

Seismic-Data Interpretations near the Blan Carbon Sequestration Test Well in Hancock Co., Kentucky

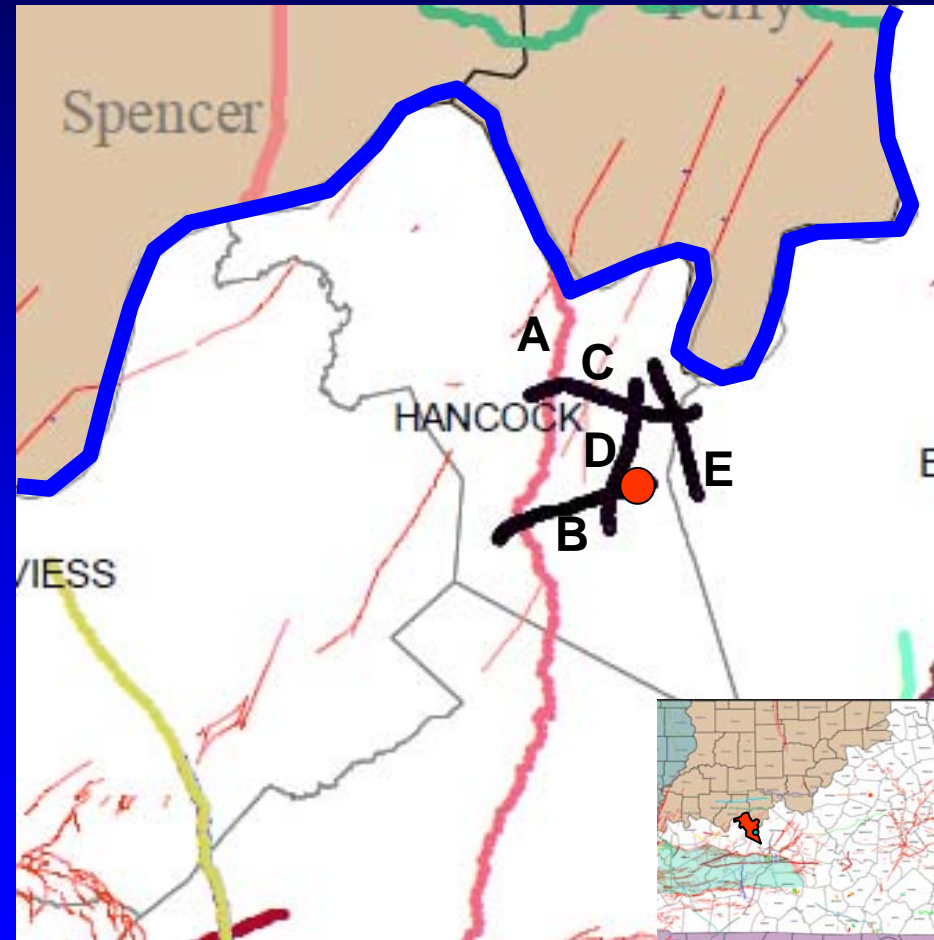
**KYCCS Western Kentucky Deep Test
Review Meeting
Friday, October 23, 2009**

*James A. Drahovzal
Consulting Geologist
Sponsored by
Kentucky Geological Survey*



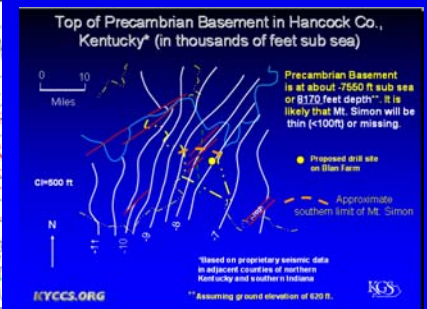
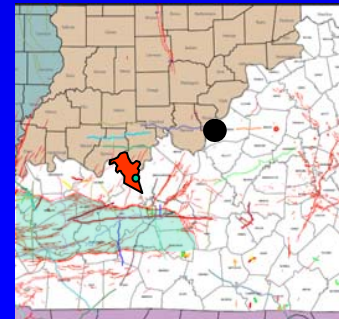
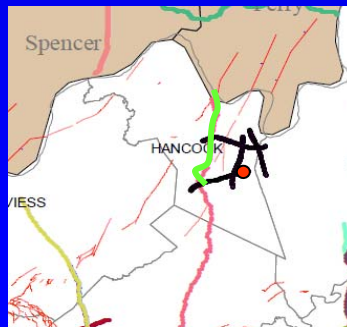
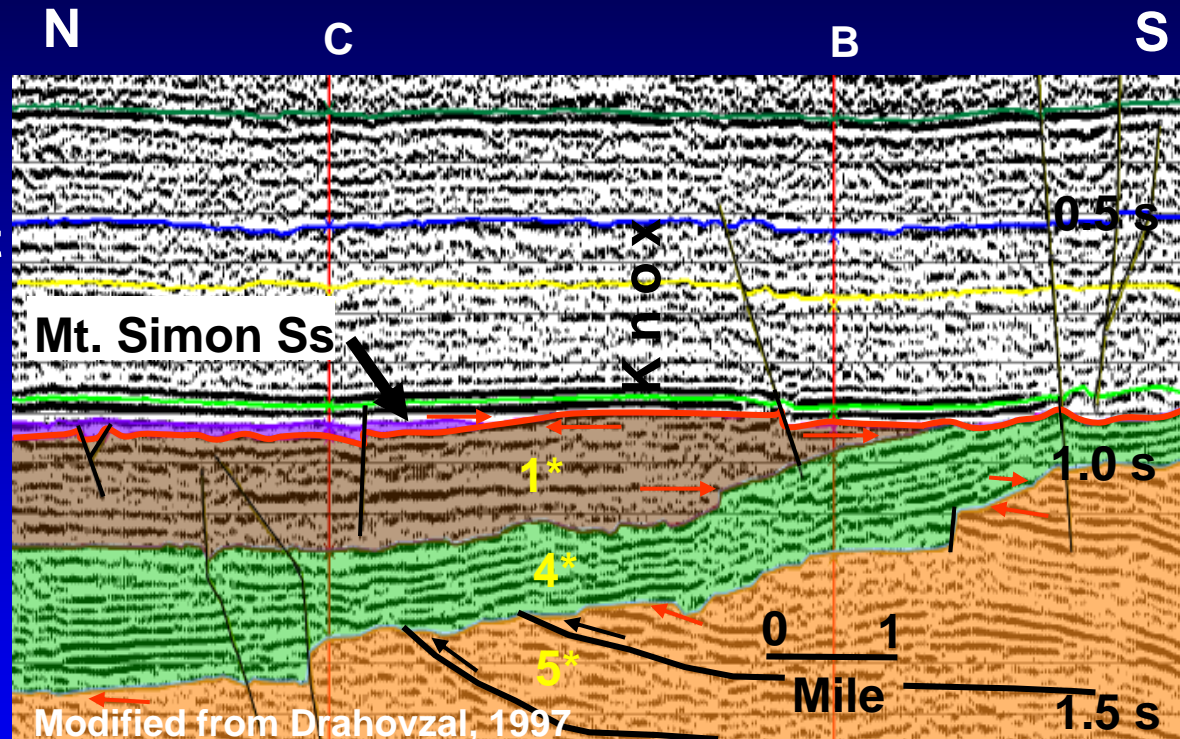
KGS #1 Marvin Blan well and seismic data in Hancock Co., Ky

- Well completed to **8,126 ft** (-7491 ft subsea) in Hancock Co. in western Kentucky
- Seismic-data support
 - One existing line 4 mi. to west of well (A, red line)
 - Four new seismic lines shot for the well (B-E, black lines)
 - Seismic-data gap on B



Interpretation of Line A Before Well Drilled

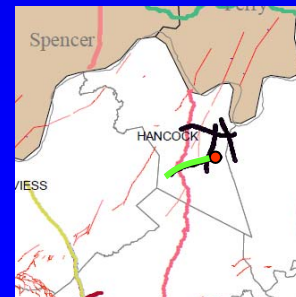
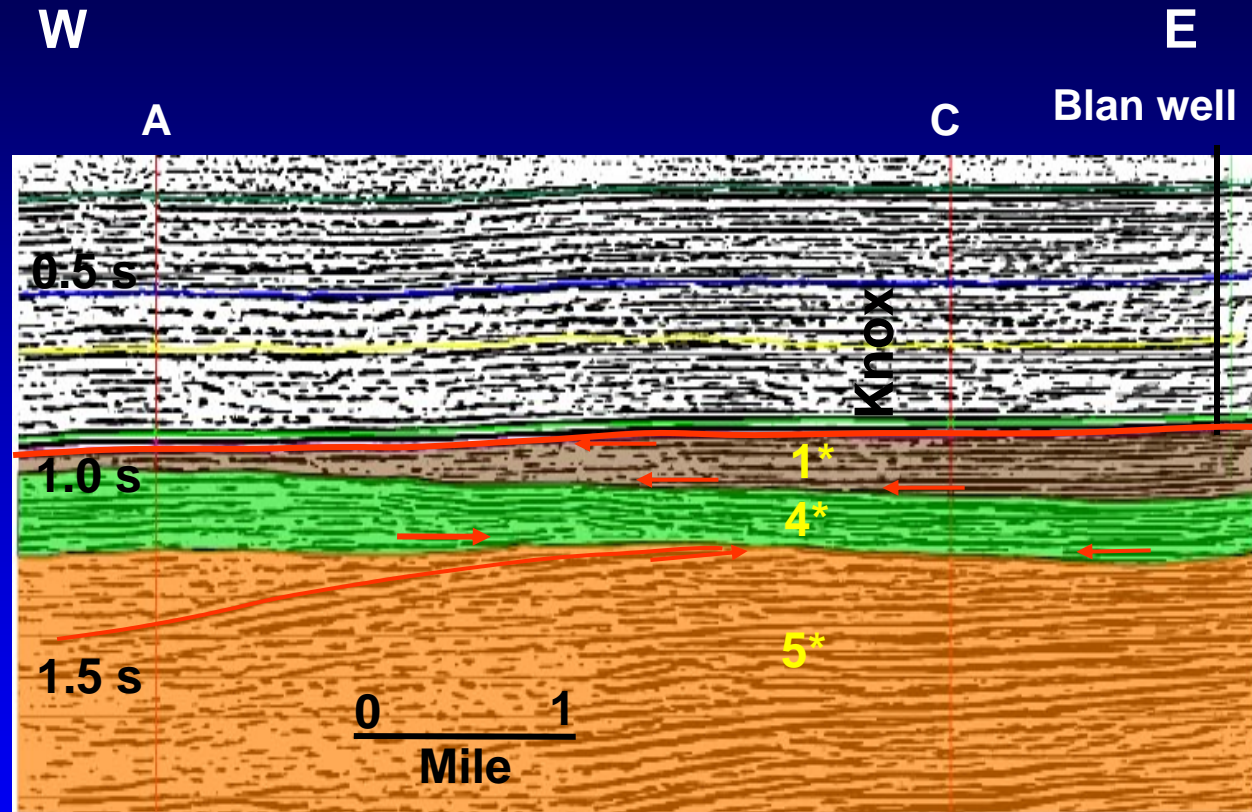
- Predicted stratigraphic tops were approximate
- Knox predicted to be 4,000 ft thick at well and unfaulted
- Mt. Simon interpreted at North end of line
 - Based on correlations from Wad Fee well in Louisville and seismic lines in southern Indiana
 - Mt. Simon onlaps and pinches out to the S.
 - Predicted **NO** or very thin Mt. Simon in the well
- Recognized three Proterozoic seismic sequences
 - Predicted drilling into Sequence 1*-- siliciclastic



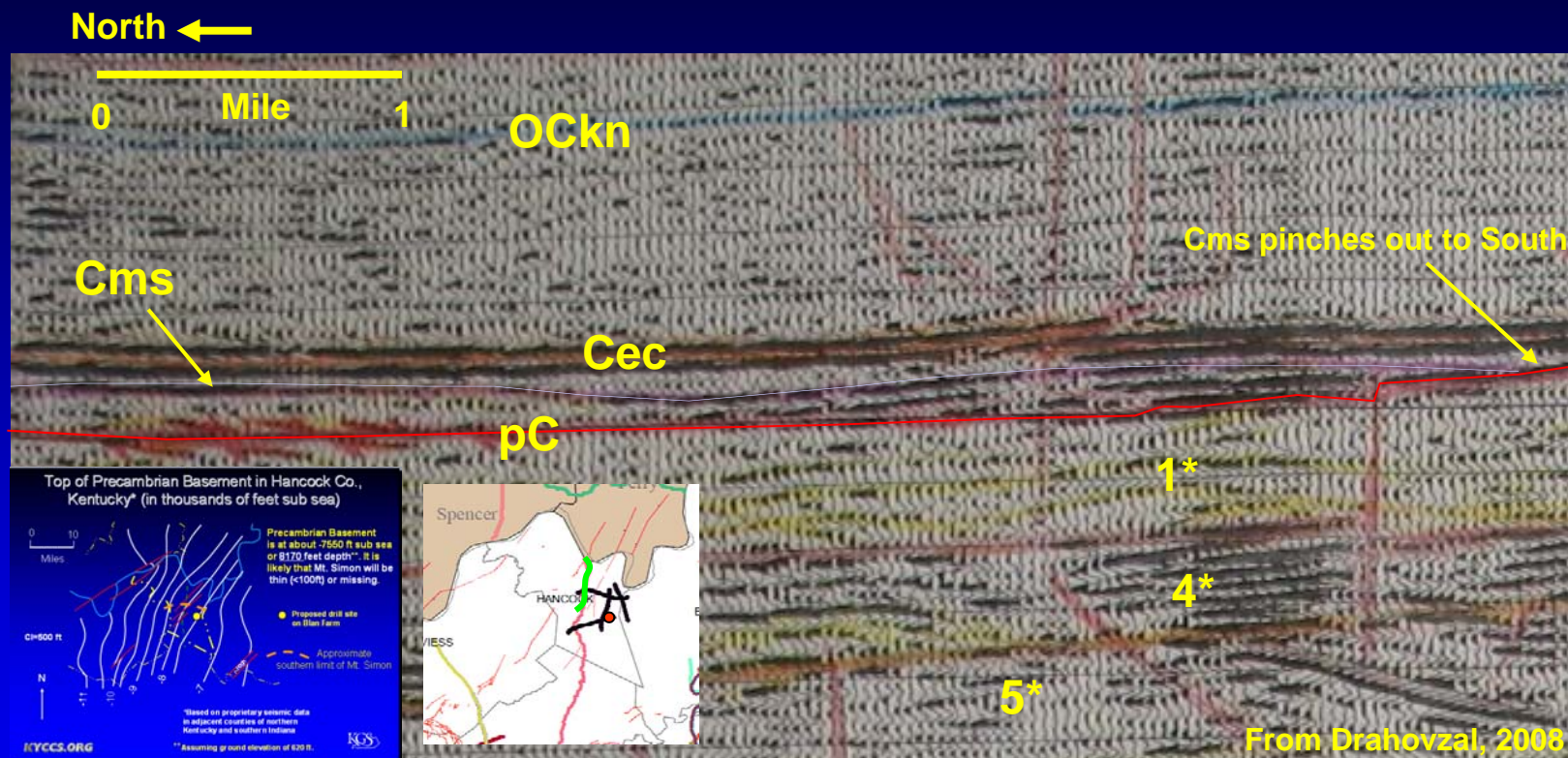
How did we do?

New Data: Line B and the Blan Well

- Area near well is unfaulted
- Knox thickness is **3,617 ft** (instead of 4,000 ft); nearer to the **3,580 ft** predicted using the new data
- **No** Mt. Simon in the well as predicted
 - Basement high in area
- Eau Claire much thinner than predicted—87 ft (instead of predicted 300 ft)
 - Also due to basement high
 - Seismic miscorrelation
 - Lack of velocity data
- Well penetrated 300 ft of Precambrian Sequence 1*—a siliclastic, as predicted
- Confirmed 2002 study of Precambrian sequences



Mount Simon Sandstone on Original Line A Data



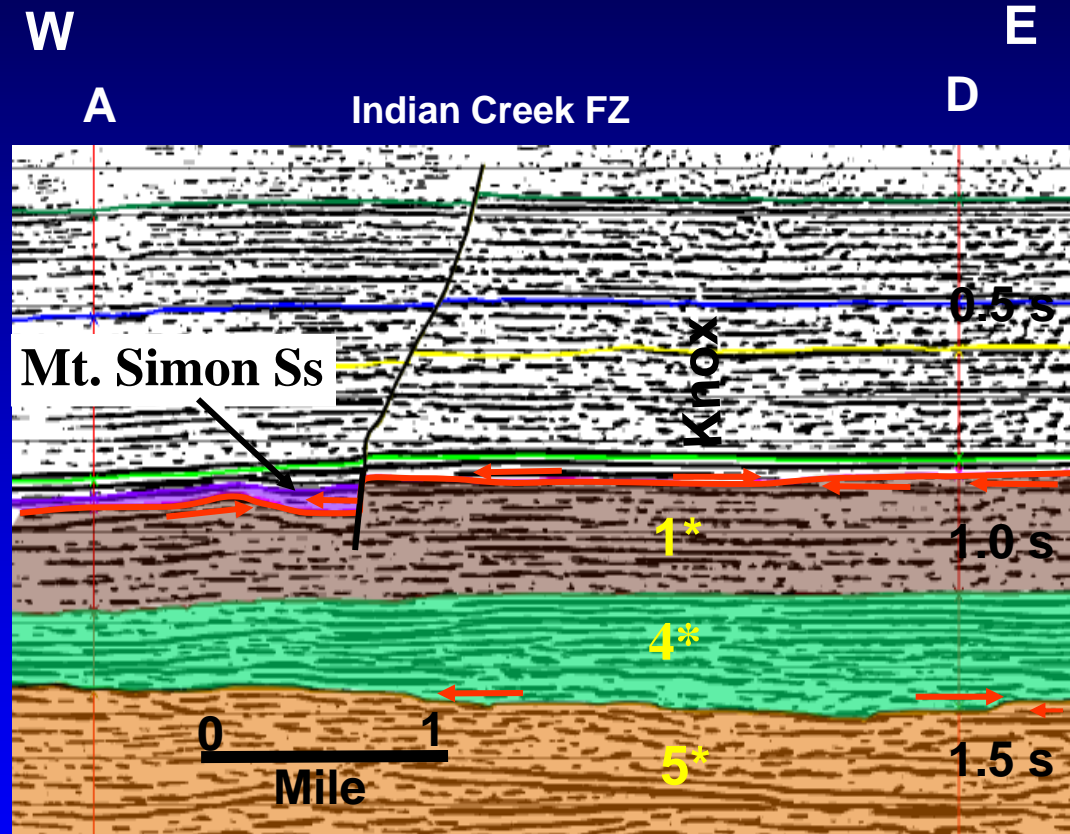
- Up to 590 ft of Mt. Simon at North end
- Mt Simon onlaps and pinches out to South

OCKn Knox Group; Cec Eau Claire Formation; Cms Mt. Simon Sandstone; pC Precambrian; pC1* Precambrian Unit 1*; pC4* Precambrian Unit 4*; pC5* Precambrian Unit 5*

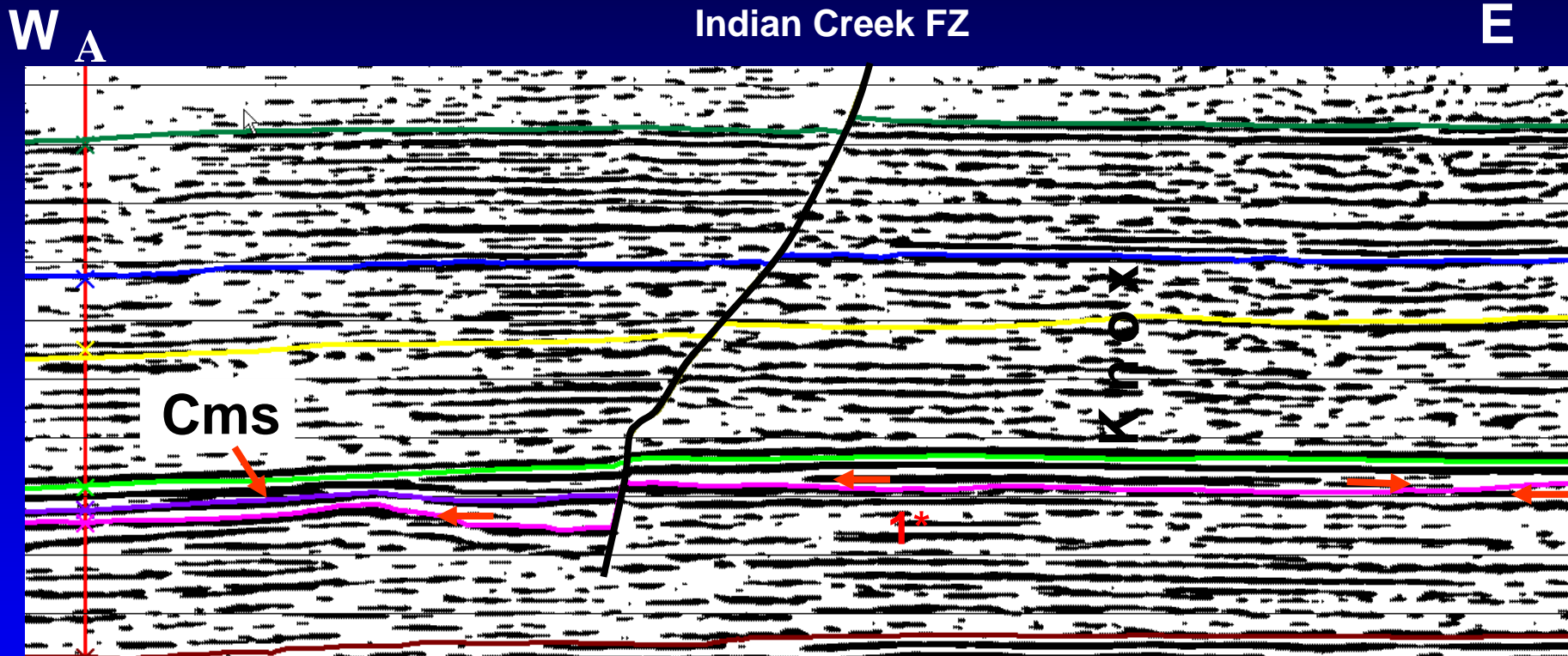


Mt. Simon on Line C (New Data)

- Only new line that showed the Mt. Simon
- Mt. Simon terminates at Indian Creek FZ
- Note irregular base and truncation of Precambrian surface



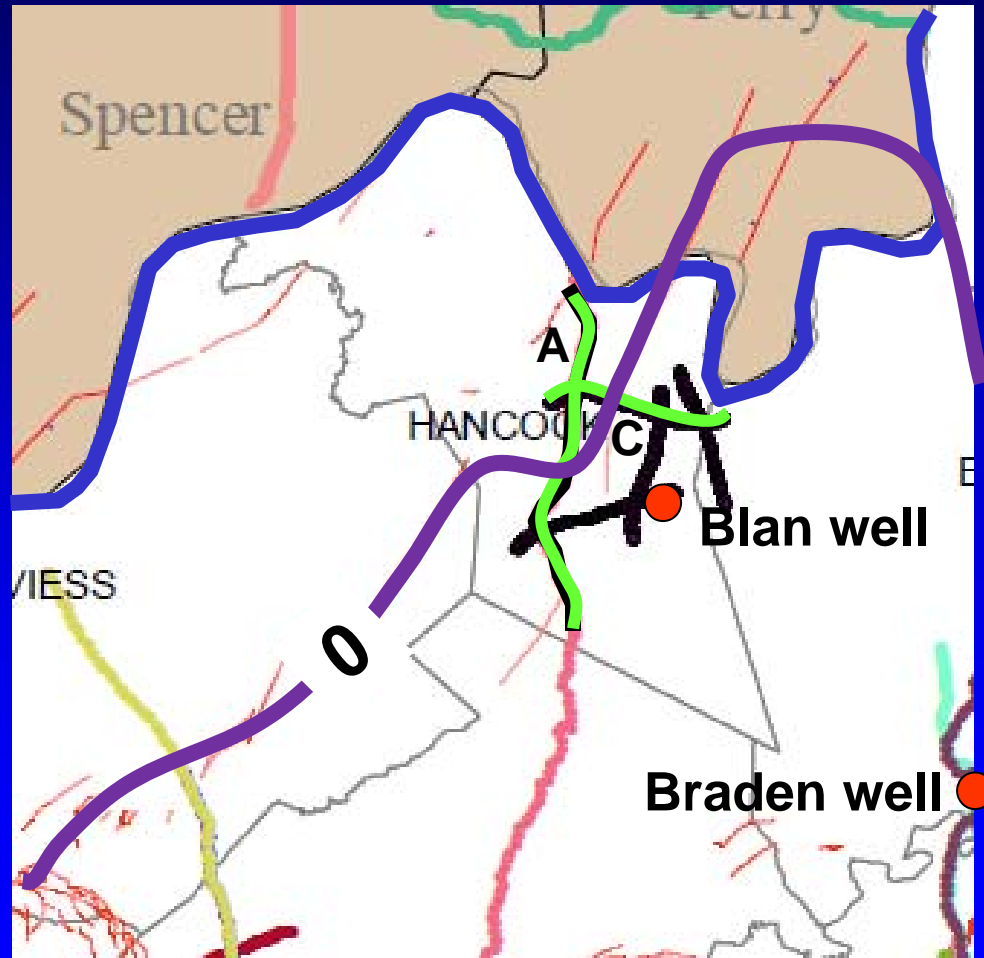
Detail of Seismic Line C



- Bright reflector to East could be a thin remnant of Mt. Simon that pinches out to West and East
- None of the other new lines showed Mt. Simon

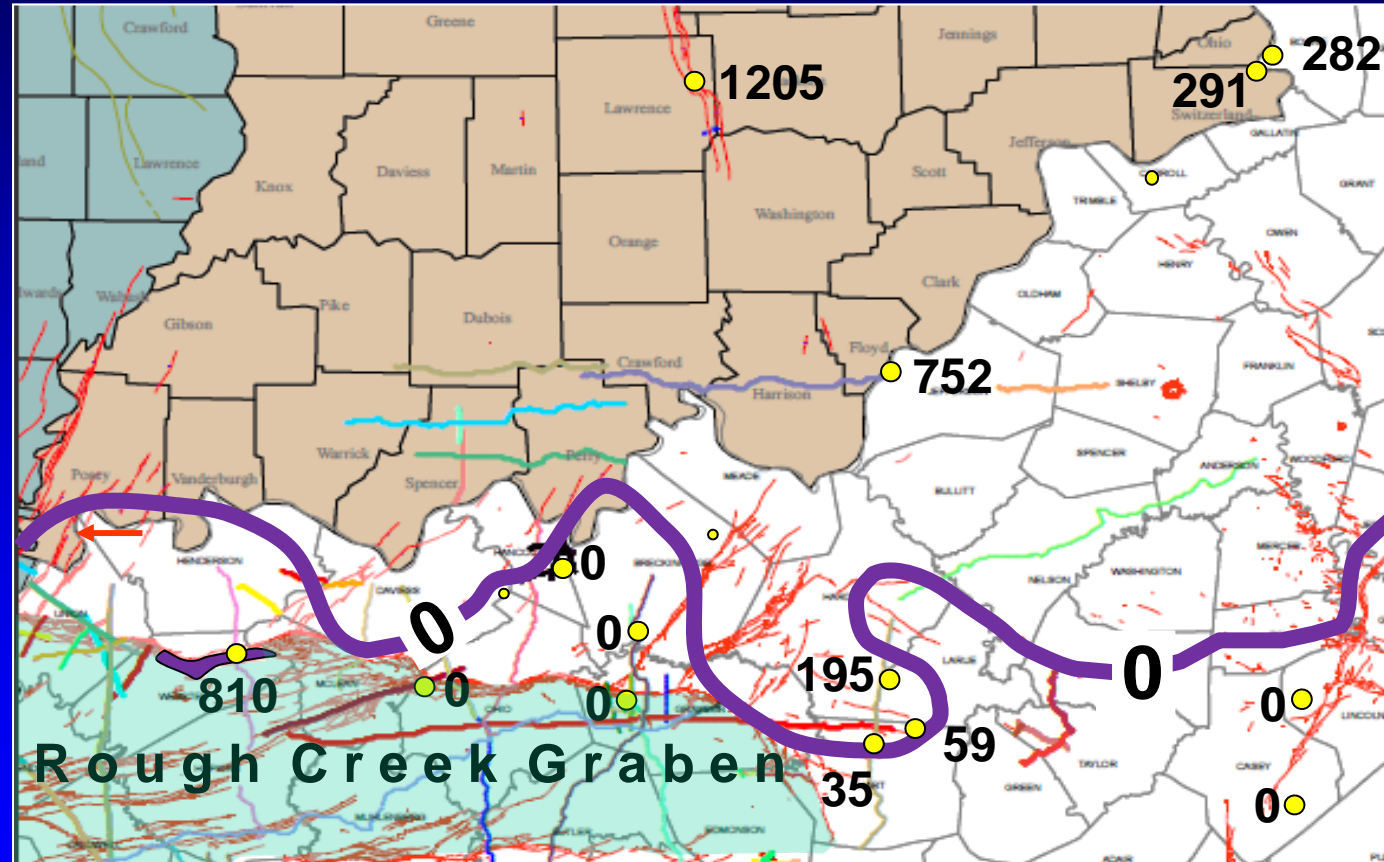
Mount Simon Sandstone Distribution in Hancock Co., Ky

- Pinch out on line A
- Fault Bounded on C along Indian Creek FZ
- Based on the seismic lines, **NO** Mt. Simon was predicted in Blan well
- Nor in Braden well
- Both of those conclusions born out by results from wells



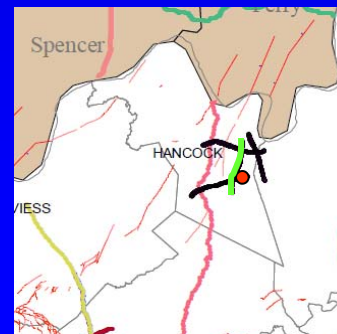
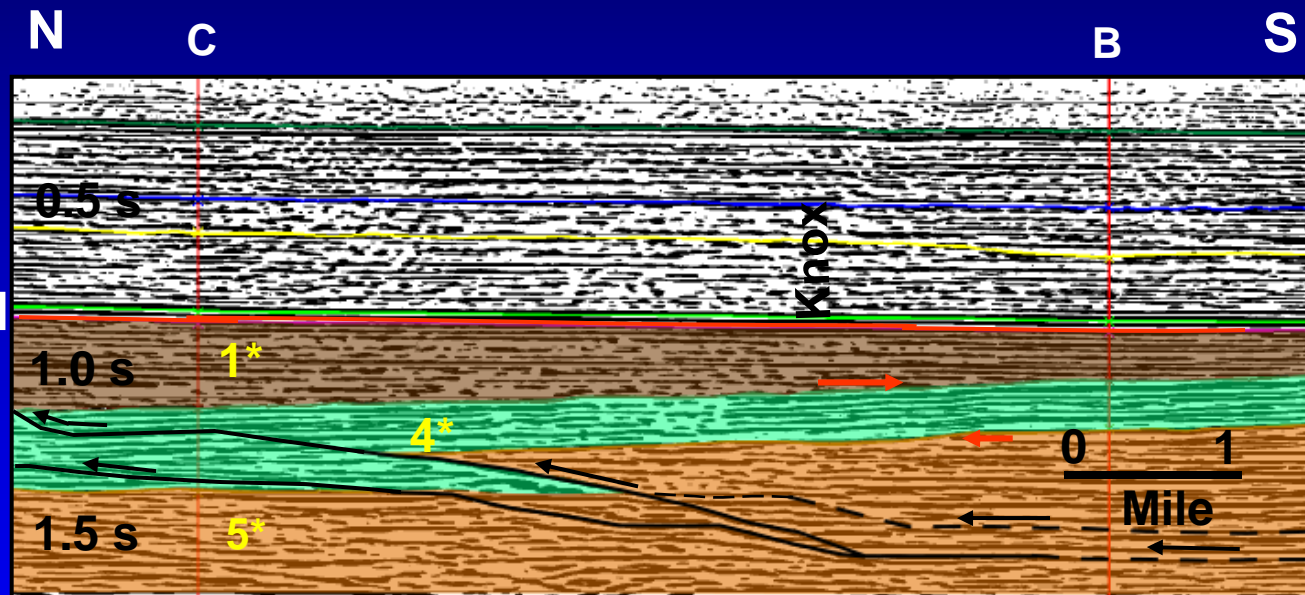
Mt. Simon Sandstone Distribution in North Kentucky

- Much less Mt. Simon North of RCG than previously thought
- Series of basement highs and lows



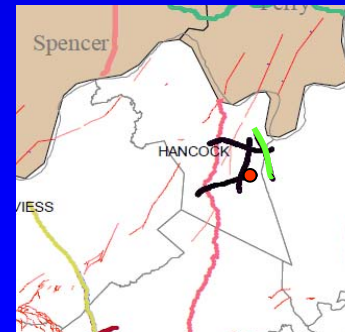
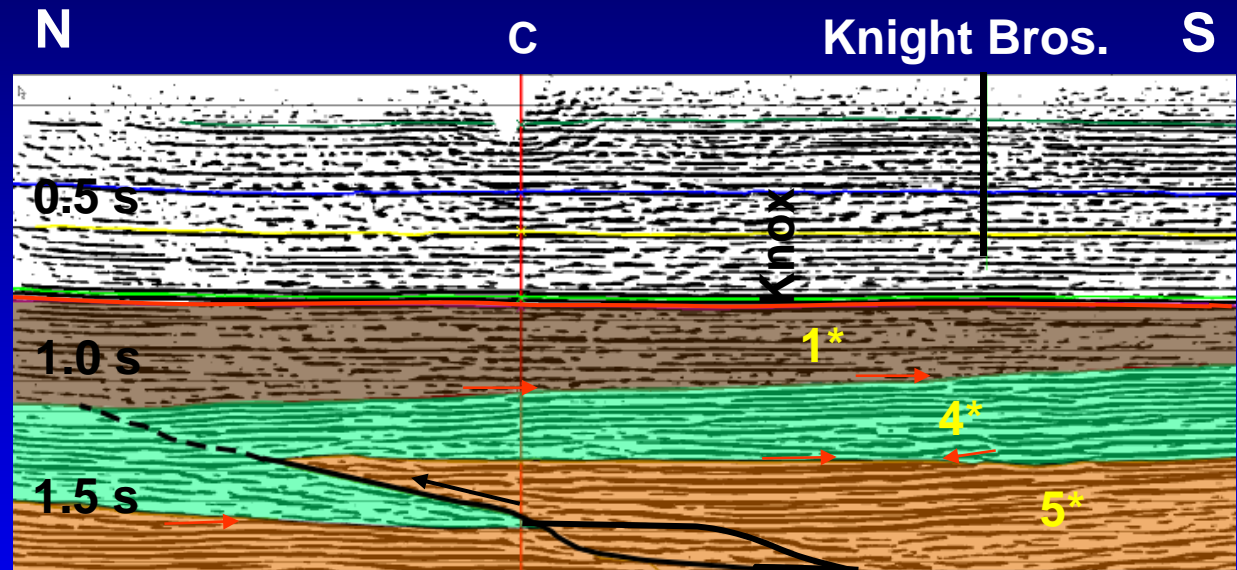
Interpretation of Line D

- Paleozoic and unconformity dip south
- Knox uniform thickness
- No Mt. Simon
- 4* dips only gently N and is not folded as in Line A
- 4* & 5* cut by imbricate thrust faults
- Faults are **North-vergent**
 - A vergence not seen previously in western Kentucky Proterozoic



Interpretation of Line E

- Same relationships as in previous line
- Again, north vergent faults
- 1* undeformed
- Faulting related to compressional uplift of Louisville High to the East
 - Compressional uplift ~600 Ma
 - Sequence 1* likely erosional clastic detritus ~590 Ma



Conclusions

- No major faulting is present near the Blan well
- The Knox is of nearly uniform in thickness in the vicinity of the well; 3,617 ft thick at the well
- The Blan well has no Mt. Simon, as predicted; and the Mt. Simon is apparently more restricted North of the RCG in Kentucky than previously thought; local basement highs are present in the area resulting in thin to absent Mt. Simon and thin Eau Claire sections
- The distributions of Proterozoic sequences defined in 2002 by seismic- data interpretations were confirmed by the Blan well and the new 2-D seismic data
- The Blan well encountered a red lithic arenite in Sequence 1*, the general lithology predicted from earlier seismic interpretations
- Sequence 1* is likely clastic detritus derived from erosion of the Louisville Uplift to the East, is likely fluvial, and is about 590 Ma in age
- The northwest-vergent faulting in Hancock Co., is previously unknown in the area, but is likely related to the 600 Ma compressional uplift of the Louisville structure