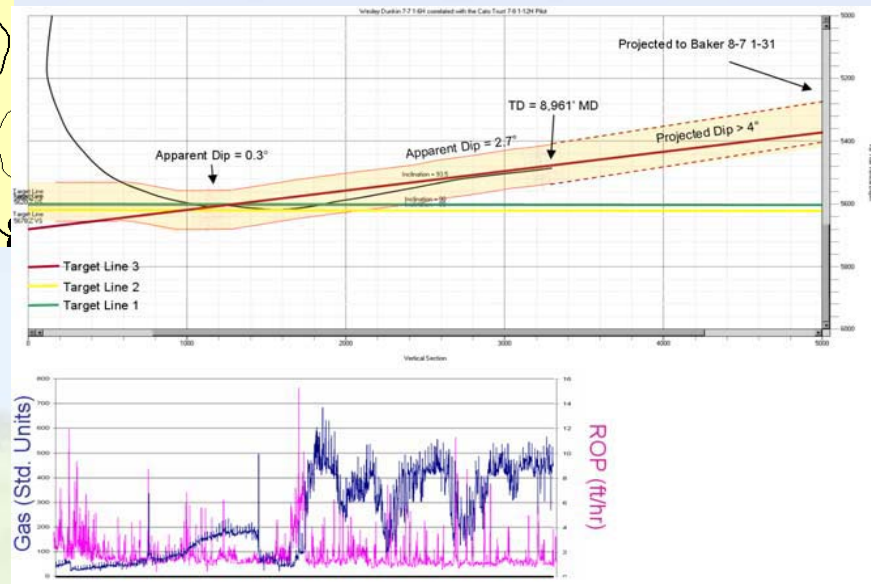
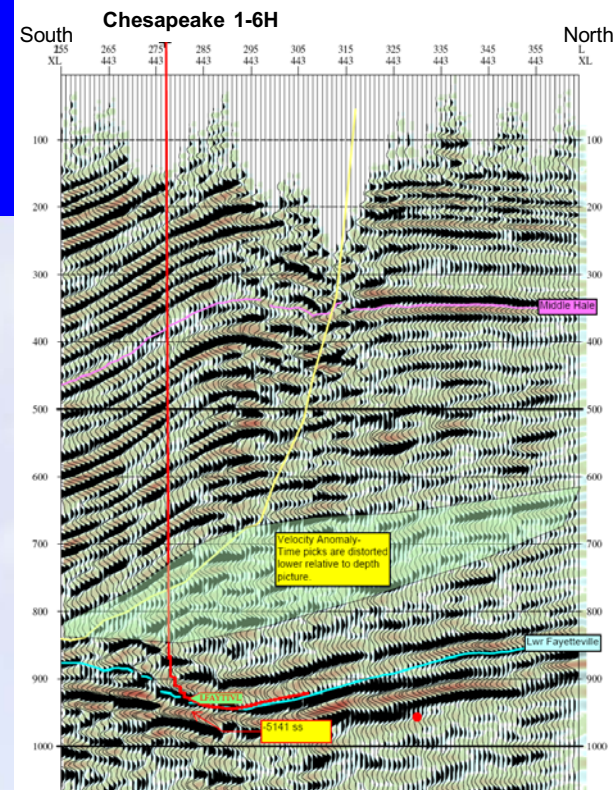


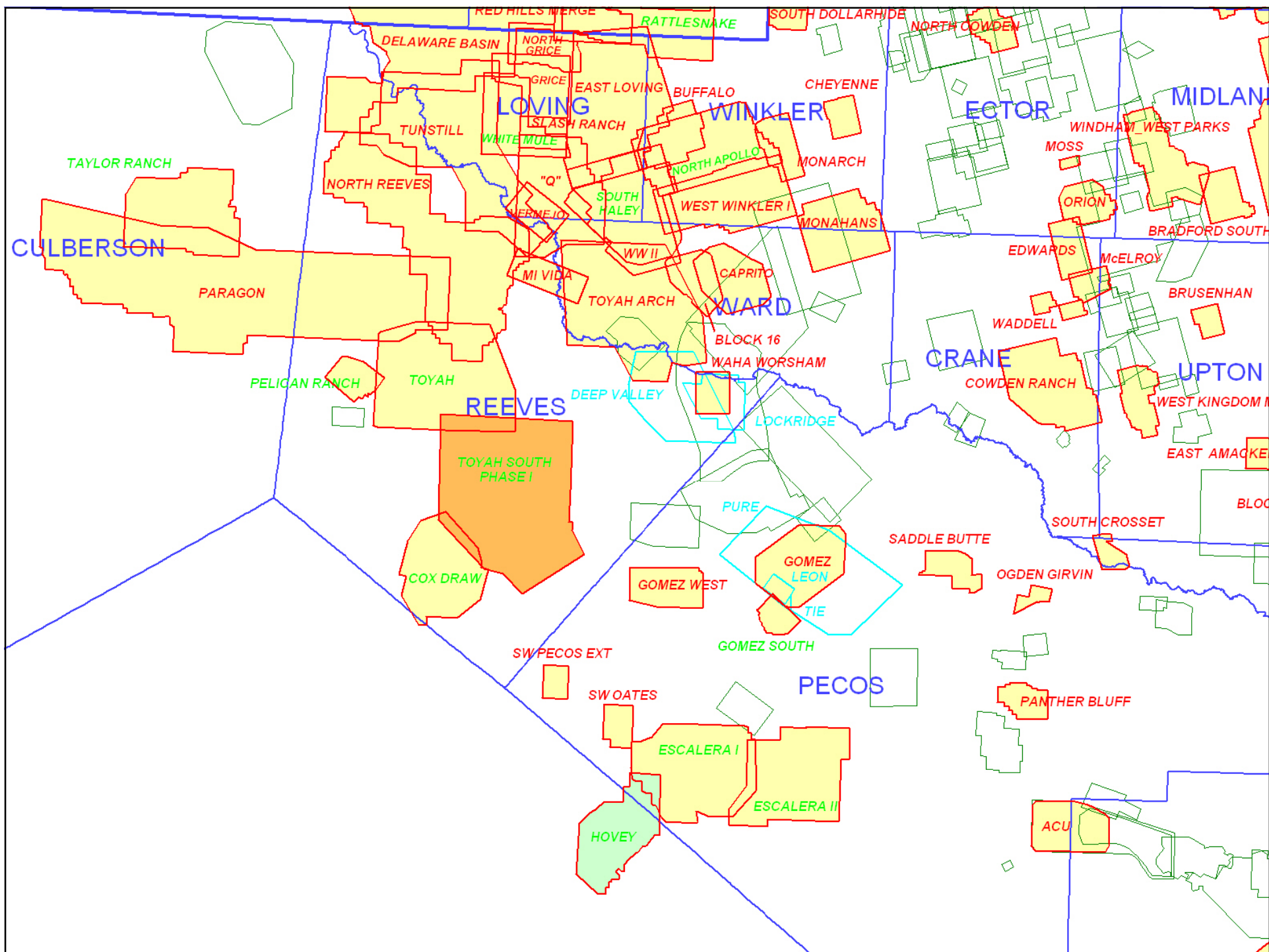


Structural contour lines of the L. Fayetteville Shale from 3D seismic and well control with the wellbore path highlighted in red. Contour interval is 50'.

Middle Right--Chesapeake 1-6H well path in respect to the pay zone of the L. Fayetteville Shale (highlighted zone).

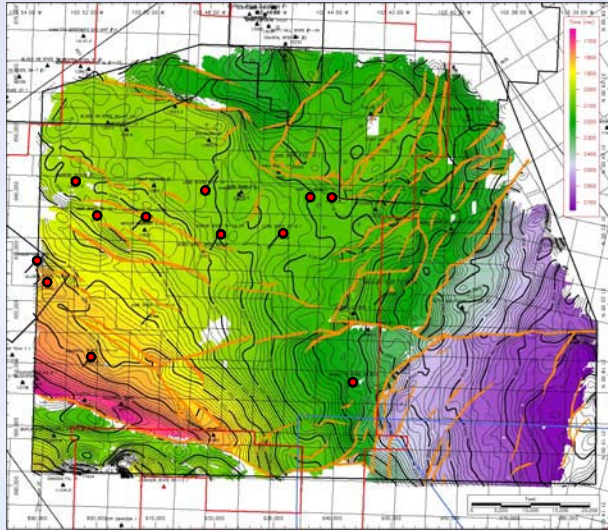
Lower Right--Gas shows and ROP are graphed to correlate with vertical section feet of the wellbore





3D Seismic Fracture Related Attributes

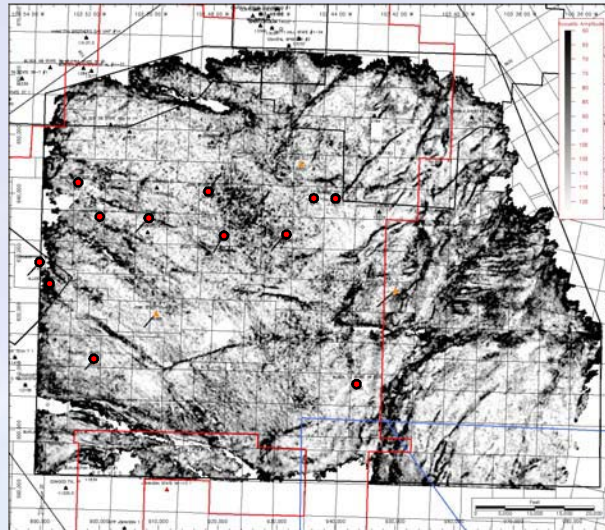
TIME STRUCTURE MAP



TIME STRUCTURE MAP

- Illustrates major faults
- Color and contours show structure and magnitude of offset across faults

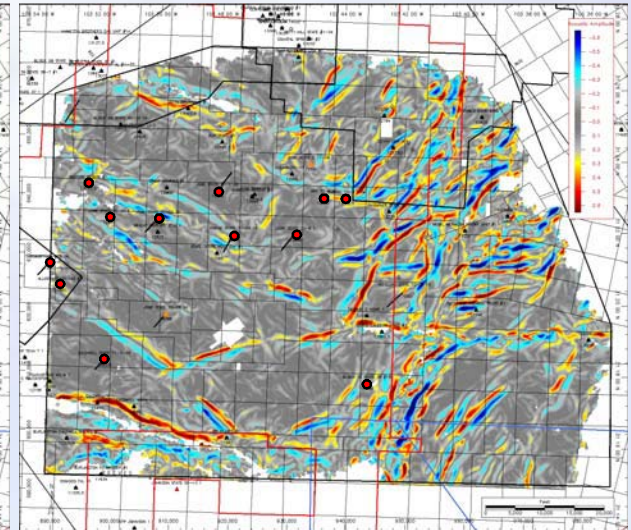
COHERENCE MAP



COHERENCE ATTRIBUTE

- Black shows discontinuities along horizon
- Illustrates major and minor faults
- horizon must be offset to show anomaly

MAX CURVATURE MAP



MAXIMUM CURVATURE ATTRIBUTE

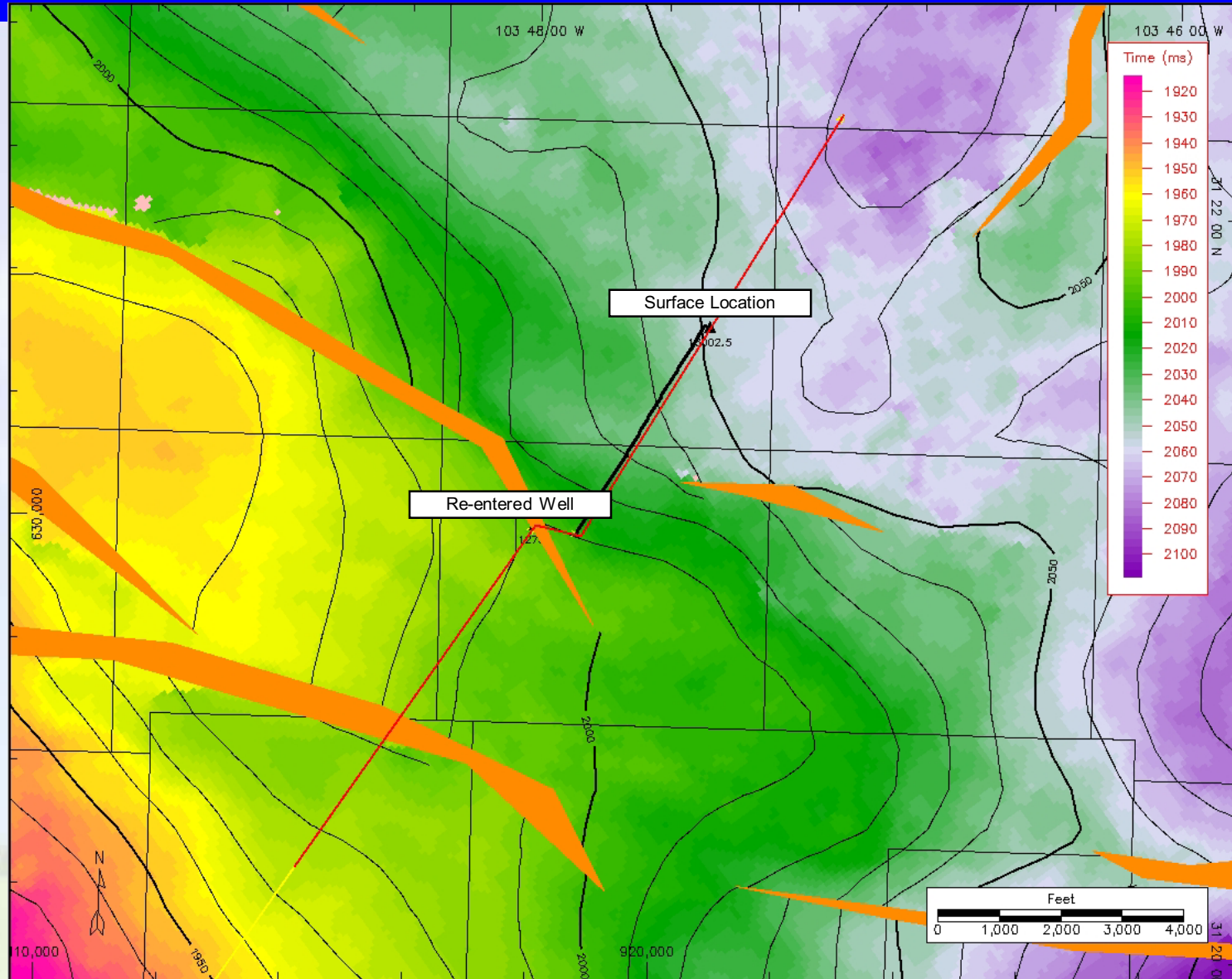
- Red = Ridges, Blue = Depressions
- Illustrates fault related folding
- Faults with very small offset imaged better with curvature vs. coherence

LOWER RESOLUTION FAULT IMAGE

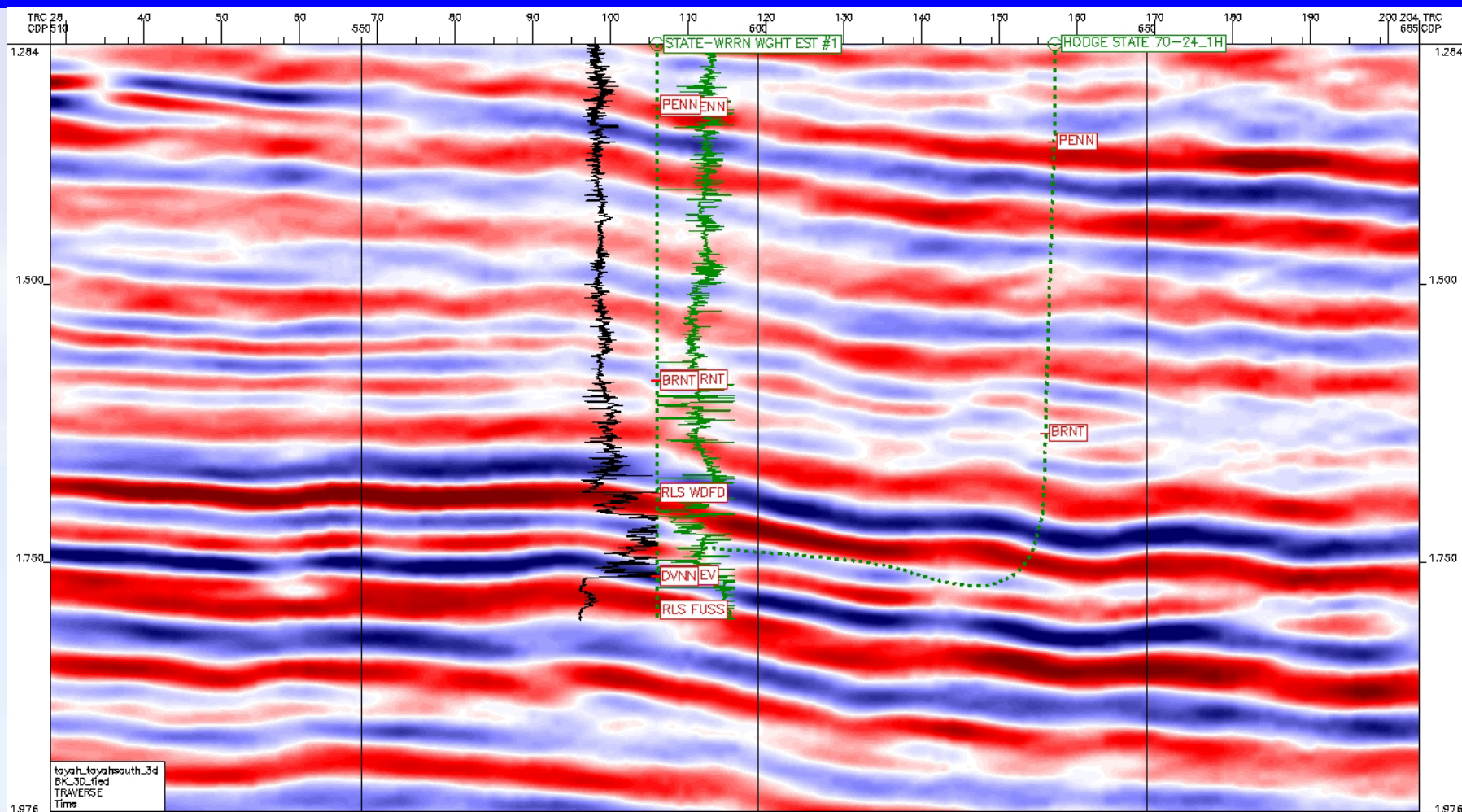
HIGHER RESOLUTION FAULT IMAGE



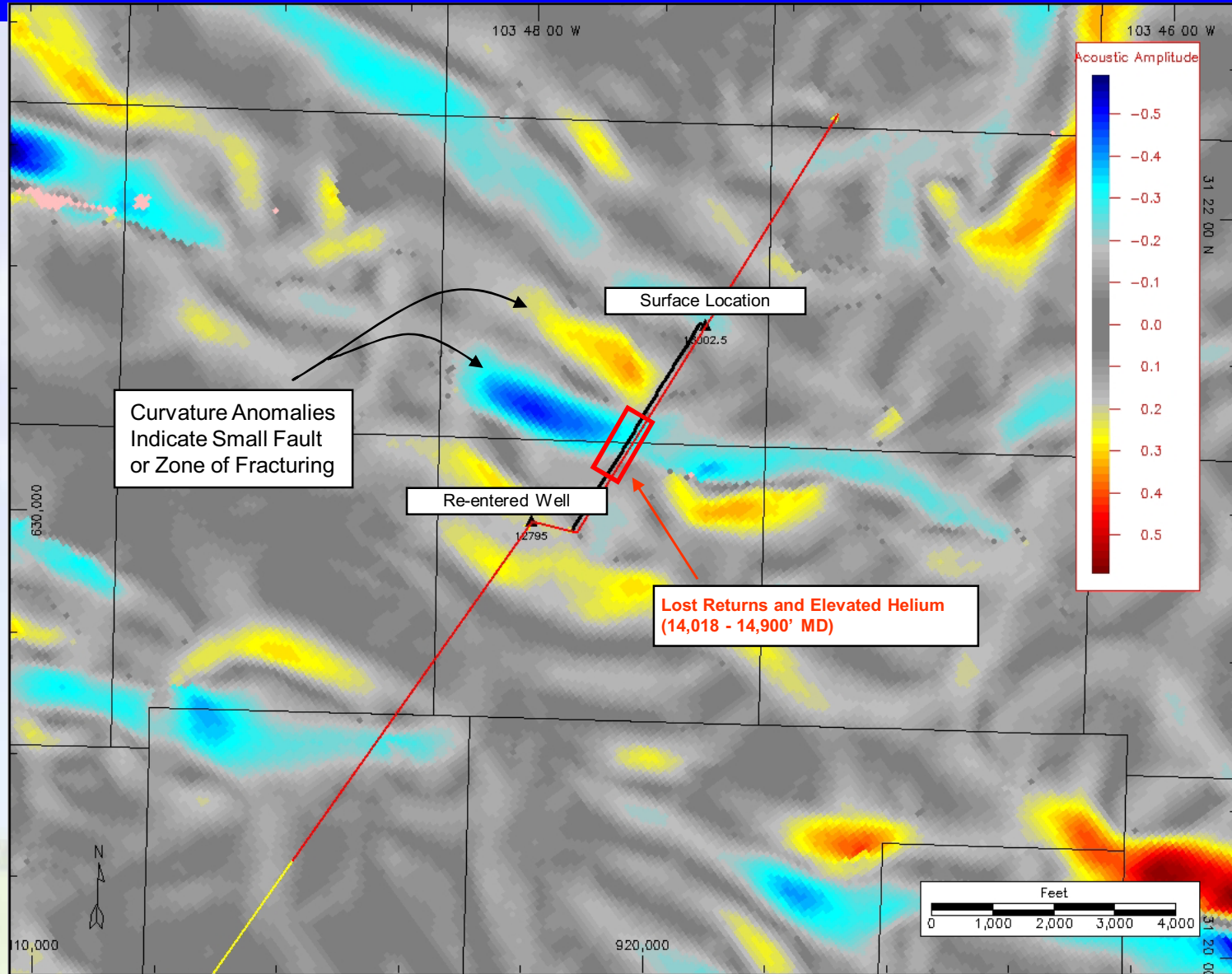
3D Seismic Time Structure Map



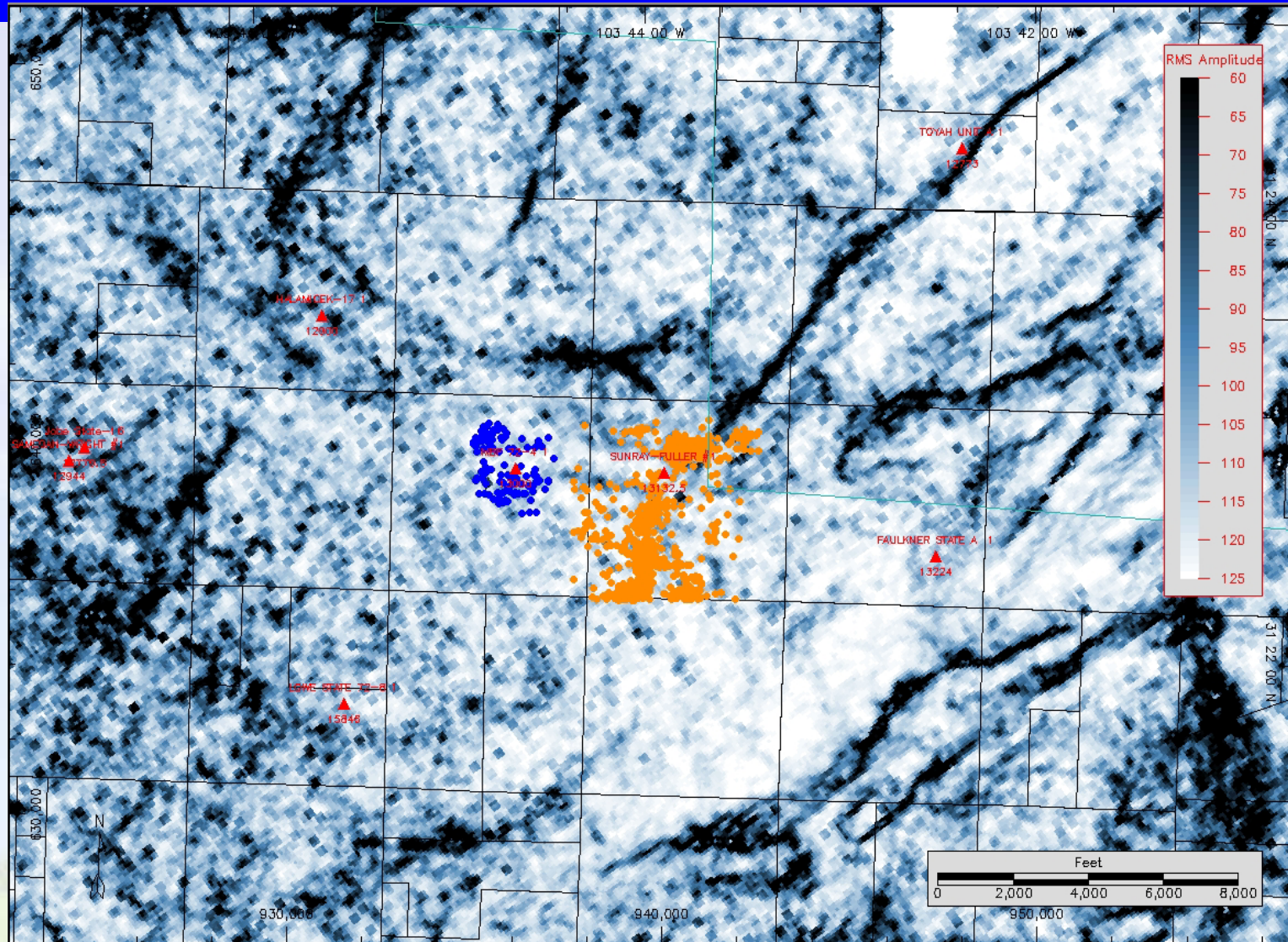
3D Seismic Traverse



3D Seismic Curvature Map



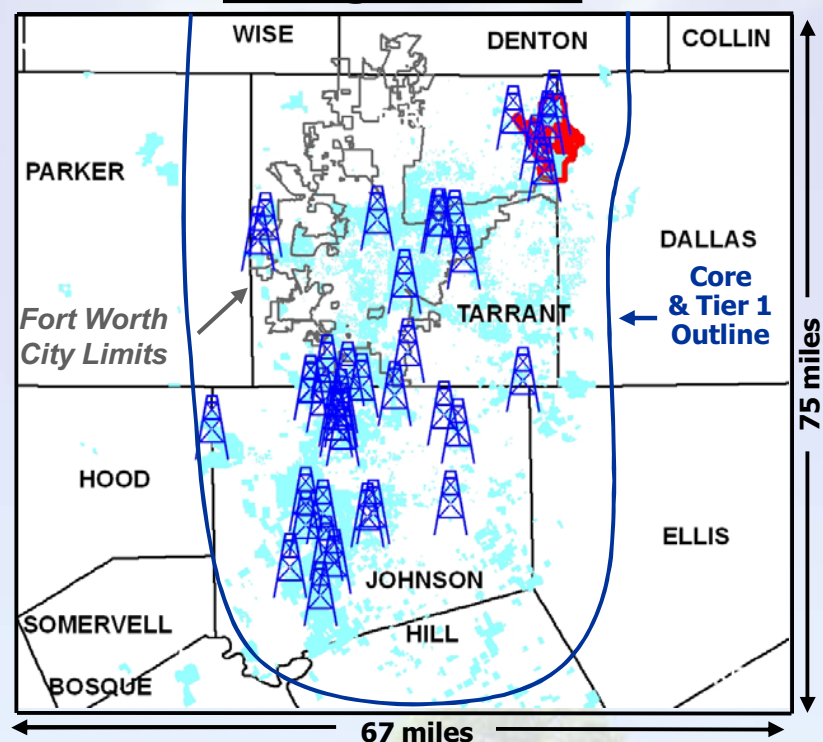
Coherence Map with Microseismic Events



Fort Worth Barnett Shale

- ❑ Established a Top-2 position in less than 4 years
- ❑ Now have ~260,000 net acres in the play (220,000 net acres in Core & Tier 1)
- ❑ ~3,550 potential net wells to develop ~6.8 tcf (net) of PUD and risked unproved reserves
- ❑ Can drill ~450 net wells per year with a 39-rig program
- ❑ Rapidly developing substantial competitive advantages and economies of scale in urban Tarrant County
- ❑ Year-end 2007 gross production exit rate increased 140% vs. 2006 exit rate to 600 mmcf/day (400 net)
 - Year-end 2008 gross production exit rate target of 900-1,000 mmcf/day

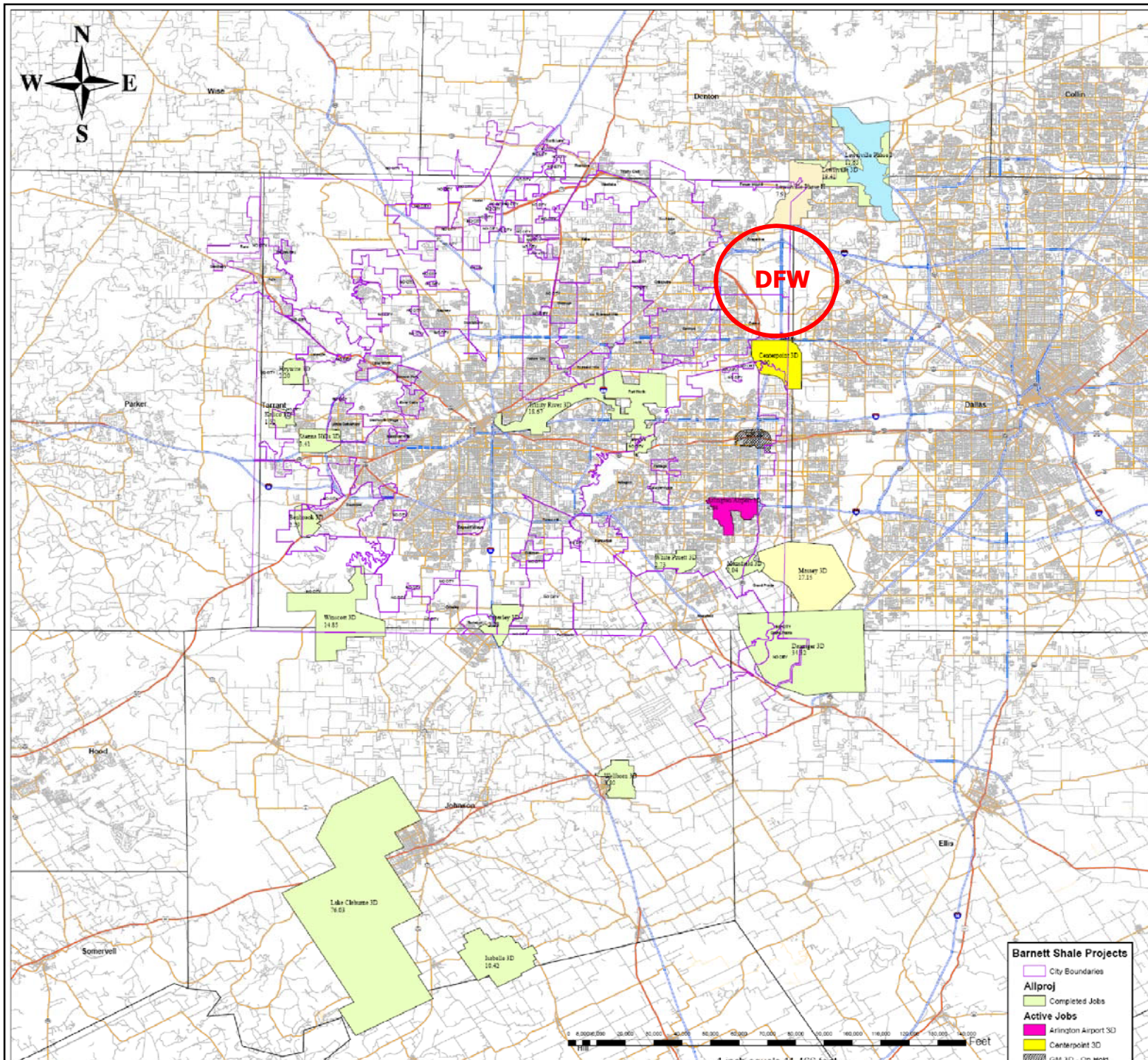
Acreage Position



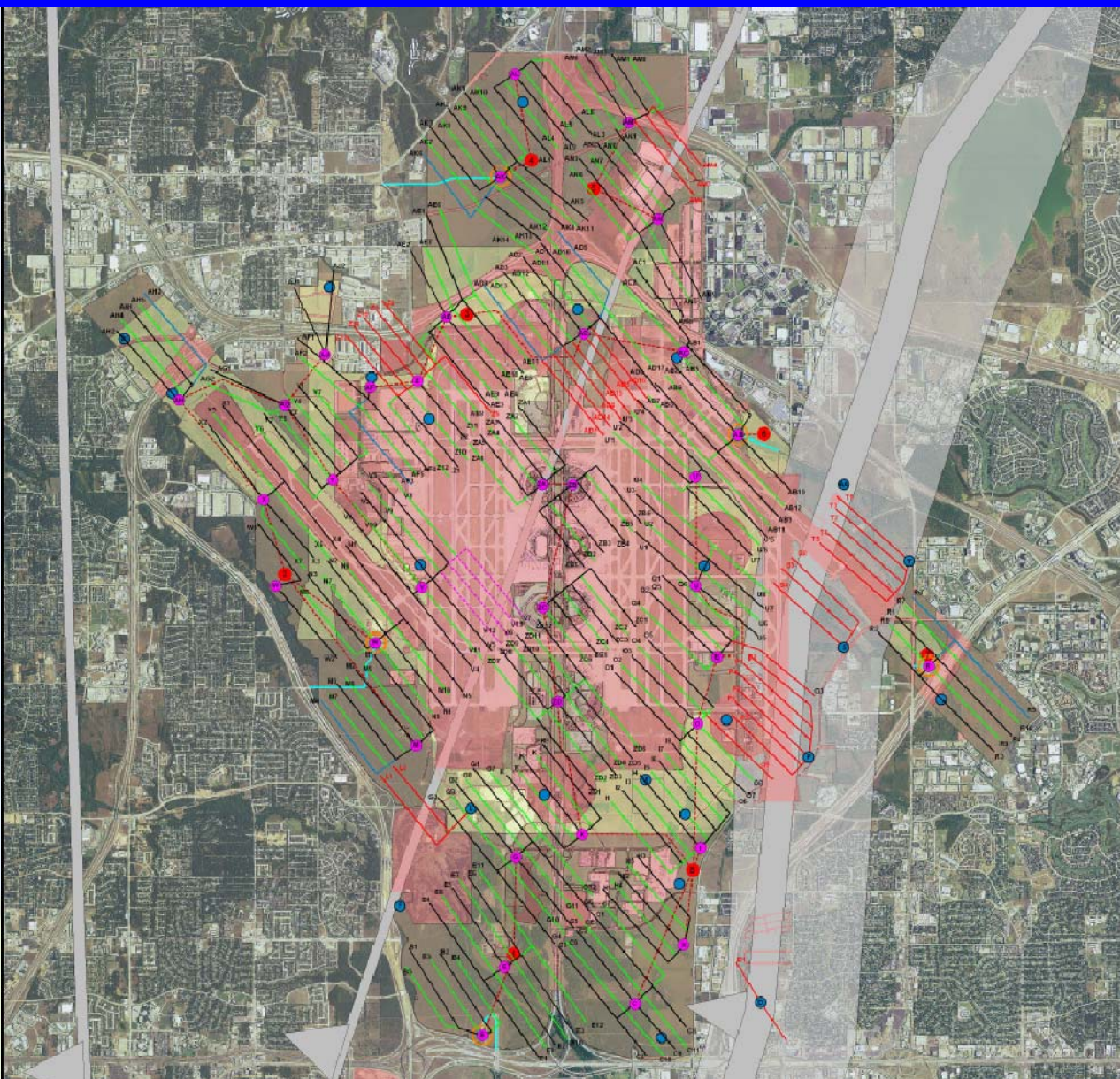
Active Rigs

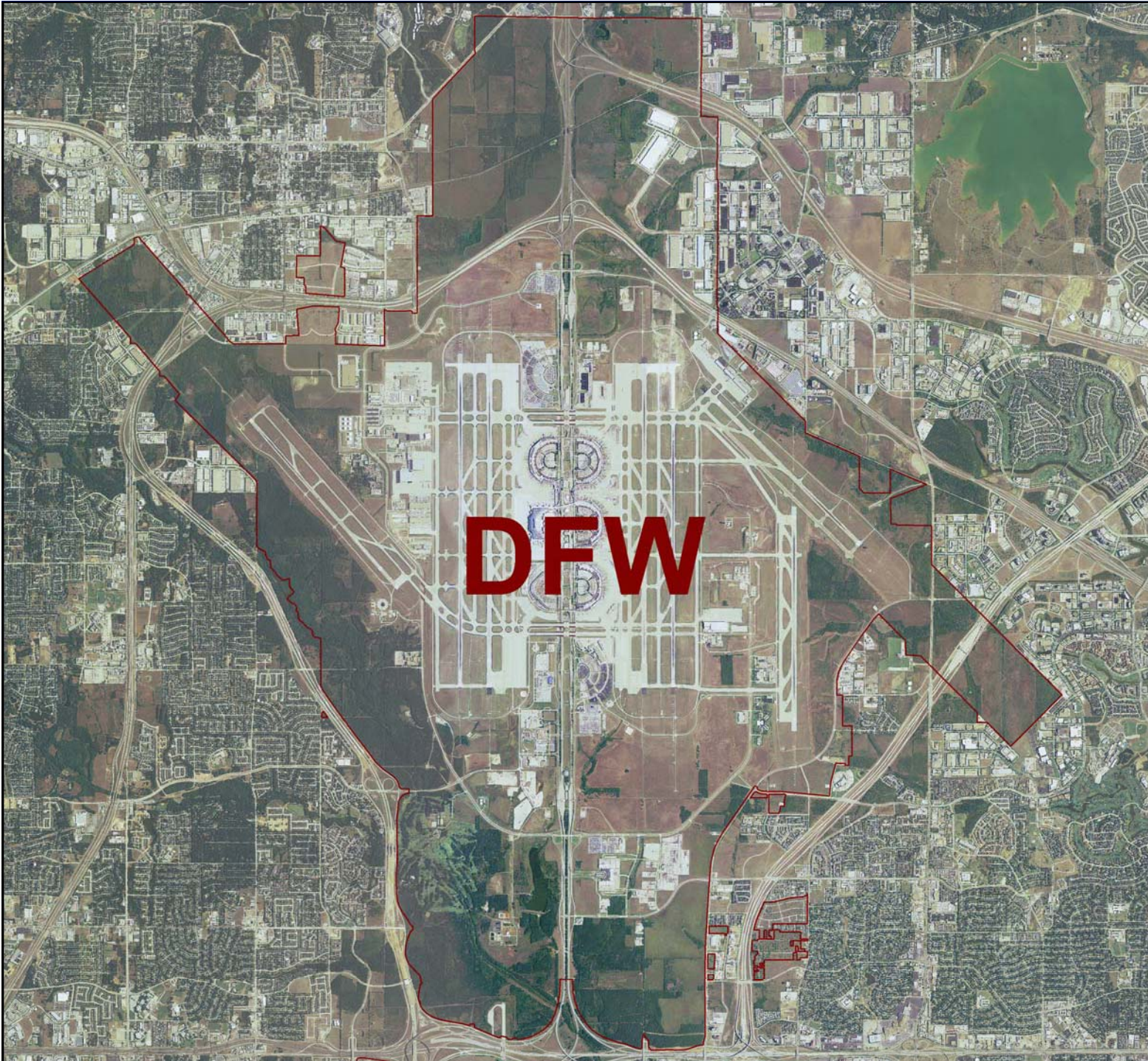
- CHK Operated
- CHK Leasehold
- City of Fort Worth Outline
- DFW Intl. Airport

With 39 drilling rigs, CHK is the most active driller in the nation's best resource play



FORMULATING THE BID ON 18,000 NA



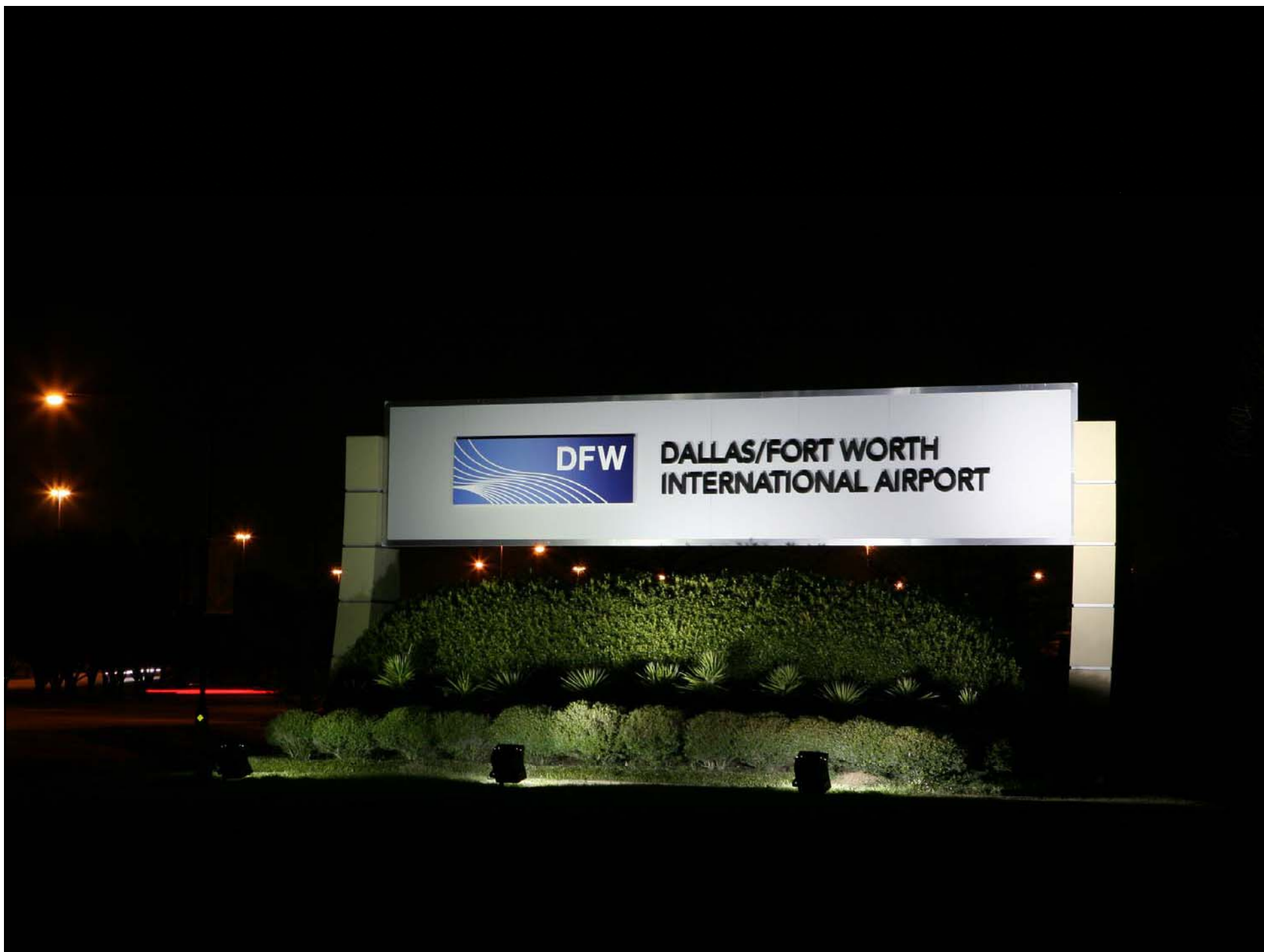


Seismic at DFW Airport

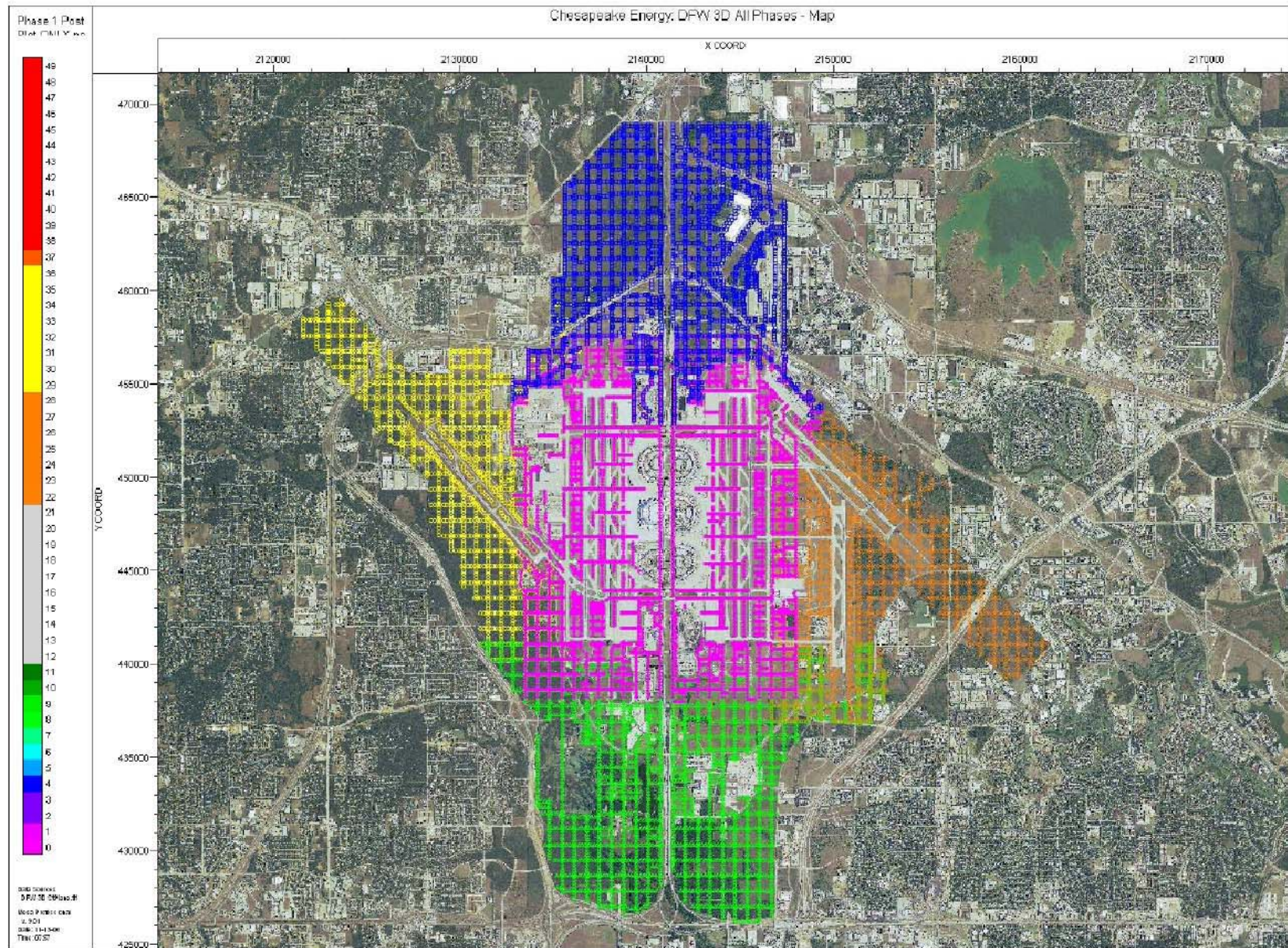


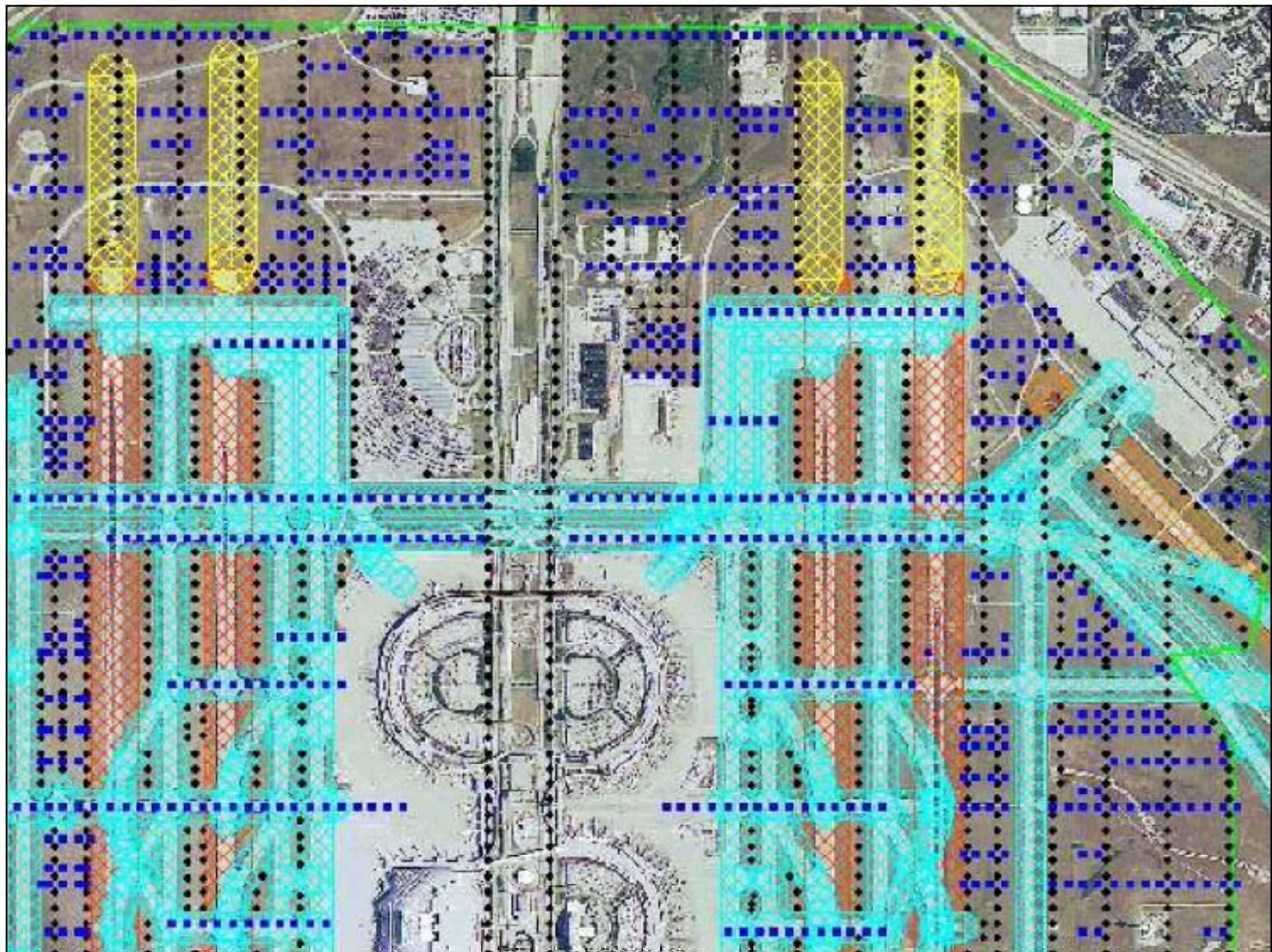


**DALLAS/FORT WORTH
INTERNATIONAL AIRPORT**

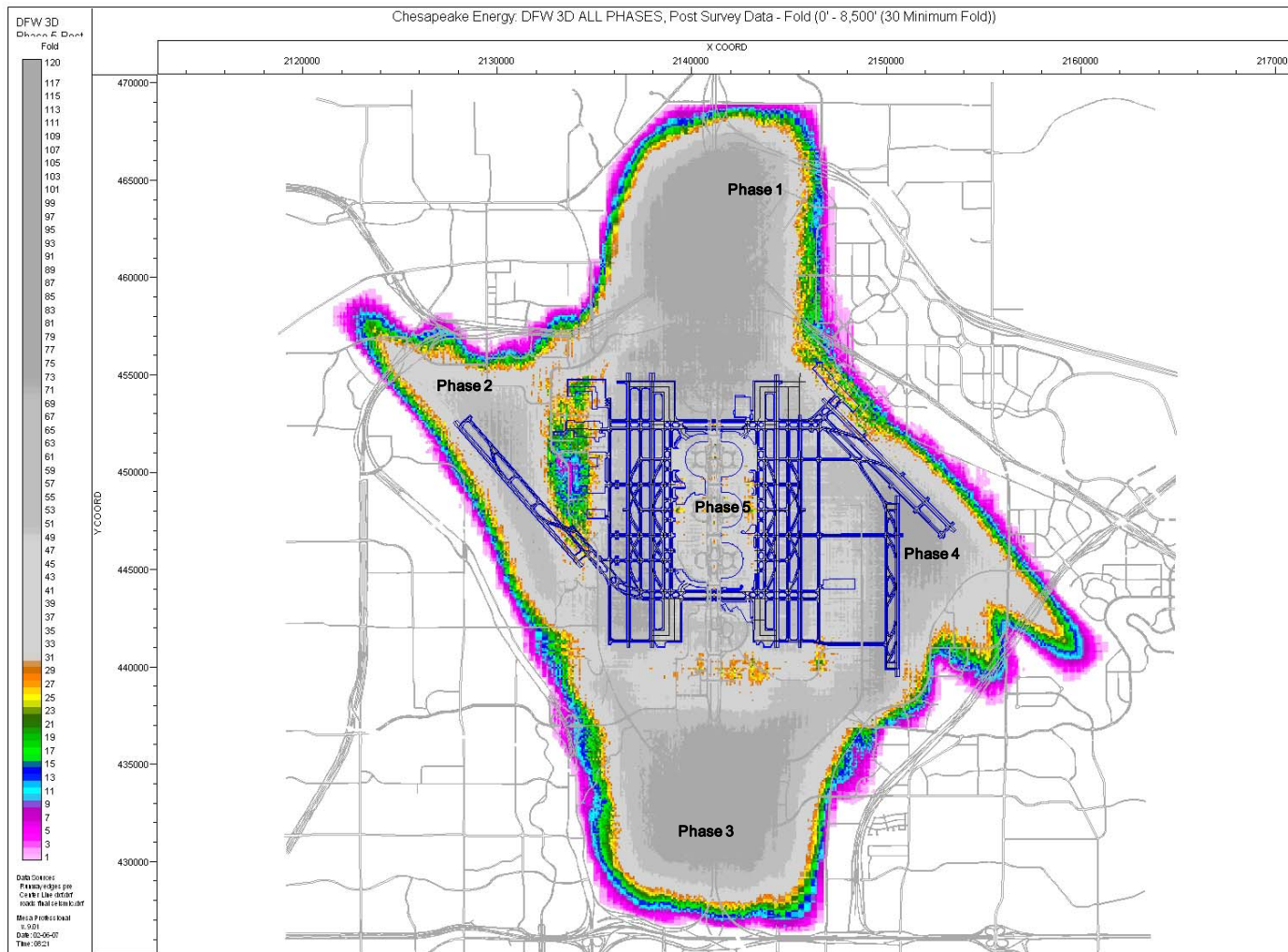


DFW 3-D: 35 Square Miles in 5 Phases

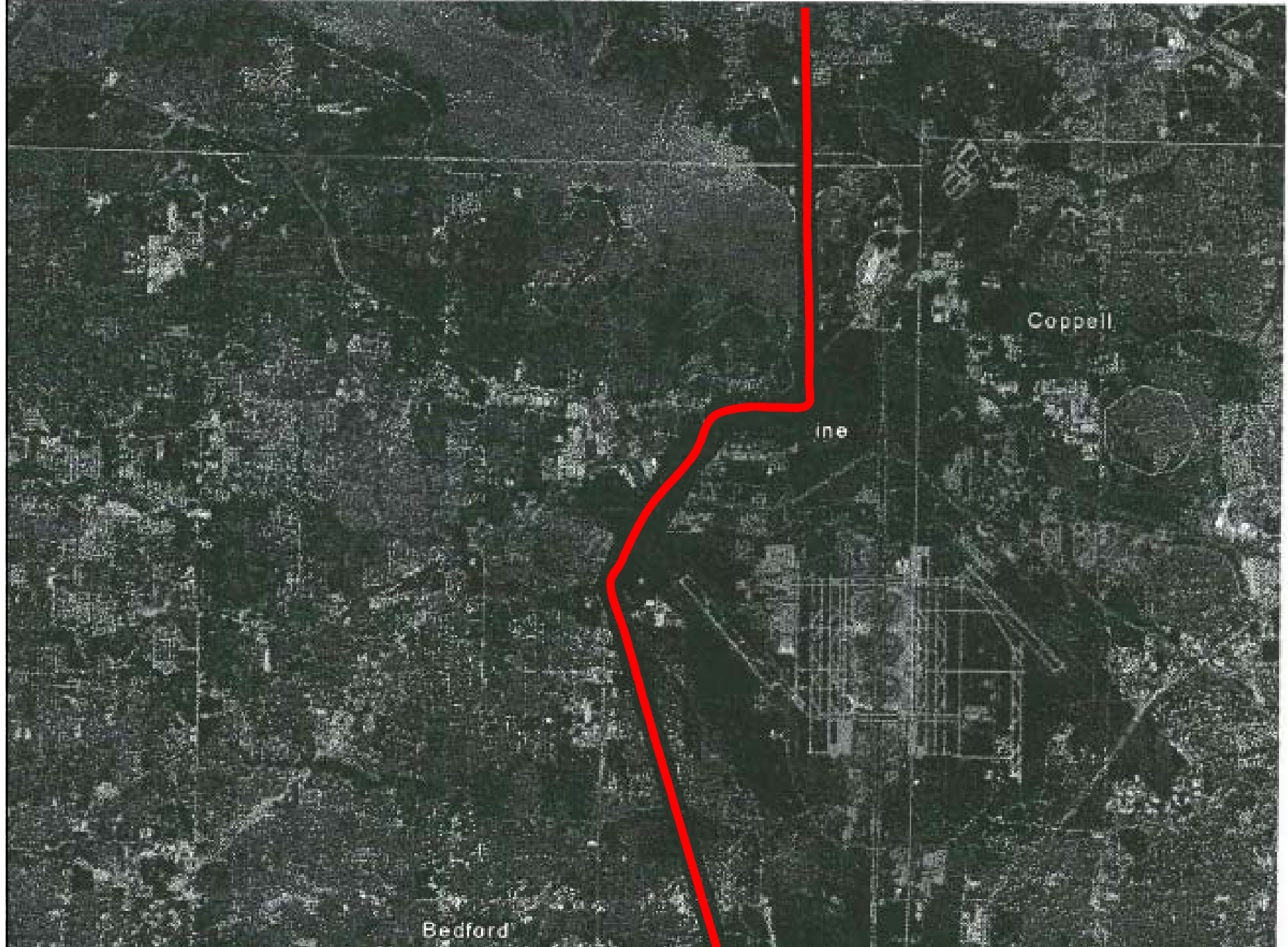




Final Fold at 0' – 8,500' of DFW 3D Survey



Approx. Eastern limit of the Barnett Shale Gas



Mr. Mark Lester.
Executive Vice President
Chesapeake Energy Corporation

Dear Sir:

This is to let you know that I was Map Dowsing the eastern boundary of the Barnett Shale, when I suddenly stopped short of DFW Airport. This map shows where the gas ends. The Barnett Shale is probably there, but void of gas. Usually if it doesn't dowse, it isn't there. Sorry I had to give you this bad news.



DFW Airport Lease

- ❑ Results better than expected with less karsting and faulting
- ❑ Spud first well in May '07
- ❑ Initial drilling and core analysis yielded better than expected results
 - Shale up to 500 feet thick
- ❑ Have now drilled ~50 wells to date; production exceeds 60 mmcf/day
- ❑ Operating a 5-rig continuous drilling program through 2011
- ❑ Plan to drill 300-325 horizontal wells from ~50 pad sites



\$233 PER AC

DFW 3D SEISMIC COST ESTIMATE

BEST "ESTIMATE" AT CURRENT STATUS; i.e. Completion of pre-seismic and initiation

Of geodetic survey and re-filing of seismic permit application;

ITEM	EXPENDITURE
PRE-SEISMIC TESTING	\$ 40,000
PEAK PARTICLE VELOCITY TEST	\$ 3,500
GEODETIC SURVEY	\$ 112,500
LINE CLEARANCE	\$ 35,000
ADDITIONAL RECORDING EQUIP. LEASE	\$ 843,000
RECORDING 3D ACQUISITION 87 DAYS @\$33,000/D	\$2,871,000
Q.C. AND SUPERVISION	\$ 34,000
SECURITY & MISCELLANEOUS	\$ 30,000
DATA PROCESSING ~ 25 Recorded Sqs	\$ 50,000

TOTAL = \$4,019,000

(\$4,019,000 divided by 18,000 Total Acres = \$223/acre)

(\$4,019,000 divided by ~ 25 Recorded Sq's = \$160,760/Sq.)

THESE TOTAL EXPENDITURES ARE MORE THAN X2 THE ORIGINAL EST. OF \$1,875,000. INCREASE PRIMARILY DUE TO RESTRICTED NIGHT TIME WORKING HOURS OF SOME 6 TO 7 HOURS PER NIGHT, RESTRICTED NUMBER OF PERSONNEL, ADDITIONAL EQUIPMENT LEASE EXPENDITURES, AND GEODETIC SURVEY COST.

24 HOUR STACK

