

Field trip to Berexco Cutter KGS #1 Stevens County, Kansas September 10-11, 2012



Beredco Rig #1
S/2 S/2 S/2 NE Section 31s-35w
Stevens County Kansas

Organized by KGS & Berexco, LLC

Schedule

- September 10, 2012
 - Brian Dressel, DOE Program Manager arrives at Wichita Midcontinent airport at 1:30 p.m.
 - Drive to Dodge City, KS and check-in at Holiday Inn Express for evening.
 - Wichita to Dodge City - 154 miles via US 400/US 54 – 2 hrs. 42 minutes by Google
 - 2320 W. Wyatt Earp Street, Dodge City, Kansas 67801
 - Reservations and front desk: 620-227-5000 – Please make your reservations as early as you can.
 - Dinner -- ~5:30 p.m. Casey's Cowtown Restaurant in Dodge City, KS (503 E Trail St, Dodge City, KS 67801-9011)
 - Background presentation 7 p.m. -- on the Berexco Cutter KGS #1 at reserved conference room in the Holiday Inn Express.
 - http://www.kgs.ku.edu/PRS/Ozark/cutter_kgs_1.html
- September 11, 2012
 - Depart for wellsite – 8 a.m. -- Berexco Cutter KGS #1 wellsite is located near 5.7 miles southwest of Satanta, Kansas and is on right side of road off U.S. 56. See attached pdf file for map. Handout will be provided during the field at wellsite or before.
 - Dodge City to Satanta, via US-56, 60 mi, 1 hr 8 min. by Google
 - Tour of well site – 9 a.m. to noon. Review drilling, coring, DST, and well testing program. Discuss progress, core handling and recovery, and plans. Description of relationship of this well to the overall project objectives.
 - Depart wellsite and lunch stop on return trip to Wichita – ~Noon
 - Lunch stop – TBD
 - Return to your respective destinations or return to Wichita for program review meeting.

Lawrence to Dodge City

305 miles (5 hrs)

Google

holiday in express dodge city ks

Get directions My places

Car Bus Walking Bicycle

A Kansas Geological Survey, Lawrence, KS
B holiday in express dodge city,ks
Add Destination - Show options
GET DIRECTIONS

Suggested routes

US-50 W	305 mi, 5 hours 11 mins	No traffic information
US-400 W/US-54 W	317 mi, 5 hours 14 mins	In current traffic: 5 hours 14 mins
I-35 S and US-50 W	322 mi, 5 hours 18 mins	No traffic information

Driving directions to Holiday Inn Express Dodge City

This route has tolls.

A Kansas Geological Survey
1930 Constant Avenue, Lawrence, KS 66047

1. Head northeast toward Constant Ave
2. Turn right onto Constant Ave
3. Take the 1st right onto W 19th St

- Drive to Dodge City
- Overnight stay at Holiday Inn Express
- Dinner 5:30 p.m.
- Background presentation on Berexco Cutter KGS #1, 7 p.m. at the hotel

Manhattan, KS to Dodge City

230 miles, 4.25 hrs

Google

holiday in express dodge city ks

Sign in

Get directions My places

Car, Bus, Walk, Bike

A Kansas State University, Manhattan, KS
B holiday in express dodge city,ks
Add Destination - Show options
GET DIRECTIONS

Suggested routes

I-70 W	230 mi, 4 hours 17 mins
US-50 W	256 mi, 4 hours 28 mins
US-77 S/Rte 77 S and US-50 W	261 mi, 4 hours 39 mins

Driving directions to Holiday Inn Express Dodge City, 2320 West Wyatt Earp Boulevard, Dodge City, KS 67801

A K-State Gardens Fountain
K-State Gardens Fountain
Manhattan, KS 66502

1. Head south on Serum Plant Rd toward Jardine Dr
2. Take the 1st right onto Jardine Dr
3. Turn left onto Denison Ave

0.1 mi
0.3 mi

20 mi
50 km Liberal

Map data ©2012 Google - Edit in Google Map Maker Report a problem



Pro-Stake LLC
Oil Field & Construction Site Staking
P.O. Box 2324
Garden City, Kansas 67846
Office/Fax: (620) 276-6159
Cell: (620) 272-1499



1013135-B
PLAT NO.

10180
INVOICE NO.

Berexco LLC

OPERATOR

Stevens County, KS

COUNTY

Cutter KGS #1

LEASE NAME

2440' FNL - 1320' FEL

LOCATION SPOT

1 31s 35w
Sec. Twp. Rng.

GR. ELEVATION: **2923.1'**

SCALE: **N/A**
DATE STAKED: **July 10th, 2012**
MEASURED BY: **Luke R.**
DRAWN BY: **Luke R.**
AUTHORIZED BY: **Dana W.**

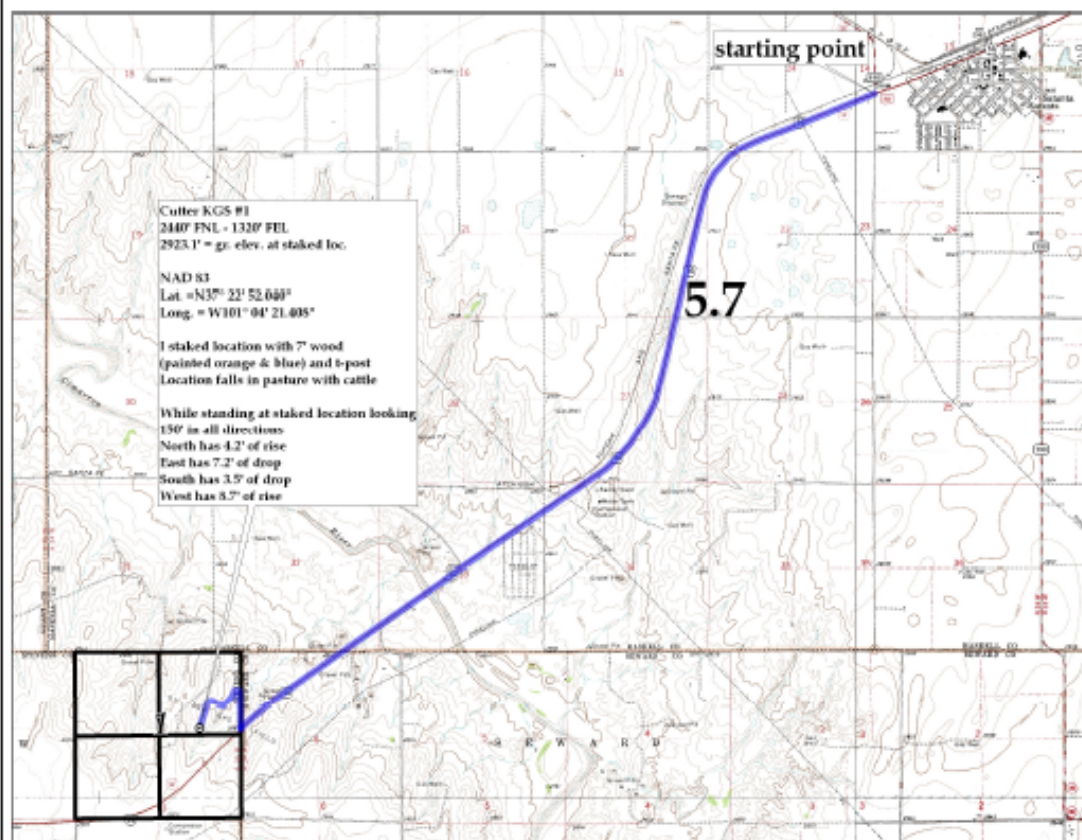


Directions: Starting from the West side of Satanta, Ks at the intersections of Hwy 56 & Hwy 190 - Now go 5.7 miles SW on Hwy 56 to ingress stake North into - Now go 0.2 mile North on Rd 28/Rd A to ingress stake SW into - Now go 0.3 mile SW & NW on lease rd to ingress stake S-SW into - Now go 835' S-SW through pasture with cattle into staked location.

Final Ingress must be verified by land owner or Operator.

This drawing does not constitute a monumented survey or a land survey plat.

This drawing is for construction purposes only.



Berexco Cutter KGS #1.kmz

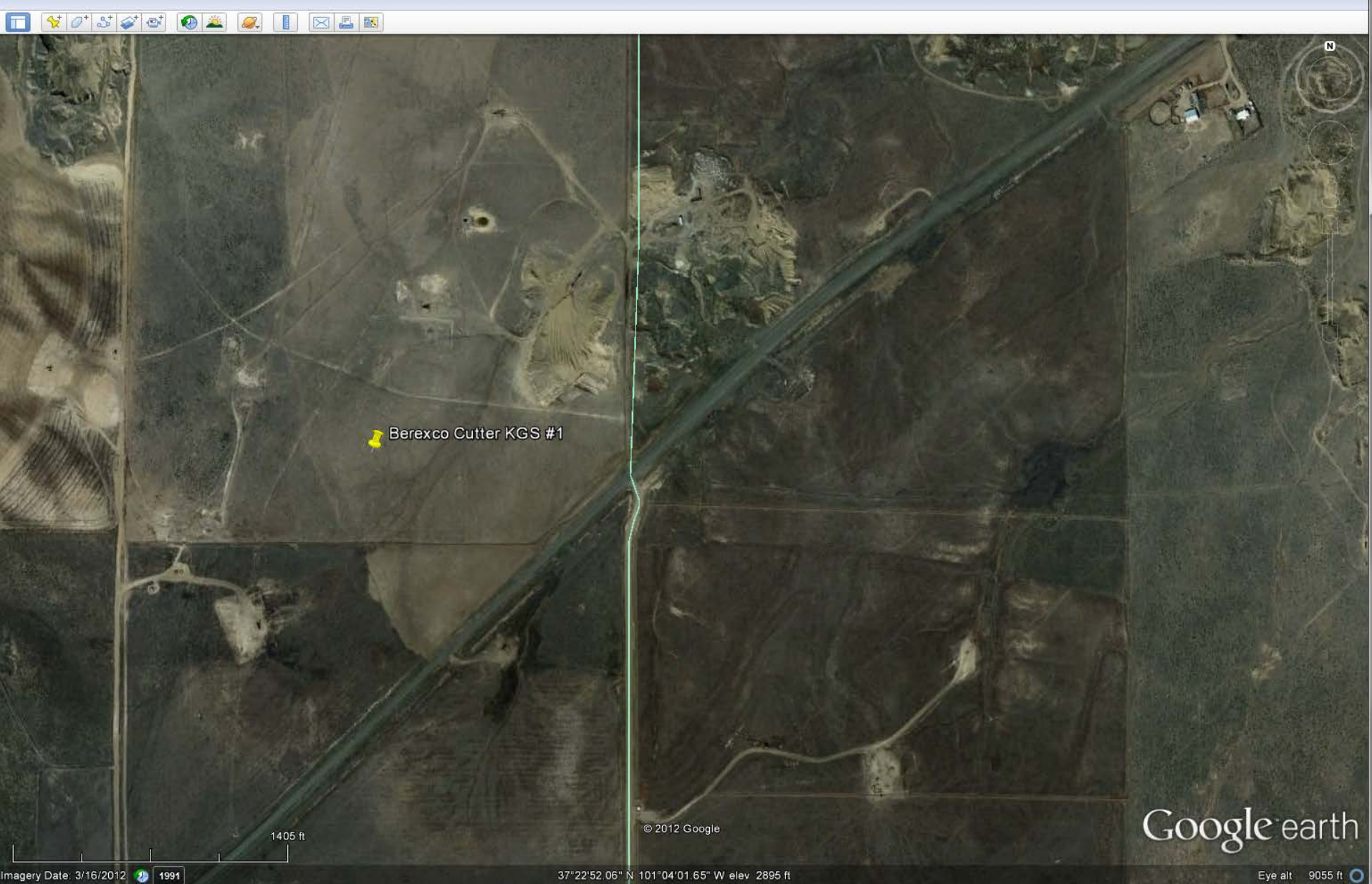
File attached to original email

Google Earth streams the world over wired and wireless networks enabling users to virtually go anywhere on the planet and see places in photographic detail. This is not like any map you have ever seen. This is a 3D model of the real world, based on real satellite images combined with maps, guides to restaurants, hotels, entertainment, businesses and more. You can zoom from space to street level instantly and then pan or jump from place to place, city to city, even country to country.

Get Google Earth. Put the world in perspective.

(<http://earth.google.com>)

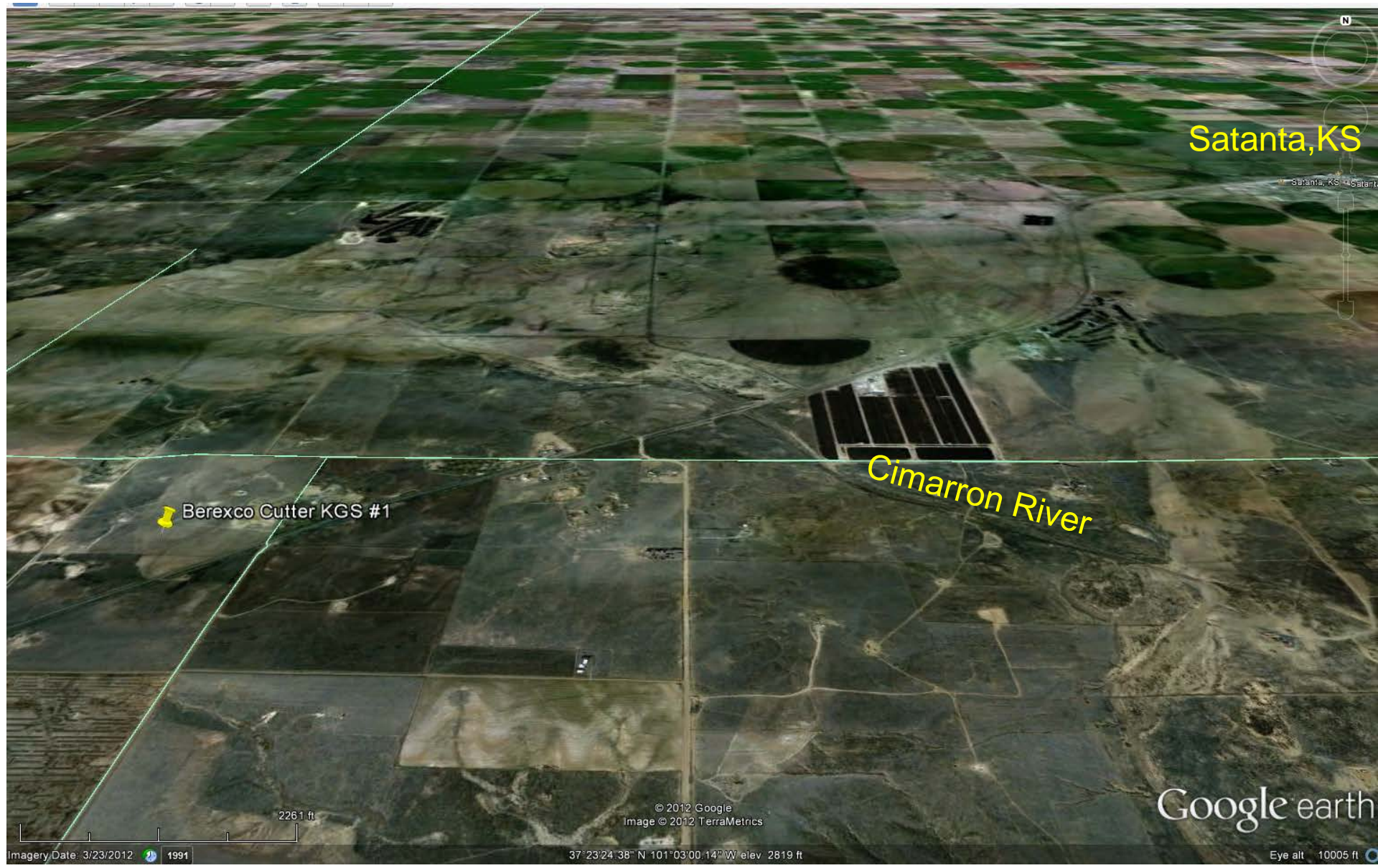
Cutter #1 wellsite on Google Earth

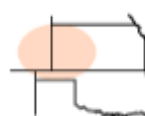


Cutter drillsite (SW side of map) and Satanta, KS (upper right)



Oblique view between Cutter drillsite (left) and Satanta, KS (right) with Cimarron River valley between (looking north)





10180
INVOICE NO.

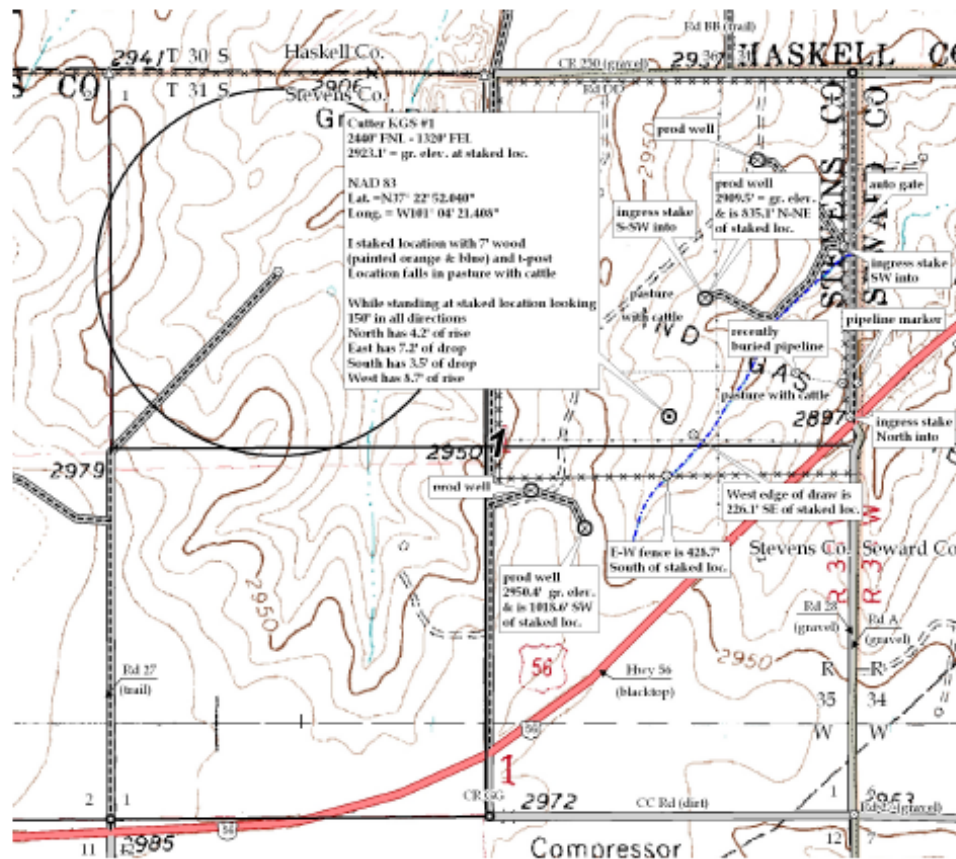
Cutter KGS #1

LEASE NAME
2440' FNL - 1320' FEL

1	31s	35w	
Sec.	Temp.	Ring	
			2923.1'

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1013135-B
 PLAT NO.

10180
 INVOICE NO.

Berexco LLC

Cutter KGS #1

OPERATOR
Stevens County, KS
 COUNTY

LEASE NAME
2440' FNL - 1320' FEL
 LOCATION SPOT

1 31s 35w
 Sec. Twp. Rng.

GR. ELEVATION: **2923.1'**

SCALE: **1" = 1000'**
 DATE STAKED: **July 10th, 2012**
 MEASURED BY: **Luke R.**
 DRAWN BY: **Luke R.**
 AUTHORIZED BY: **Dana W.**

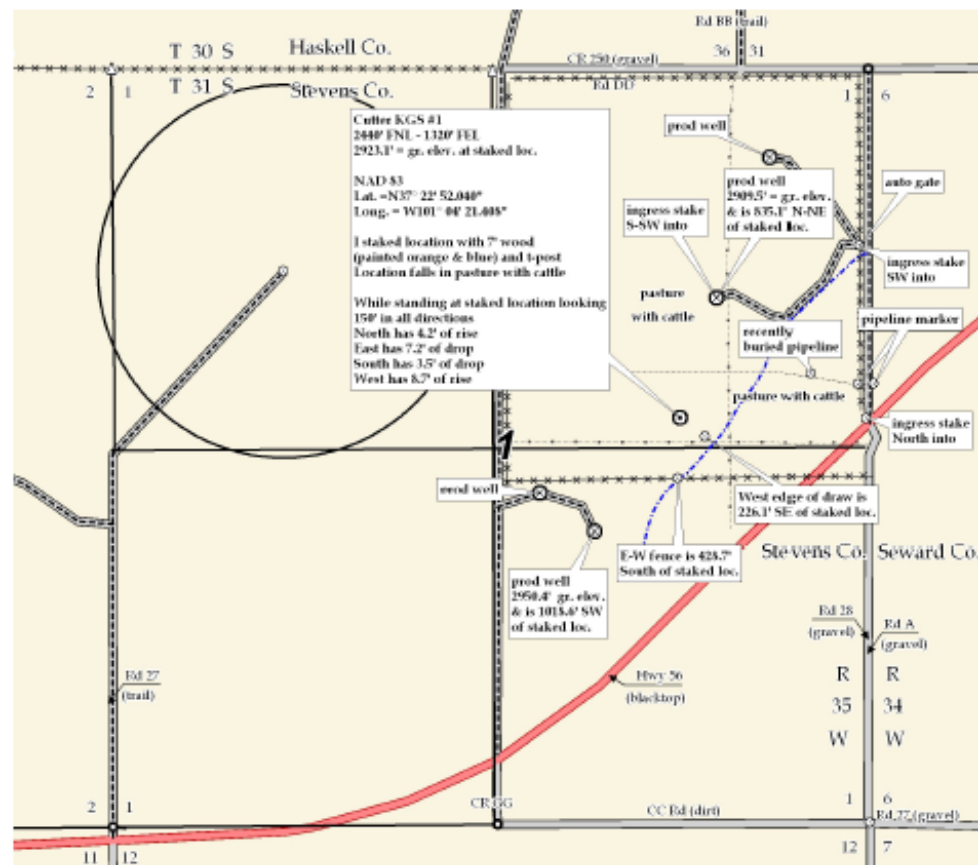


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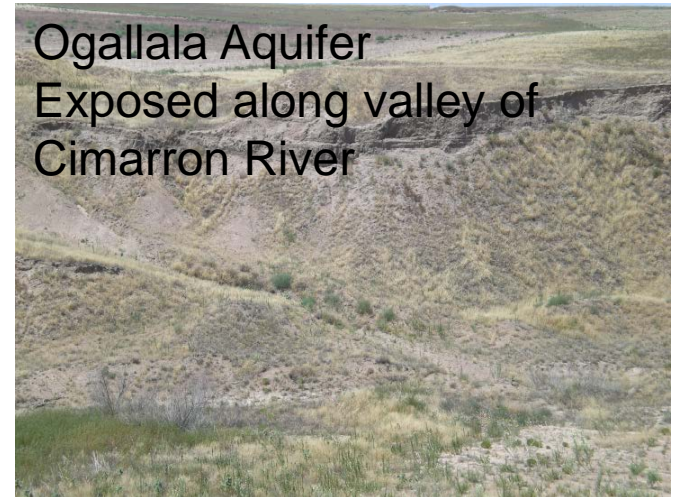
Final Ingress must be verified by land owner or Operator.

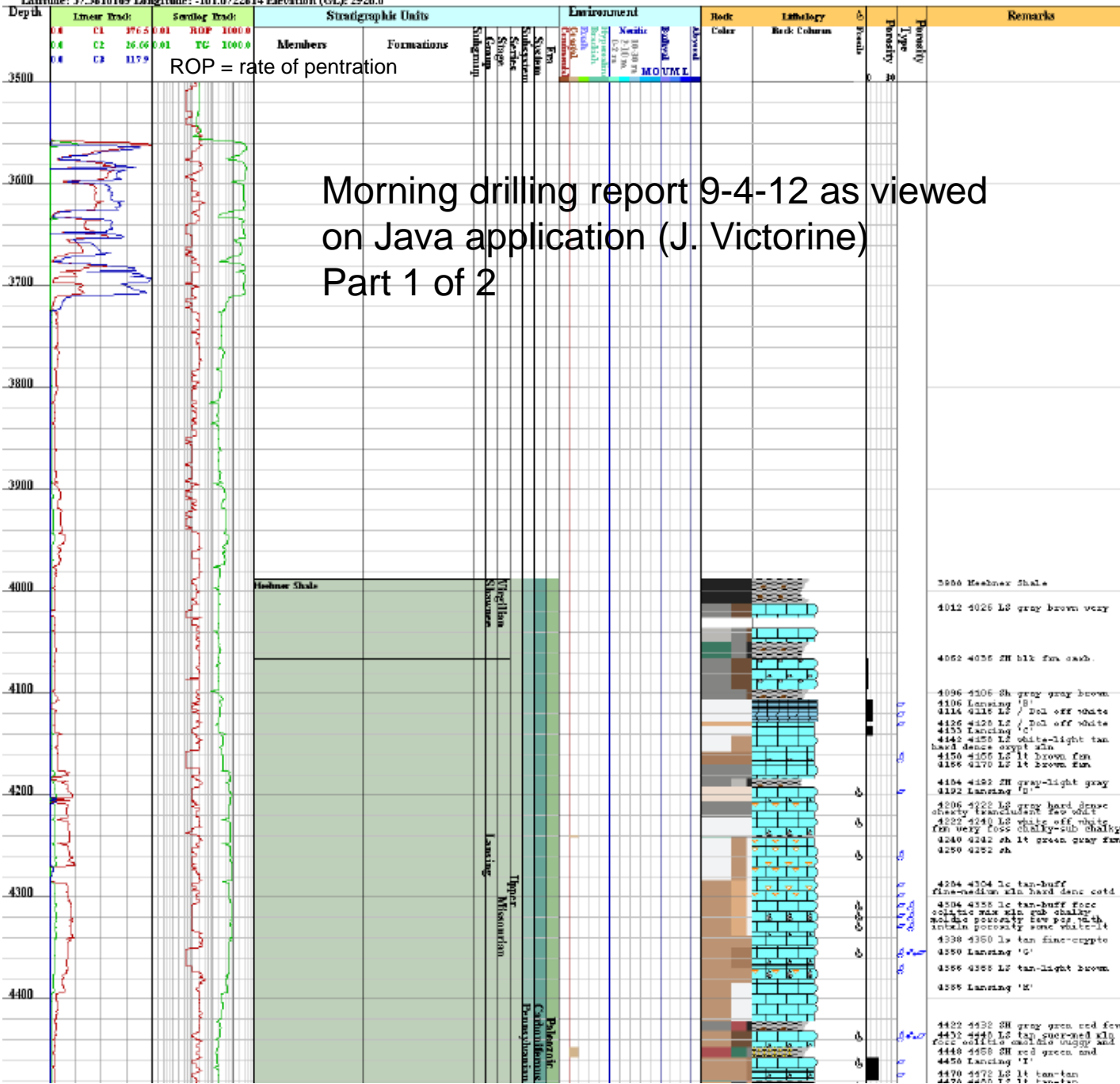
This drawing does not constitute a monumented survey or a land survey plat.

This drawing is for construction purposes only.



Photos near drill site





Primary Rock Lithology

- Shale
- Sand, Sandstone, t
- Limestone
- Limestone Dolomite

Secondary Rock Lithology

- Shaly
- Sandy
- Chert
- carbonaceous, carb
- pyrite, pyritic
- oolitic
- fossiliferous
- Calcareous

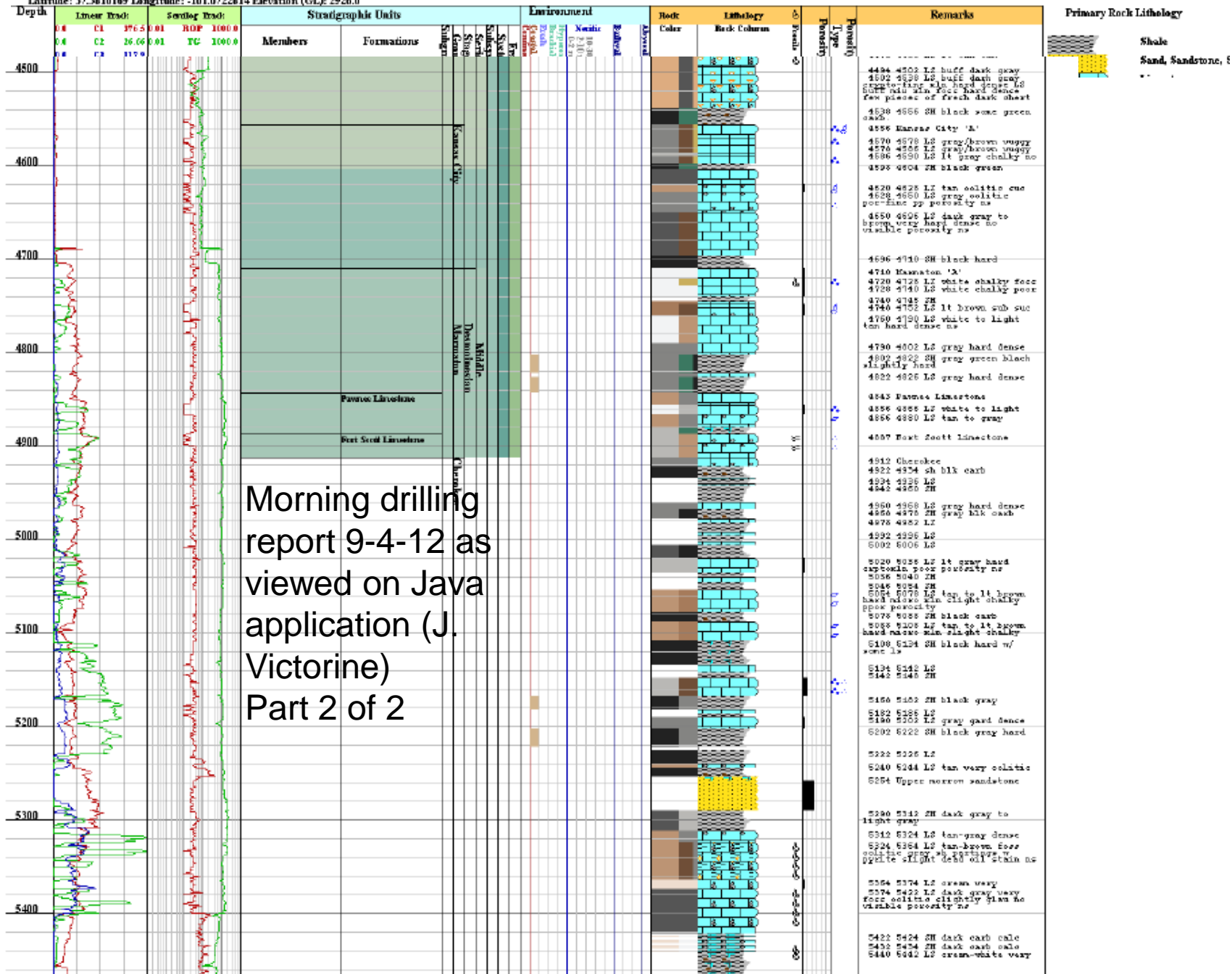
Fossils

- Fresh Water (F) Few
- Brackish Water (B) Many
- Marine (M) Broken
- Macrofossils
- Trace Fossils

Porosity Type

- Intergranular
- Mouldic
- Vuggy
- Pinpoint

Cutter KGS 1 (15-189-22781) T: 31 S R: 35 W S: 1
Latitude: 37.3810169 Longitude: -101.0722814 Elevation (GL): 2926.0

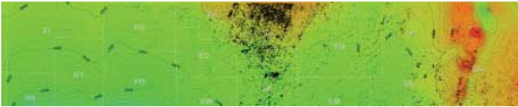


KGS website for Cutter KGS #1


http://www.kgs.ku.edu/PRS/Ozark/cutter_kgs_1.html



South-central Kansas CO₂ Project
Kansas Geological Survey



Cutter KGS 1 well

[KGS Database Page](#) for the Cutter KGS 1 well

Geologic Report updated Aug. 31, 2012

From 3950 to 5668 feet

- [Acrobat PDF version](#) (952 kB)
- [TIFF version](#) (1.7 MB)

From 3950 to 5621 feet

- [Acrobat PDF version](#) (924 kB)
- [TIFF version](#) (1.7 MB)

From 3950 to 5543 feet

- [Acrobat PDF version](#) (880 kB)
- [TIFF version](#) (1.6 MB)

From 3950 to 5482 feet

- [Acrobat PDF version](#) (850 kB)
- [TIFF version](#) (1.5 MB)

From 3950 to 5400 feet (core point 2)

- [Acrobat PDF version](#) (728 kB)
- [TIFF version](#) (1 MB)

From 3950 to 5233 feet (core point)

- [Acrobat PDF version](#) (728 kB)

About...

South-central Kansas CO₂ Project is a DOE-funded project of the Kansas Geological Survey.

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[Well 1-28](#)

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[Wellington Field](#)

[Gravity Data](#)

For KCC Use:
Effective Date: 07/23/2012
District # 3
SGA? ☐ Yes ☒ No

KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION

1087644

Form C-1
March 2010

Form must be Typed
Form must be Signed
All blanks must be Filled

NOTICE OF INTENT TO DRILL

Must be approved by KCC five (5) days prior to commencing well

Form KSONA-1, Certification of Compliance with the Kansas Surface Owner Notification Act, MUST be submitted with this form.

Expected Spud Date: 07/30/2012
month day year

OPERATOR: License# 34318
Name: BEREXCO LLC
Address 1: 2020 N. BRAMBLEWOOD
Address 2:
City: WICHITA State: KS Zip: 67208 + 1094
Contact Person: Dana Wreath
Phone: 316-285-3311

CONTRACTOR: License# 34317
Name: BEREDCO LLC

Well Drilled For: Well Class: Type Equipment:
☐ Oil ☐ Enh Rec ☐ Infield ☒ Mud Rotary
☐ Gas ☐ Storage ☐ Pool Ext. ☐ Air Rotary
☐ Disposal ☐ Wildcat ☐ Cable
☐ Seismic: # of Holes ☒ Other
☒ Other: Stratigraphic Test

☐ If OWWO: old well information as follows:

Operator:
Well Name:
Original Completion Date: Original Total Depth:

Directional, Deviated or Horizontal wellbore? ☐ Yes ☒ No

If Yes, true vertical depth:

Bottom Hole Location:

KCC DKT #:

Prorated & Spaced: Hugoton-Panoma.

Spot Description:
S2 - S2 - NE Sec. 1 Twp. 31 S. R. 35 ☐ E ☒ W
(G/G/G) 2440 feet from ☒ N / ☐ S Line of Section
1320 feet from ☒ E / ☐ W Line of Section

Is SECTION: ☒ Regular ☐ Irregular?

(Note: Locate well on the Section Plat on reverse side)

County: Stevens

Lease Name: Custer KGS Well #: 1

Field Name: Custer

Is this a Prorated / Spaced Field? ☐ Yes ☒ No

Target Formation(s): Arbuckle

Nearest Lease or unit boundary line (In footage): 1320

Ground Surface Elevation: 2623 Surveyed feet MSL

Water well within one-quarter mile: ☐ Yes ☒ No

Public water supply well within one mile: ☐ Yes ☒ No

Depth to bottom of fresh water: 420

Depth to bottom of usable water: 540

Surface Pipe by Alternate: ☒ I ☐ II

Length of Surface Pipe Planned to be set: 1750

Length of Conductor Pipe (If any): 40

Projected Total Depth: 7600

Formation at Total Depth: Arbuckle

Water Source for Drilling Operations:

☐ Well ☐ Farm Pond ☒ Other: unk.

DWR Permit #:

(Note: Apply for Permit with DWR)

Will Cores be taken? ☒ Yes ☐ No

If Yes, proposed zone: Morrow, Chester & Arbuckle

AFFIDAVIT

The undersigned hereby affirms that the drilling, completion and eventual plugging of this well will comply with K.S.A. 55 et. seq.

It is agreed that the following minimum requirements will be met:

1. Notify the appropriate district office prior to spudding of well;
2. A copy of the approved notice of intent to drill shall be posted on each drilling rig;
3. The minimum amount of surface pipe as specified below shall be set by circulating cement to the top; in all cases surface pipe shall be set through all unconsolidated materials plus a minimum of 20 feet into the underlying formation.
4. If the well is dry hole, an agreement between the operator and the district office on plug length and placement is necessary prior to plugging;
5. The appropriate district office will be notified before well is either plugged or production casing is cemented in;
6. If an ALTERNATE II COMPLETION, production pipe shall be cemented from below any usable water to surface within 120 DAYS of spud date. Or pursuant to Appendix "B" - Eastern Kansas surface casing order #133,891-C, which applies to the KCC District 3 area, alternate II cementing must be completed within 30 days of the spud date or the well shall be plugged. In all cases, NOTIFY district office prior to any cementing.

Submitted Electronically

For KCC Use ONLY	
API # 15 -	15-189-22781-00-00
Conductor pipe required	0 feet
Minimum surface pipe required	560 feet per ALT. <input checked="" type="checkbox"/> I <input type="checkbox"/> II
Approved by:	Rick Hestermann 07/18/2012
This authorization expires:	07/18/2013
(This authorization void if drilling not started within 12 months of approval date.)	
Spud date:	Agent:

Mail to: KCC - Conservation Division,
130 S. Market - Room 2078, Wichita, Kansas 67202

Remember to:

- File Certification of Compliance with the Kansas Surface Owner Notification Act (KSONA-1) with Intent to Drill;
- File Drill Pit Application (form CDP-1) with Intent to Drill;
- File Completion Form ACC-1 within 120 days of spud date;
- File acreage attribution plat according to field proration orders;
- Notify appropriate district office 48 hours prior to workover or re-entry;
- Submit plugging report (CP-4) after plugging is completed (within 60 days);
- Obtain written approval before disposing or injecting salt water.
- If well will not be drilled or permit has expired (See: authorized expiration date) please check the box below and return to the address below.

☐ Well will not be drilled or Permit Expired Date:
Signature of Operator or Agent: ☒



1087644

For KCC Use ONLY

API # 15 - 15-189-22781-00-00

IN ALL CASES PLOT THE INTENDED WELL ON THE PLAT BELOW

In all cases, please fully complete this side of the form. Include items 1 through 5 at the bottom of this page.

Operator: BEREXCO LLCLease: Cutter KGSWell Number: 1Field: Cutter

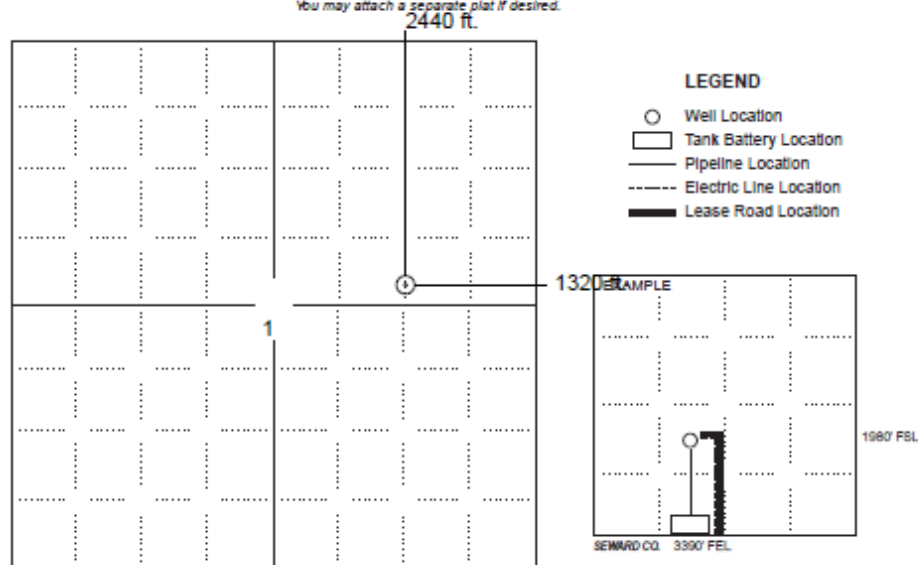
Number of Acres attributable to well: _____

QTR/QTR/QTR/QTR of acreage: 82 - 82 - 82 - NELocation of Well: County: Stevens2440 _____ feet from ☒ N / ☐ S Line of Section1320 _____ feet from ☒ E / ☐ W Line of SectionSec. 1 Twp. 31 S. R. 35 ☐ E ☒ WIs Section: ☒ Regular or ☐ Irregular

If Section is Irregular, locate well from nearest corner boundary.

Section corner used: ☐ NE ☐ NW ☐ SE ☐ SW**PLAT**

Show location of the well. Show footage to the nearest lease or unit boundary line. Show the predicted locations of lease roads, tank batteries, pipelines and electrical lines, as required by the Kansas Surface Owner Notice Act (House Bill 2032). You may attach a separate plat if desired.

**NOTE:** In all cases locate the spot of the proposed drilling location.**In plotting the proposed location of the well, you must show:**

1. The manner in which you are using the depicted plat by identifying section lines, i.e. 1 section, 1 section with 8 surrounding sections, 4 sections, etc.
2. The distance of the proposed drilling location from the south / north and east / west outside section lines.
3. The distance to the nearest lease or unit boundary line (in footage).
4. If proposed location is located within a prorated or spaced field a certificate of acreage attribution plat must be attached: (CO-7 for oil wells; CG-8 for gas wells).
5. The predicted locations of lease roads, tank batteries, pipelines, and electrical lines.

KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION
APPLICATION FOR SURFACE PIT



Form CDP-1
May 2010
Form must be Typed

Submit in Duplicate

Operator Name: BEREXCO LLC		License Number: 34318	
Operator Address: 2020 N. BRAMBLEWOOD		WICHITA KS 67206	
Contact Person: Dana Wreath		Phone Number: 316-265-3311	
Lease Name & Well No.: Cutter KGS 1		Pit Location (QQQQ): S2 - S2 - S2 - NE	
Type of Pit: <input type="checkbox"/> Emergency Pit <input type="checkbox"/> Burn Pit <input type="checkbox"/> Setting Pit <input checked="" type="checkbox"/> Drilling Pit <input type="checkbox"/> Workover Pit <input type="checkbox"/> Haul-Off Pit (If WP Supply API No or Year Drilled)	Pit is: <input checked="" type="checkbox"/> Proposed <input type="checkbox"/> Existing If Existing, date constructed: Pit capacity: 10250 (bbls)	Sec. 1 Twp. 31 R. 35 <input type="checkbox"/> East <input checked="" type="checkbox"/> West 2440 Feet from <input checked="" type="checkbox"/> North / <input type="checkbox"/> South Line of Section 1320 Feet from <input checked="" type="checkbox"/> East / <input type="checkbox"/> West Line of Section Stevens County	
Is the pit located in a Sensitive Ground Water Area? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Chloride concentration: _____ mg/l (For Emergency Pits and Setting Pits only)	
Is the bottom below ground level? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Artificial Liner? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
How is the pit lined if a plastic liner is not used? Bentonite Clay in freshwater drilling mud, native mud and clay.			
Pit dimensions (all but working pits): 120 Length (feet) 120 Width (feet) <input type="checkbox"/> N/A: Steel Pits Depth from ground level to deepest point: 4 (feet) <input type="checkbox"/> No Pit			
If the pit is lined give a brief description of the liner material, thickness and installation procedure.		Describe procedures for periodic maintenance and determining liner integrity, including any special monitoring.	
Distance to nearest water well within one-mile of pit: 3100 feet Depth of water well 450 feet		Depth to shallowest fresh water 200 feet. Source of information: <input type="checkbox"/> measured <input type="checkbox"/> well owner <input type="checkbox"/> electric log <input checked="" type="checkbox"/> KDWR	
Emergency, Setting and Burn Pits ONLY: Producing Formation: _____ Number of producing wells on lease: _____ Barrels of fluid produced daily: _____ Does the slope from the tank battery allow all spilled fluids to flow into the pit? <input type="checkbox"/> Yes <input type="checkbox"/> No		Drilling, Workover and Haul-Off Pits ONLY: Type of material utilized in drilling/workover: freshwater Bentonite/chemical mud. Number of working pits to be utilized: 4 Abandonment procedure: Allow evaporation of liquid until bottom of pit is dry, then push in sides and backfill with drill cuttings in place. Finally level to contour of surrounding terrain, as close as possible to its natural slope. Drill pits must be closed within 365 days of spud date.	
Submitted Electronically			
KCC OFFICE USE ONLY Date Received: 07/17/2012 Permit Number: 15-189-22781-00-00 Permit Date: 07/18/2012 Lease Inspection: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Liner <input type="checkbox"/> Steel Pit <input type="checkbox"/> RFAC <input type="checkbox"/> RFAS			

Mail to: KCC - Conservation Division, 130 S. Market - Room 2078, Wichita, Kansas 67202

KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION
CERTIFICATION OF COMPLIANCE WITH THE
KANSAS SURFACE OWNER NOTIFICATION ACT



Form KSONA-1
July 2010
Form must be Typed
All blanks must be Filled

This form must be submitted with all Forms C-1 (Notice of Intent to Drill); CB-1 (Cathodic Protection Borehole Intent); T-1 (Request for Change of Operator Transfer of Injection or Surface Pit Permit); and CP-1 (Well Plugging Application). Any such form submitted without an accompanying Form KSONA-1 will be returned.

Select the corresponding form being filed: ☒ C-1 (Intent) ☐ CB-1 (Cathodic Protection Borehole Intent) ☐ T-1 (Transfer) ☐ CP-1 (Plugging Application)

OPERATOR: License # 34318 Name: BEREXCO LLC Address 1: 2020 N. BRAMBLEWOOD Address 2: _____ City: WICHITA State: KS Zip: 67206 + 1094 Contact Person: Dana Wreath Phone: (316) 265-3311 Fax: (316) 681-4731 Email Address: Dwreath@Berexco.com	Well Location: S2 S2 S2 NE Sec. 1 Twp. 31 S. R. 35 <input type="checkbox"/> East <input checked="" type="checkbox"/> West County: Stevens Lease Name: Cutter KGS Well #: 1 If filing a Form T-1 for multiple wells on a lease, enter the legal description of the lease below:
--	---

Surface Owner Information:

Name: Bobby D. Passmore & Carlis J. Passmore Address 1: PO Box 297 Address 2: _____ City: Hugoton State: KS Zip: 67951 + 0297
--

When filing a Form T-1 involving multiple surface owners, attach an additional sheet listing all of the information to the left for each surface owner. Surface owner information can be found in the records of the register of deeds for the county, and in the real estate property tax records of the county treasurer.

If this form is being submitted with a Form C-1 (Intent) or CB-1 (Cathodic Protection Borehole Intent), you must supply the surface owners and the KCC with a plat showing the predicted locations of lease roads, tank batteries, pipelines, and electrical lines. The locations shown on the plat are preliminary non-binding estimates. The locations may be entered on the Form C-1 plat, Form CB-1 plat, or a separate plat may be submitted.

Select one of the following:

- ☒ I certify that, pursuant to the Kansas Surface Owner Notice Act (House Bill 2032), I have provided the following to the surface owner(s) of the land upon which the subject well is or will be located: 1) a copy of the Form C-1, Form CB-1, Form T-1, or Form CP-1 that I am filing in connection with this form; 2) if the form being filed is a Form C-1 or Form CB-1, the plat(s) required by this form; and 3) my operator name, address, phone number, fax, and email address.
- ☐ I have not provided this information to the surface owner(s). I acknowledge that, because I have not provided this information, the KCC will be required to send this information to the surface owner(s). To mitigate the additional cost of the KCC performing this task, I acknowledge that I am being charged a \$30.00 handling fee, payable to the KCC, which is enclosed with this form.

If choosing the second option, submit payment of the \$30.00 handling fee with this form. If the fee is not received with this form, the KSONA-1 form and the associated Form C-1, Form CB-1, Form T-1, or Form CP-1 will be returned.

Submitted Electronically

Mail to: KCC - Conservation Division, 130 S. Market - Room 2078, Wichita, Kansas 67202



Cutter KGS #1

S/2 S/2 NE, Sec. 1-31S-35W
Stevens County, Kansas
API Number: 15-189-22781

Elevation: 2926' GL, 2939' KB

2440' from North line of Section
1320' from East line of Section
Regular Section ---- ☒
Irregular Section --- ☐

Primary Objective: Core Morrow, Chester and Arbuckle

DAILY REPORTS FROM CONTRACTOR

Weekdays:

FAX reports **NO LATER THAN 9:00 a.m.**, to the
BEREXCO offices in Wichita.

Weekends/Holidays:

Call Evan Mayhew at 316 215 1245.

SURFACE CASING

Size: 8 5/8", Depth: Est. 1750'
Surface cement: Basic 620 624 2277

DRILLING TIME

One foot drilling time over the following
interval(s): 3500' to TD'

SAMPLES

One set of washed, clean, dried and bagged
cuttings should be caught and saved as follows:
10' intervals: 3500' to TD
Additional 5' samples may be caught per the
geologist's instructions.

DRILL STEM TESTING

Probable zones: Arbuckle
Possible zones: Upper Morrow, Chester
Tester: Trilobite 800.728.5369, Colby

CORING: Devilbiss Coring (405) 808 3125

GAS DETECTOR: Yes.

H2S Equipment: None

LOGGING: Halliburton

(620) 624 8123

email: TIF, PDF, LAS to lwatney@kgs.ku.edu,
dwreath@Berexco.com, rkoudele@berexco.com

Estimated Tops:

Heebner shale top	3980'
Lansing	4060'
Lansing G	4340'
Marmaton A	4704'
Pawnee	4836'
Cherokee Shale top	4908'
Upper Morrow Sand	5255'
Chester Form top	5420'
Viola	6480'
Simpson Shale top	6690'
Arbuckle	6725'
Total Depth	7550'

Wireline Logging

- Halliburton has provided excellent service at Wellington and an equivalent log suite is requested as listed below

- SERVICE CENTER: Liberal, Kansas
- SERVICE COORDINATOR: Steven White
- SERVICE MANAGER: Scott Carr

• TOOL NAME (HALLIBURTON) NAME	ABBREVIATED
• Gamma Ray	(GTET-I)
• Array Compensated True Resistivity	(ACRT-I)
• Dual Spaced Neutron	(DSNT-I)
• Spectral Density	(SDLT-I)
• Microlog	(ML)
• Wave Sonic - (Dipole Sonic)	(WSTT-I)
• Elemental Analysis Tool	(GEM)
• Comp. Spectral Natural Gamma	(CSNG-I)
• Magnetic Resonance Imaging Log	(MRIL)
• Extended Reach Micro Imaging Tool	(XRMI)

Conventional coring on KGS Cutter #1

- Virgil Devilbiss
- Devilbiss Coring Service
- 2373 CR 1207
- Blanchard, OK 73010-2806



TD & granite on Wellington KGS #1-32 with Virgil Devilbiss in clean coveralls and Beredco drilling crew, Feb. 2011

Task 17 from SOPO

- **Task 17: Acquire (New) Data at a Select Chester/Morrow Field to Model CO₂ sequestration Potential in the Western Annex**
- The Recipient shall employ additional staffing to conduct a comprehensive reservoir study of selected Chester/Morrow fields. A data-rich Chester/Morrow field with significant CO₂-EOR and sequestration potential will be selected to obtain additional data including: a) multicomponent 3D seismic survey, b) core samples from the Arbuckle Group and the Chester/Morrow sands including their cap rocks, c) pressure tests, and d) fluid samples, to develop an integrated geomodel of the Chester/Morrow sandstone reservoir and the underlying Arbuckle saline aquifer. The Recipient shall use these geomodels to conduct reservoir simulations studies to evaluate the potential of CO₂ sequestration in the Arbuckle Group saline aquifer and the overlying Chester/Morrow field.
- **Subtask 17.1. Collect existing seismic, geologic, and engineering data – Chester/Morrow fields**
- The Recipient shall collect, from consortium members, existing data (including seismic, wireline log, primary and secondary production, core, DST, geo-reports, water analyses, production and well test) relevant to the Chester/Morrow sandstone fields. Existing seismic data will be critical for characterizing the Arbuckle Group saline aquifer.
- **Subtask 17.2. Select Chester/Morrow field to acquire new data**
- The Recipient shall evaluate different Chester/Morrow fields based on a) high cumulative primary production, b) success of water-flooding, and c) data-richness. Thereafter, the Recipient shall select one Chester/Morrow field for added data collection, including multi-component 3D seismic survey followed by drilling a test borehole to obtain cores from and to test different intervals in the Arbuckle and the Chester/Morrow sands.
- **Subtask 17.3. Collect new multicomponent 3D seismic survey**
- The Recipient shall acquire multicomponent 3D seismic survey over approximately a 10 mi² area in the selected field.
- **Subtask 17.4. Process multi-component 3D seismic survey**
- The Recipient shall process the newly acquired multi-component 3D seismic data. Analysis of the data shall include, but not be limited to, Kirchoff pre-stack time migration, frequency enhancement, and relative seismic inversion. The newly acquired multi-component 3D seismic data will enhance characterization of both the Chester/Morrow sandstone reservoir and the Arbuckle Group saline aquifer by: a) detecting and characterizing important fracture/faults in the study area, b) helping resolve azimuth and frequency of fracture using seismic anisotropy, and c) determining if faults/fractures are open or closed, and d) resolving other rock properties.
- **Subtask 17.5. Develop initial geomodel for the selected Chester/Morrow field**
- The Recipient shall build fine-scale geomodels for selected Chester/Morrow sandstone reservoir by integrating seismic, gravimetric, and magnetic data.
- **Subtask 17.6. Select location for Test Borehole #3**
- The Recipient in consultation with field operator shall use this geomodel to identify the optimum location for the Test Borehole #3. The Recipient shall position the Test Borehole such that it provides maximum representative core and other test (pressure and fluid) data representing both the Chester/Morrow sandstone reservoir and the Arbuckle Group saline aquifer.

Task 17 from SOPO (continued)

- **Subtask 17.7. Complete permitting requirements for Test Borehole #3**
- The Recipient shall obtain the permits necessary to drill the Test Borehole #3. The Recipient shall complete and submit appropriate documentations, such as NEPA forms, upon determining the location of the Test Borehole #3 after evaluating newly acquired seismic data and examining field geomodel.
- **Subtask 17.8. Drill, retrieve core, log, and run DST – Test Borehole #3**
- The Recipient shall drill Test Borehole #3 to approximately 5200' (to reach upper Morrow shale, i.e., Chester/Morrow cap rock) using conventional rotary methods. An attempt will be made to collect approximately 1,200 feet of core from 5200 ft' to basement (approximately 7500' ft). This core data will be supplemented with donated core samples from nearby wells. This interval comprises the various strata including the Chester/Morrow sands and Arbuckle Group. Approximately 5 DSTs shall be taken to obtain reservoir pressures and collect produced fluid (samples) at select zones. The Recipient, in consultation with DOE and the field operator, shall consider a slant trajectory for the test boring #3 if seismic data indicates that such a trajectory can be used to drill across fractures or faults zones in the selected field. Such a trajectory would enable testing for pressure and fluid sampling on either side of the fault/fracture zone and in obtaining respective physical properties.
- **Subtask 17.9. Openhole Wireline Logging – Test Borehole #3**
- The Recipient shall obtain approximately 2500' of openhole wireline data in order to obtain petrophysical data including but not limited to porosity, saturation, well bore imagery, pore size distribution, lithology, and sonic velocity.
- **Subtask 17.10. Wellbore Completion – Test Borehole #3**
- The Recipient shall complete the wellbore by running production casing, cementing it, followed by running the cement bond log over the cemented section.
- **Subtask 17.11. Analyze wireline log - Test Borehole #3**
- The Recipient shall analyze well logs from Test Borehole #3 following procedures detailed in Subtask 4.6.
- **Subtask 17.12. Test and sample fluids (water) from select intervals – Test Borehole #3**
- The Recipient shall perforate select Arbuckle and Chester/Morrow flow-units, isolate each flow-unit, and use wireline conveyed tools to test for pressure. Each isolated zone will be swabbed to collect samples of produced fluids (including water). The Recipient in consultation with the field operator shall determine the best testing procedure to identify zonal communication within the flow-units comprising the Arbuckle Group saline aquifer system. Industry standard procedures including, but not limited to, pulse/transient testing using formation water, tracer tests, etc. shall be considered by the Recipient.
- **Subtask 17.13. Analyze Arbuckle core from Test Borehole #3**
- The Recipient shall describe retrieved Arbuckle cores following procedures outlined in Subtask 4.8. No cores penetrate below the upper 100 ft of the Arbuckle aquifer in the Western Annex. Thus, core samples of the Arbuckle Group saline aquifer (including donated core samples from nearby wells) will provide a western anchor point for the regional 17+ county Arbuckle characterization study.
- **Subtask 17.14. Analyze Chester/Morrow core from Test Borehole #3**
- The Recipient shall describe retrieved Chester/Morrow core following techniques described in Subtask 4.8. Availability of long core is limited in the Chester/Morrow sandstones in the Western Annex. Thus, a full core of the Chester/Morrow sands will provide critical petrophysical (rock) data for simulating CO₂ sequestration potential of CO₂-EOR operations.
- **Subtask 17.15. PVT analysis of oil and water from Chester/Morrow oil reservoir**
- The Recipient will obtain donated PVT analysis on oil samples from the Chester/Morrow oil reservoir.
- **Subtask 17.16. Analyze water samples from Test Borehole #3**
- The Recipient shall conduct geochemical analyses on approximately six water samples collected from different flow units to investigate the CO₂-rock interaction, following procedures stated in Subtask 4.11, for both the Arbuckle aquifer and the Chester/Morrow sandstones.

Successful bid to drill well by Berexco

Previous discussion:

Completed review of geology and seismic data at proposed drill sites using following criteria to evaluate the sites --

- 1) provide a useful location in the incised valley fill sandstones for operator,
- 2) avoid fault zones around drill site or within the 10 mi² around the well so faults are at minimum outside of the multicomponent seismic survey, and
- 3) ideally, we'd have a drill site with a high potential for porous section of lower Arbuckle and shaly or tight layers above the porous interval.

To reduce AFE costs, reduce core from 2100 ft to 1200 ft

Met the project budget.

Basement Test Well Selection Made by Watney

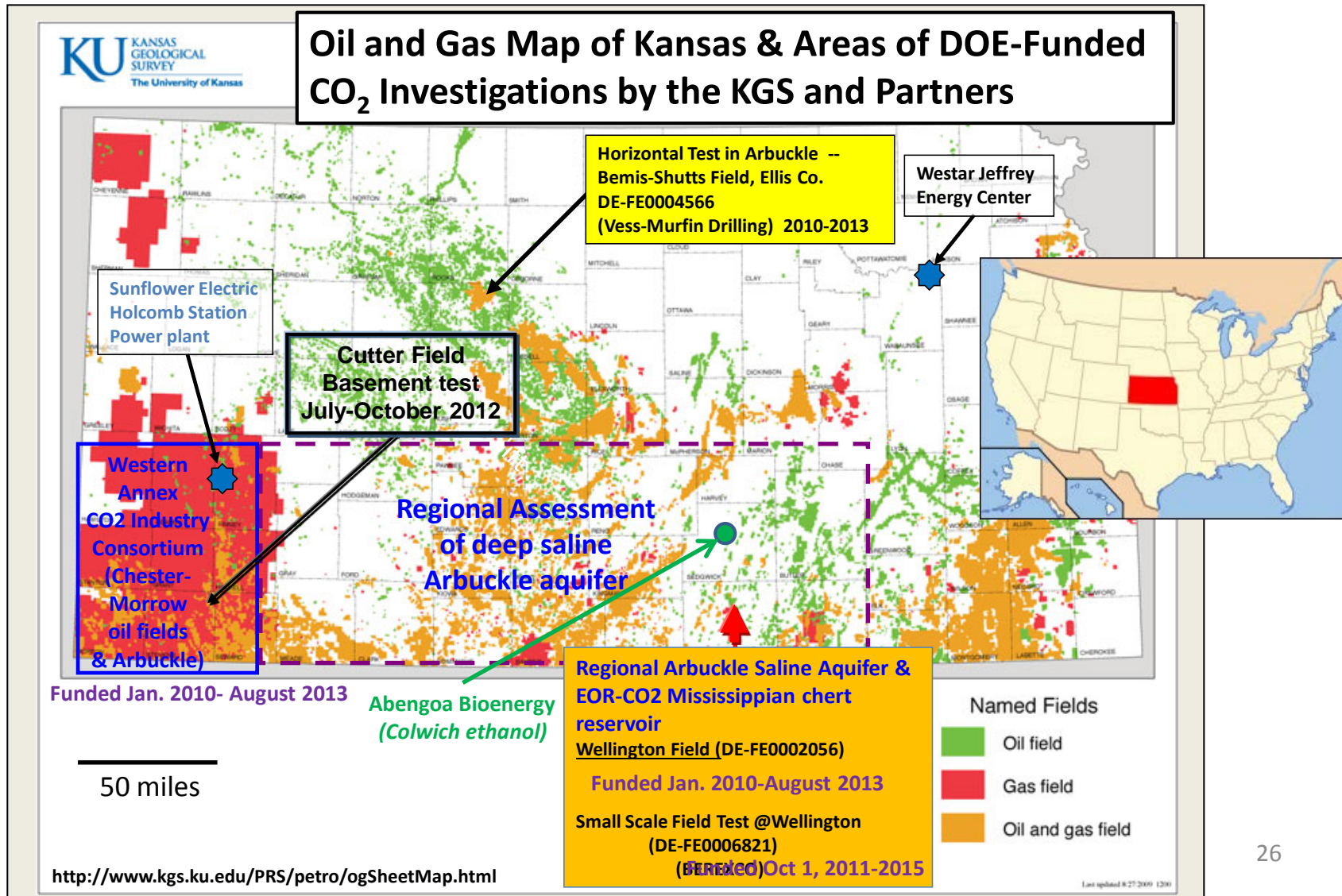
- Accepted quote from Berexco for well with 1180 ft of core
- Well location
 - Cutter Field, Stevens County
 - **Section 1-T31S–R35W**
 - **Spud date by early August 2012**
- 10 mi² multicomponent survey
 - design likely to include incised valley to east of proposed well location; acquisition as soon as possible to use initial p-wave data to assist in selecting location of new well

Coring Schedule Cutter KGS #1
Est KB 2935'

Depth Interval	Footage	Formation	Core storage
5210-5290	80	Morrow	Alum Bbl
5400-5600	200	Chester	Boxes
6400-6800	400	Kinderhook/Viola/Upper Arb	Alum Bbl
6900-7200	300	Arbuckle	Boxes
7350-7550	200	Lower Arb	Alum Bbl
	1180		

Technical Status

Characterize regional Arbuckle saline aquifer
and overlying CO₂-EOR in 5 fields



Structure Contour Map -- Top Mississippian with regional faults

DOE Contract #FE0002056
and partner cost share



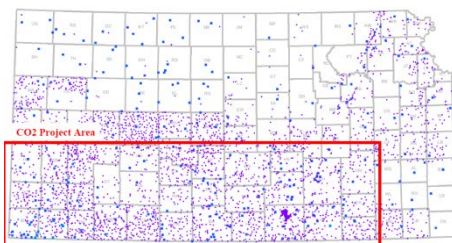
Subcontractor
Bittersweet Energy

(Gerlach, Nicholson, Hansen)

Current Status
Of

2) Fault Detection & Verification – Regional & Compartment

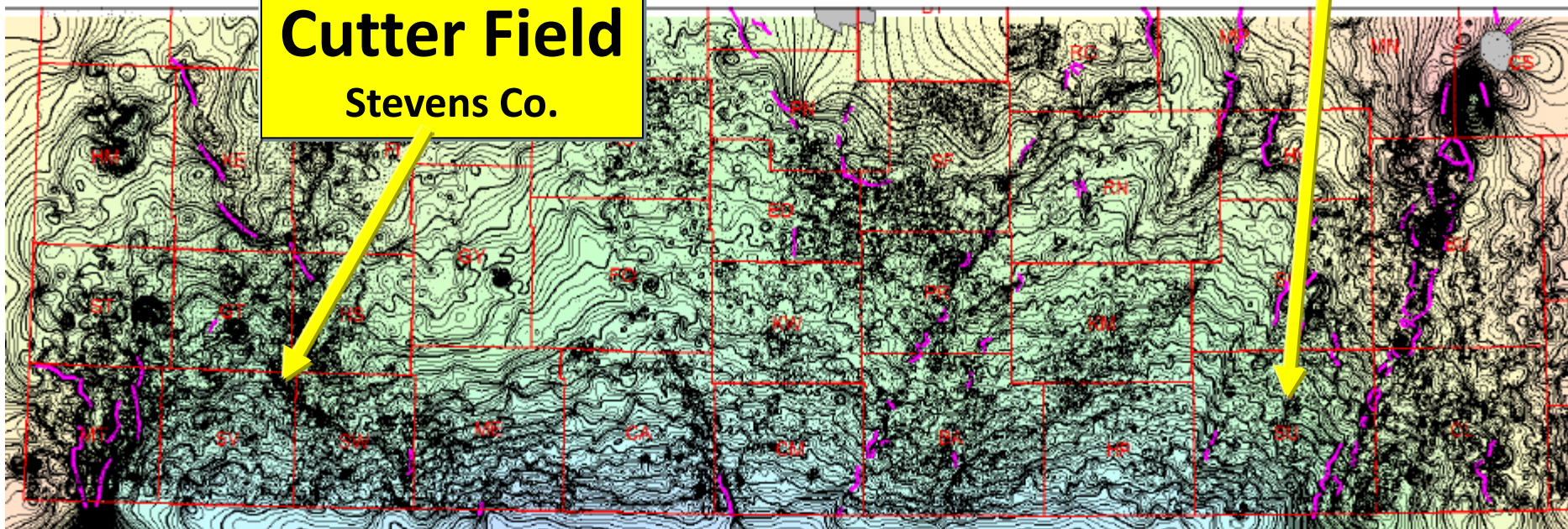
Well header records: 3170
Formation tops records: 66,309
LAS & scanned Logs for project



**Wellington
Field
Sumner Co.**

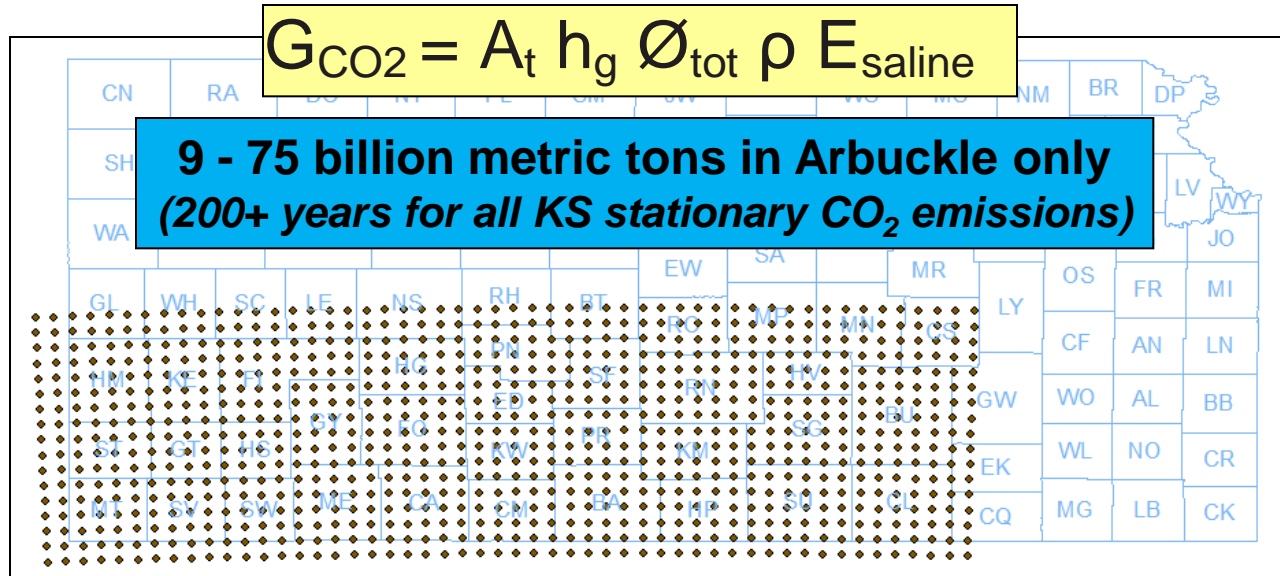
MISS Subsea ci: 25 ft with ARBK Verified Faults

**Cutter Field
Stevens Co.**



Initial CO₂ storage capacity

(reported April 2011 to NATCARB) Arbuckle Saline Formation



**Metric tons CO₂ per
Grid Cell
10 km²
(3.8 mi²)**

**Gerlach and
Bittersweet team, 2012**

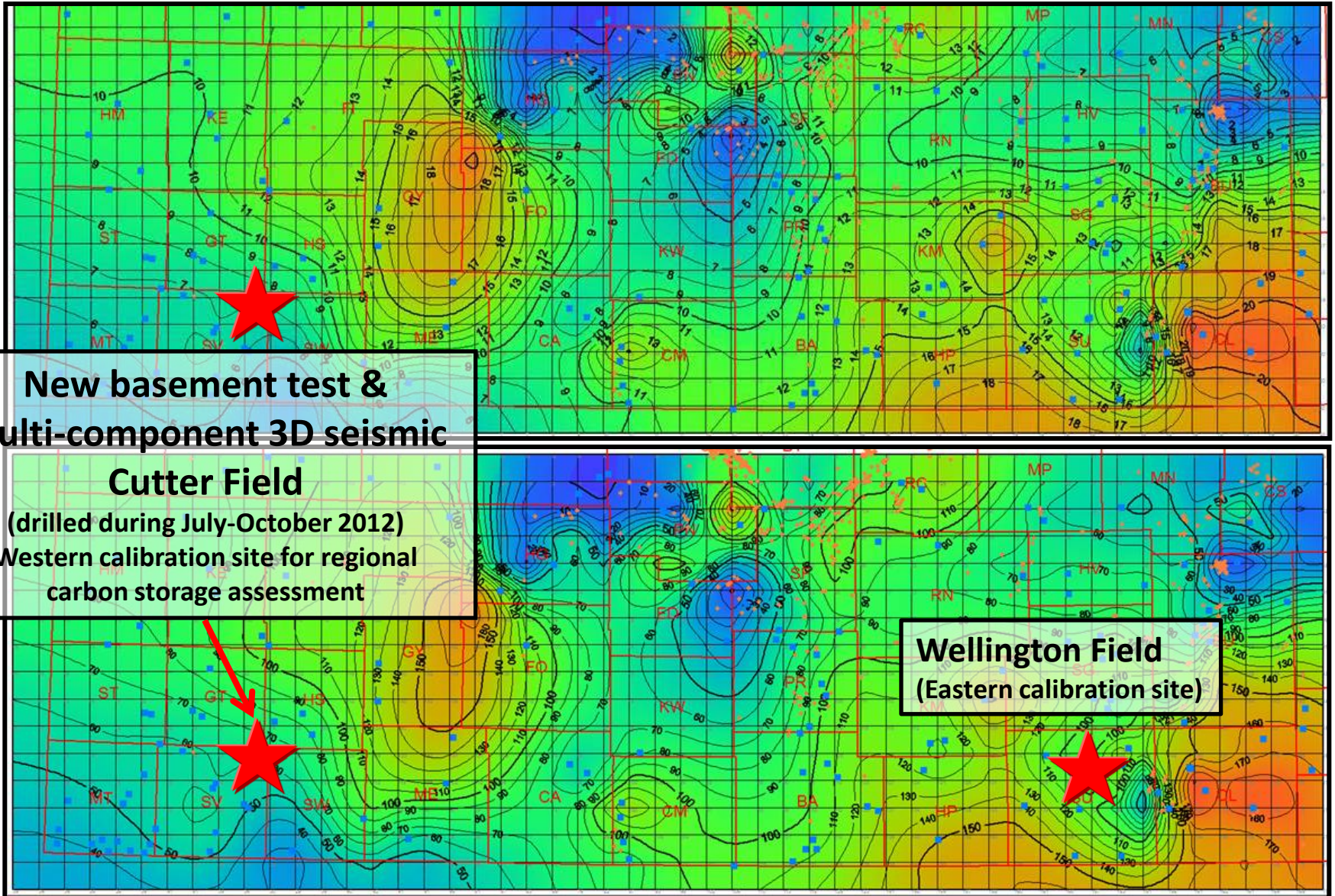
Each grid cell is 10K (+/-)	
P10	Total All Cells
8,781,380,535	
22,214,247	High Cell
10,287,863	Median Cell
10,554,544	Mean Cell

P90	Total All Cells
75,464,988,970	
190,903,682	High Cell
88,411,323	Median Cell
90,703,112	Mean Cell



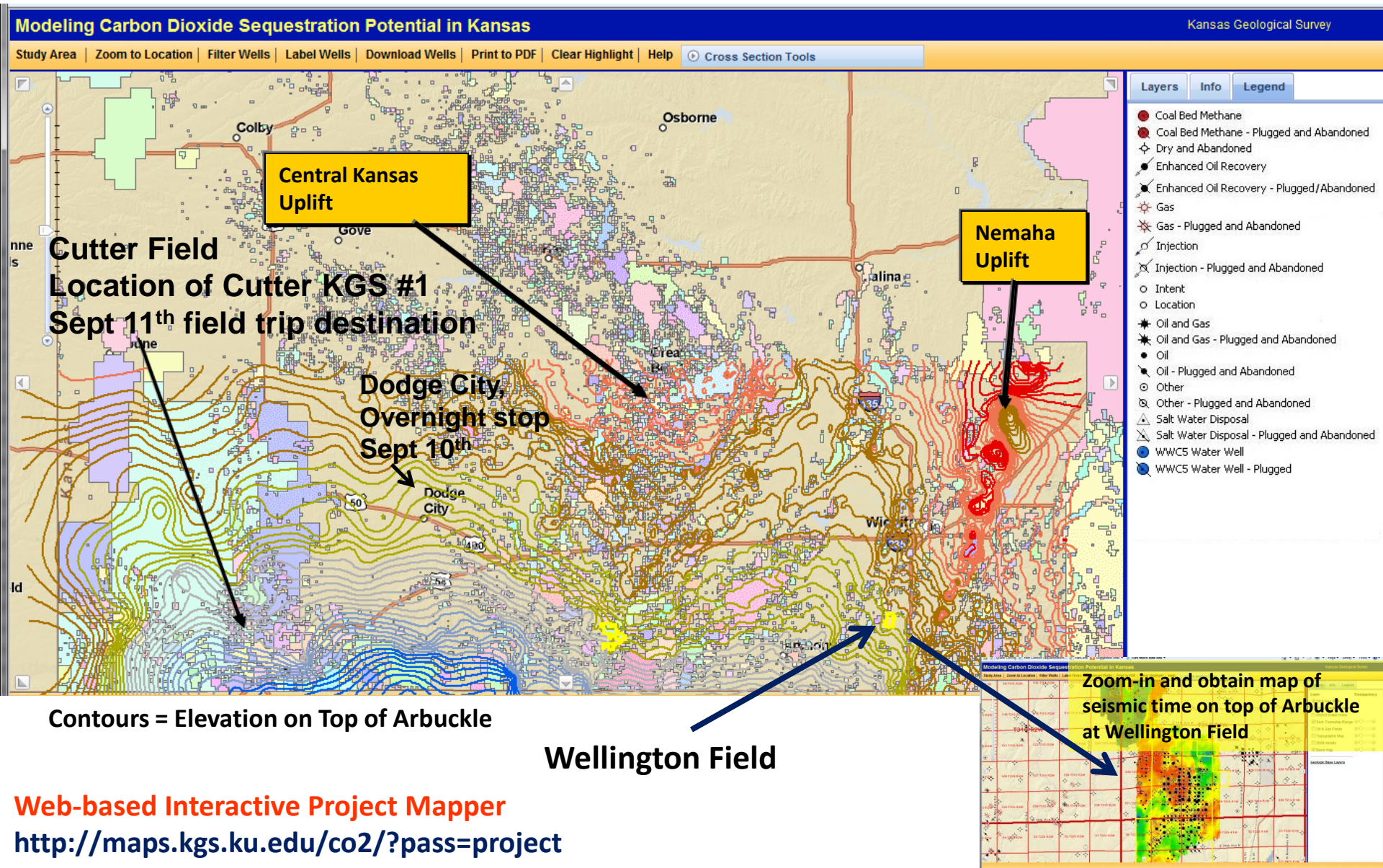
Arbuckle Storage Volume CO₂ (million tonnes/10 km)

P10 (top) and P90 (bottom)



Structural configuration on top of Arbuckle Group

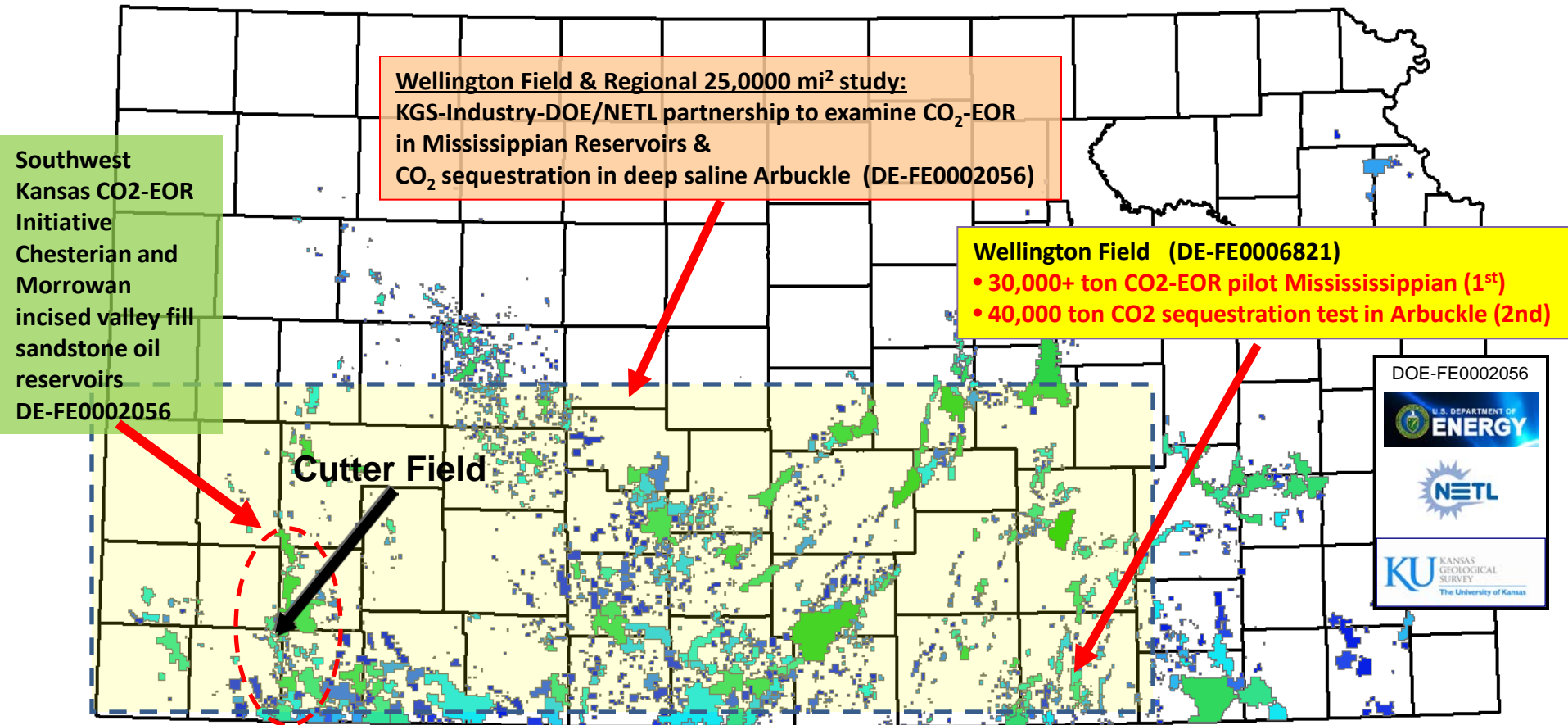
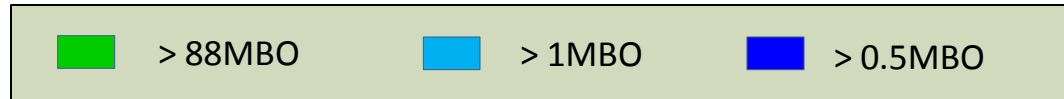
(interactive map to access to data and interpretations)



Mississippian Oil Fields

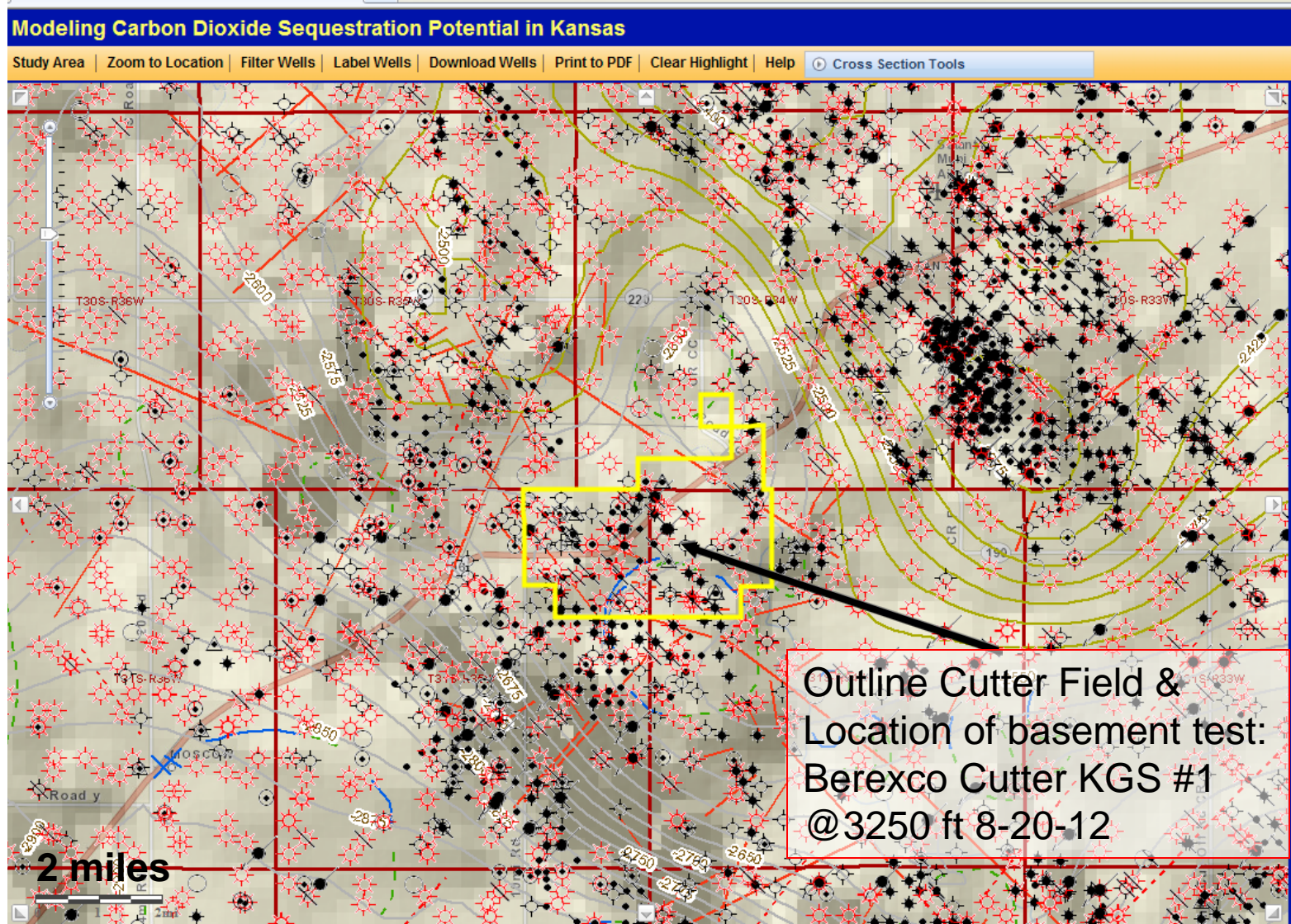
-- sizing opportunities in southern Kansas

CO₂-EOR & Horizontal Drilling

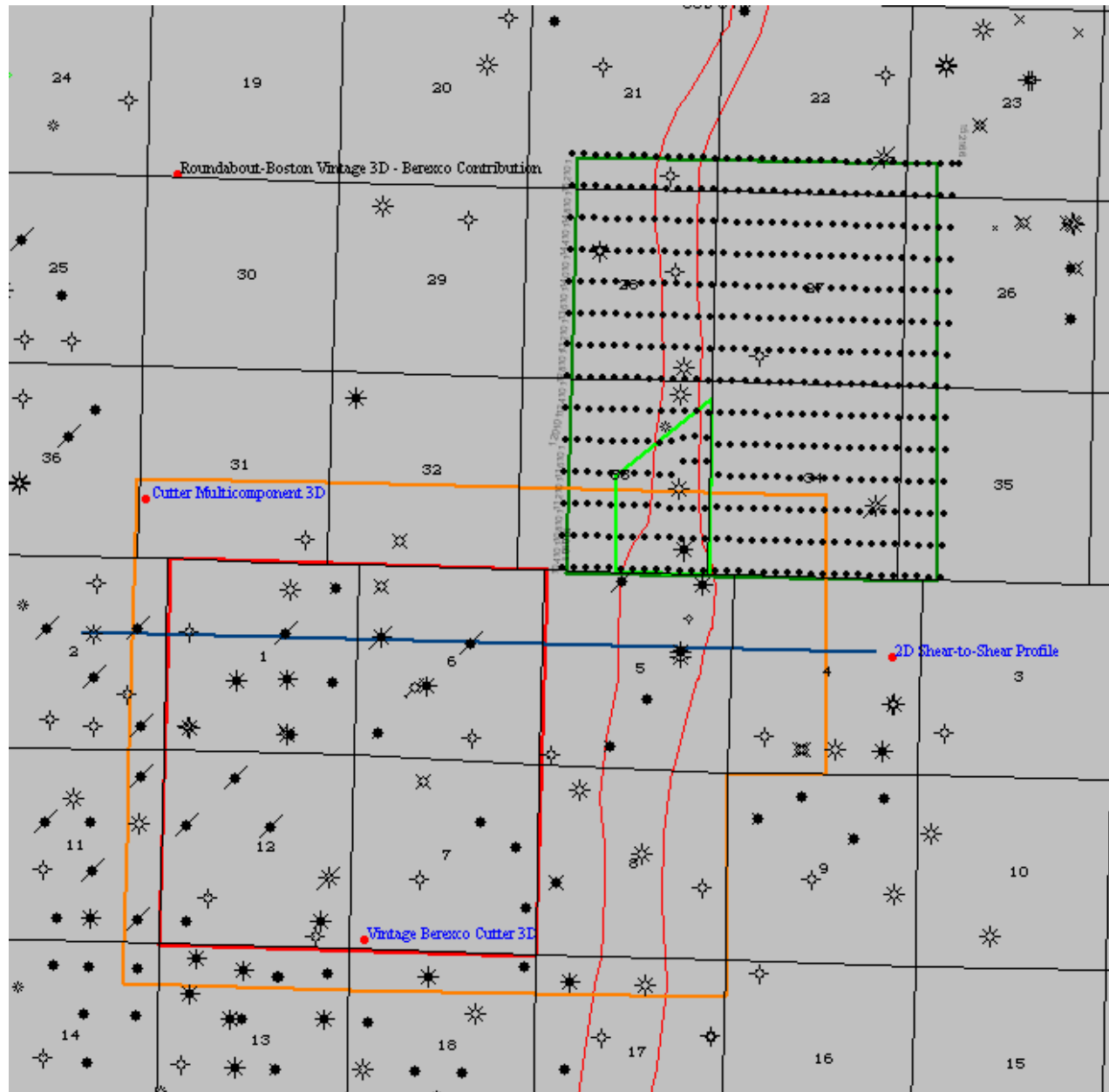


Cutter Field drill site, SW Kansas

Top Mississippian (contours), surface lineaments (red lines),
Lower Permian top Ft. Riley Ls. dip gradient (gray shading)

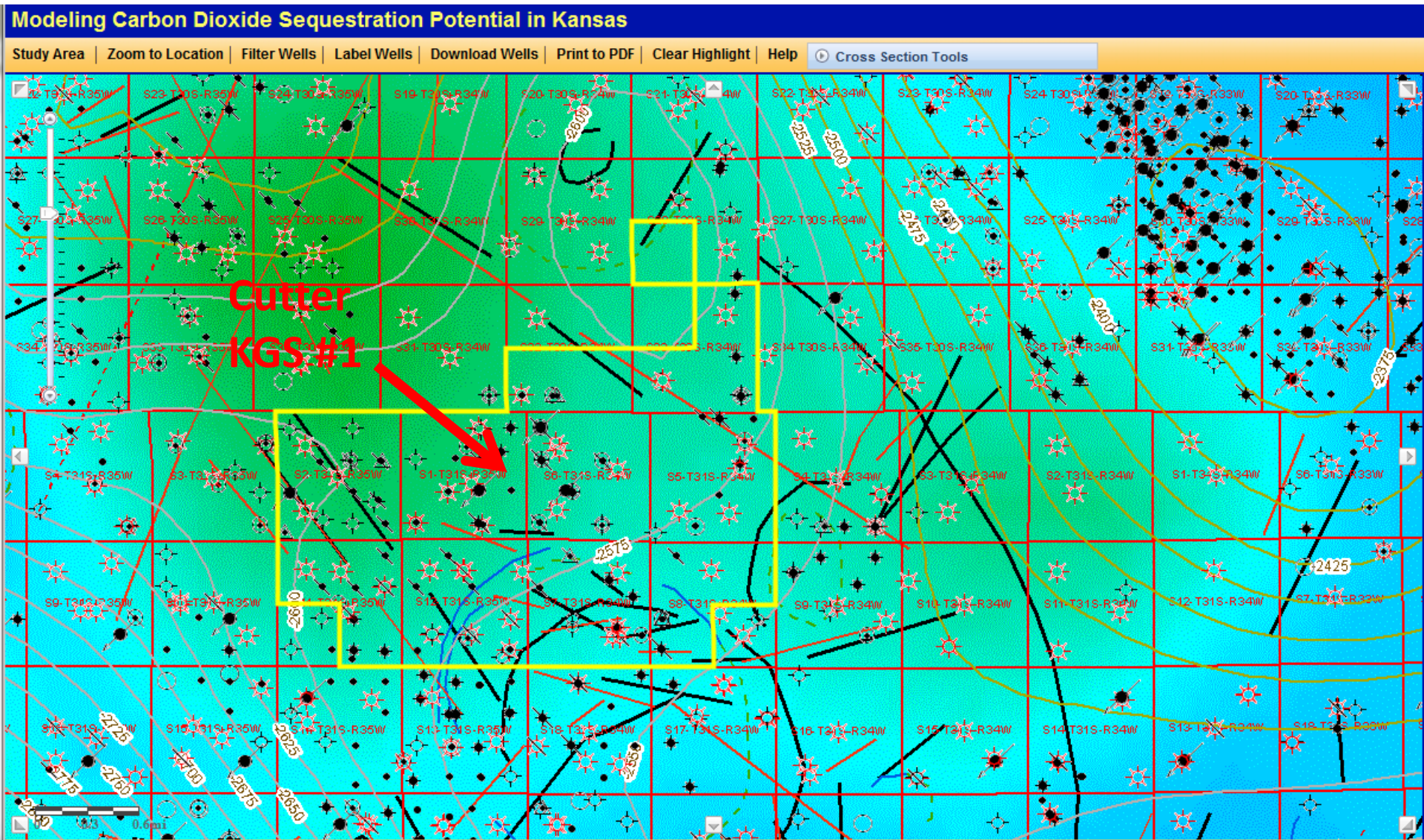


New Seismic Acquisition & Vintage Data at Cutter Field

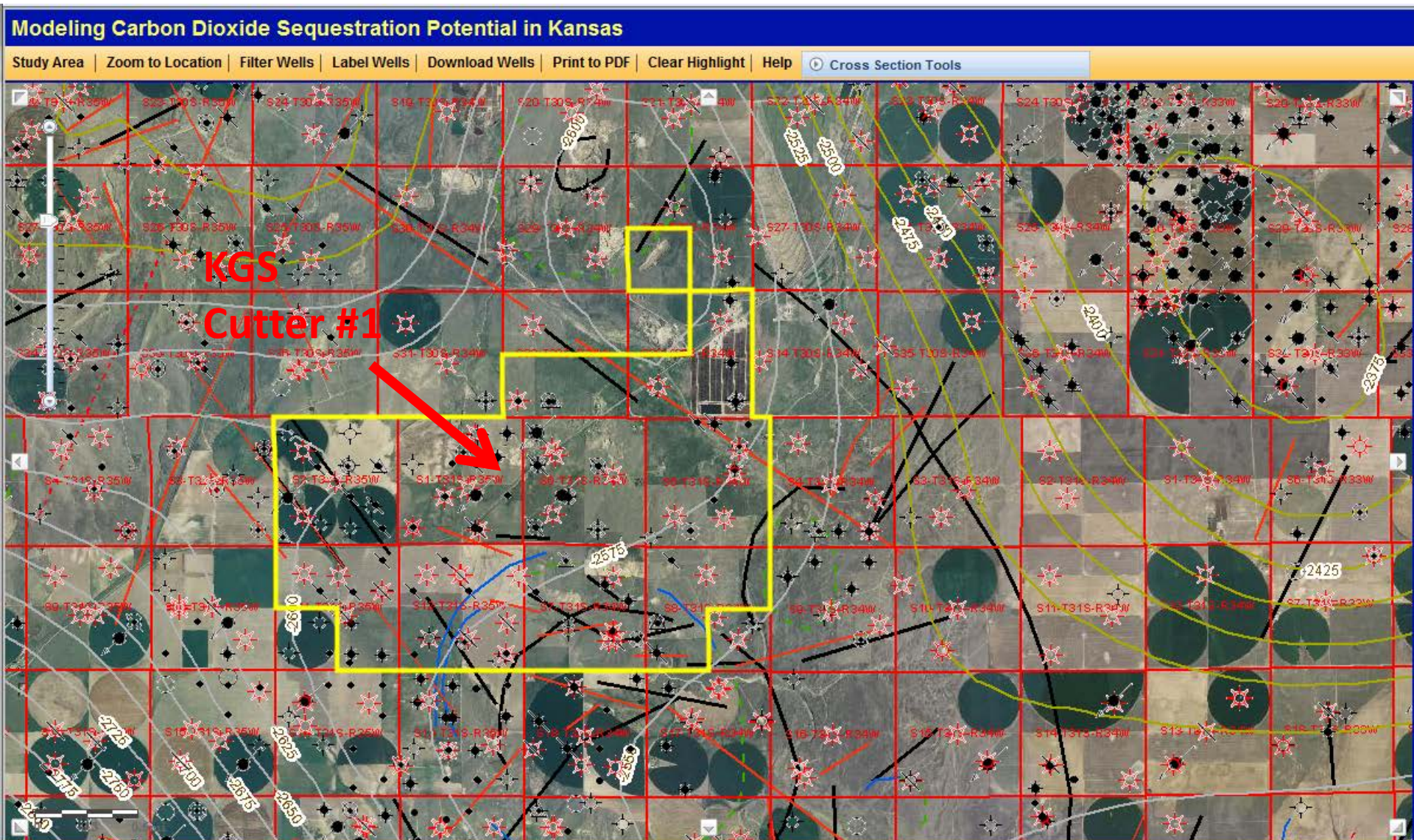


Regional mapping on interactive mapper

Mississippian structure, 2-10 mile filtered total magnetic anomaly, and surface lineaments



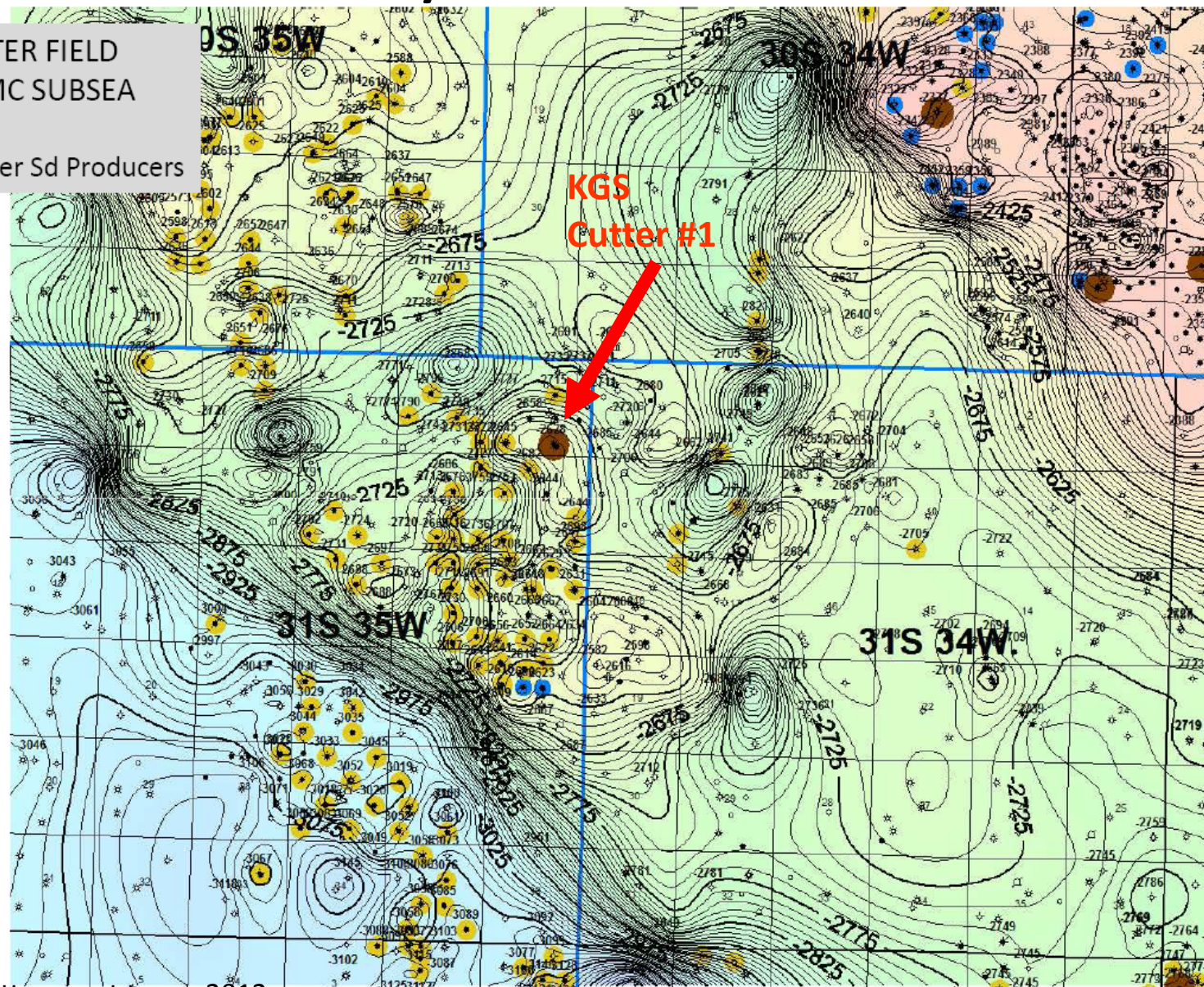
Surface lineaments and 2008 aerial photo



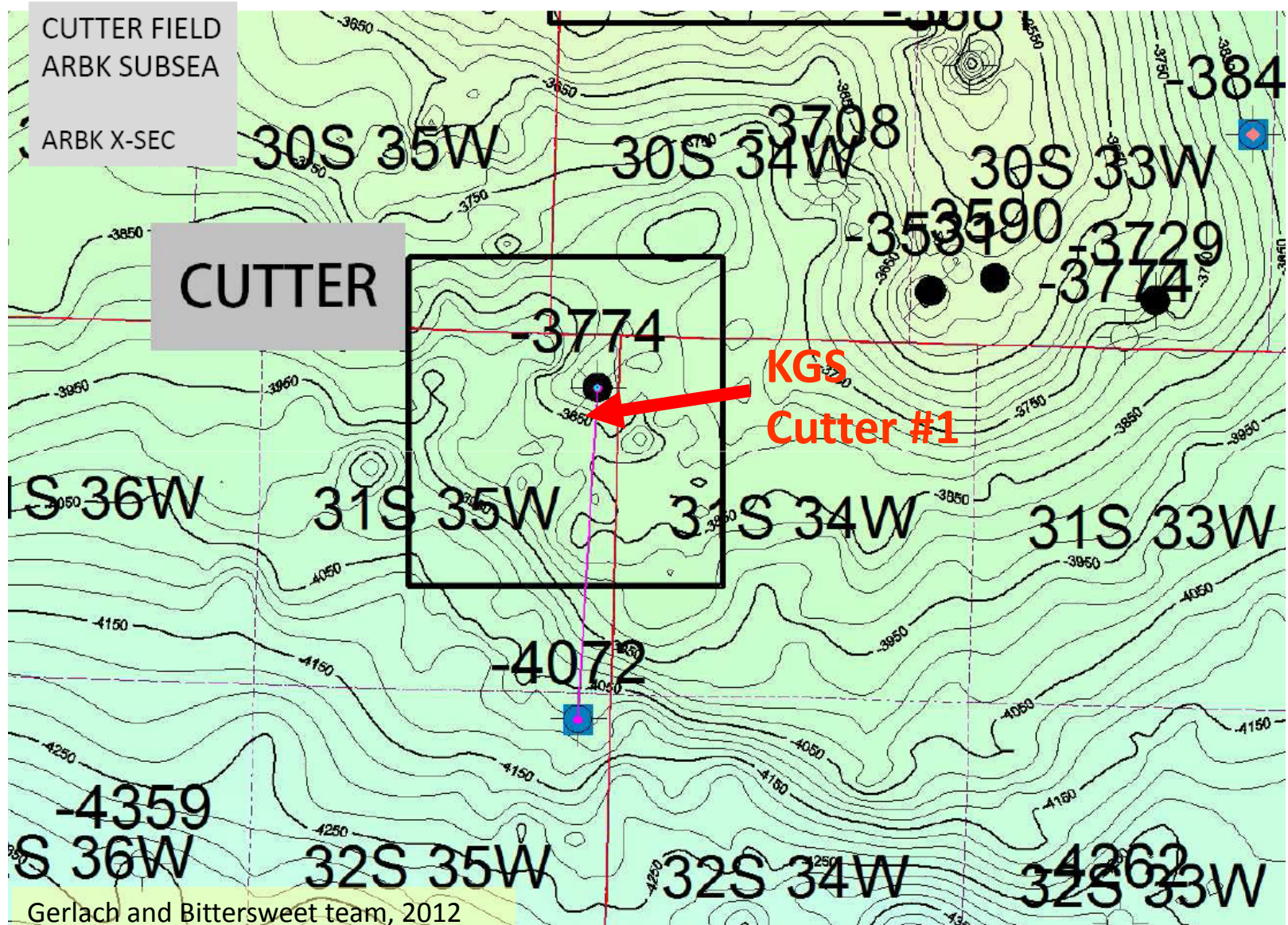
KGS well on Mississippian plateau with local high with sharp flexure/fault located to SW

CUTTER FIELD
MRMC SUBSEA

Chester Sd Producers



Subregional Arbuckle structure around Cutter and N-S cross section index near new well location



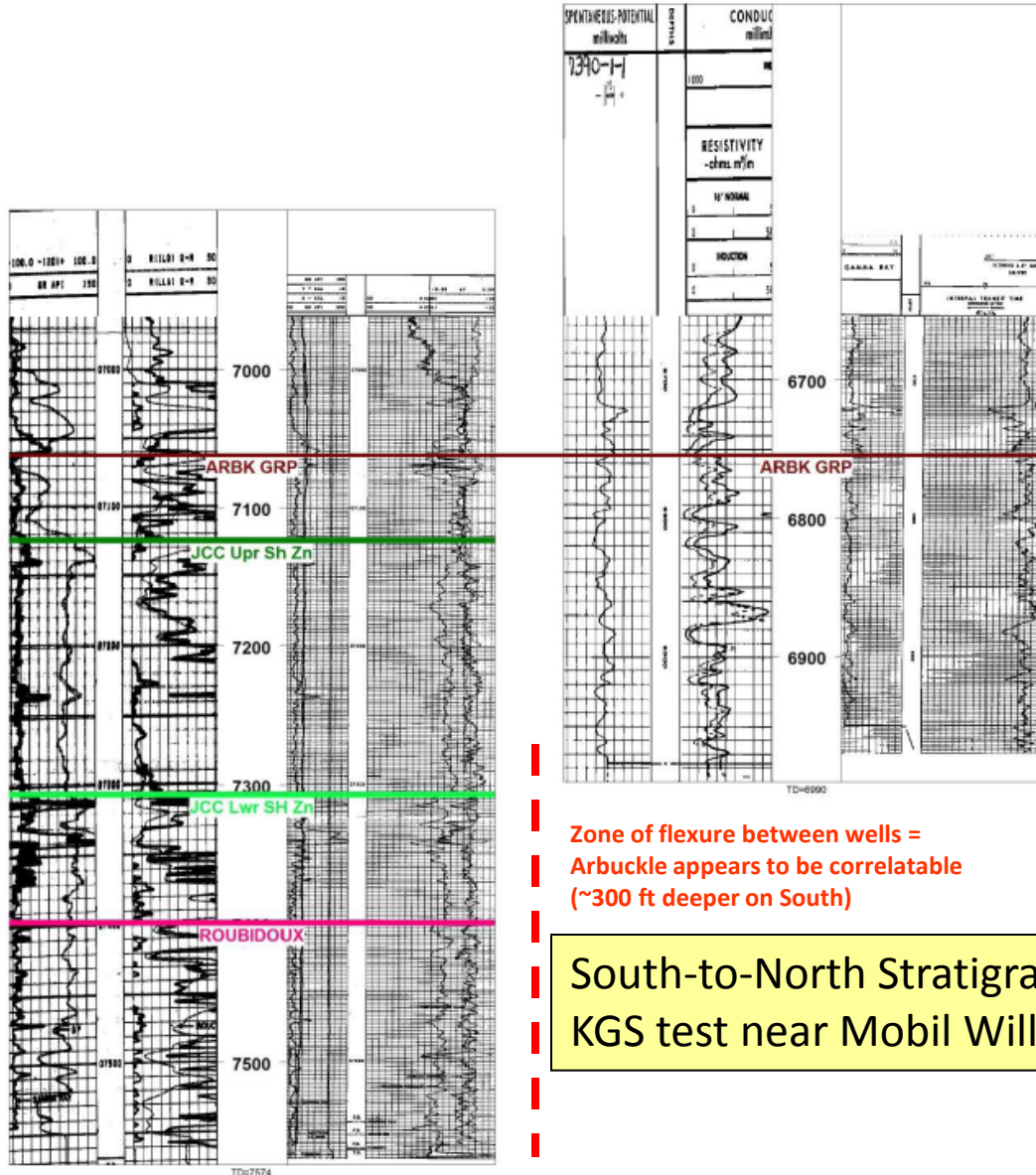
South

1006157485
MOBIL OIL
FRED BROWNELL 1
SE SE NW
TWP: 32 S - Range: 35 W - Sec. 1

29435 R

North

1002950515
SOCOMY MOBIL OIL
WILLIAM 1 CUTTER 1
C SW SE
TWP: 31 S - Range: 35 W - Sec. 1



Top Arbuckle Datum

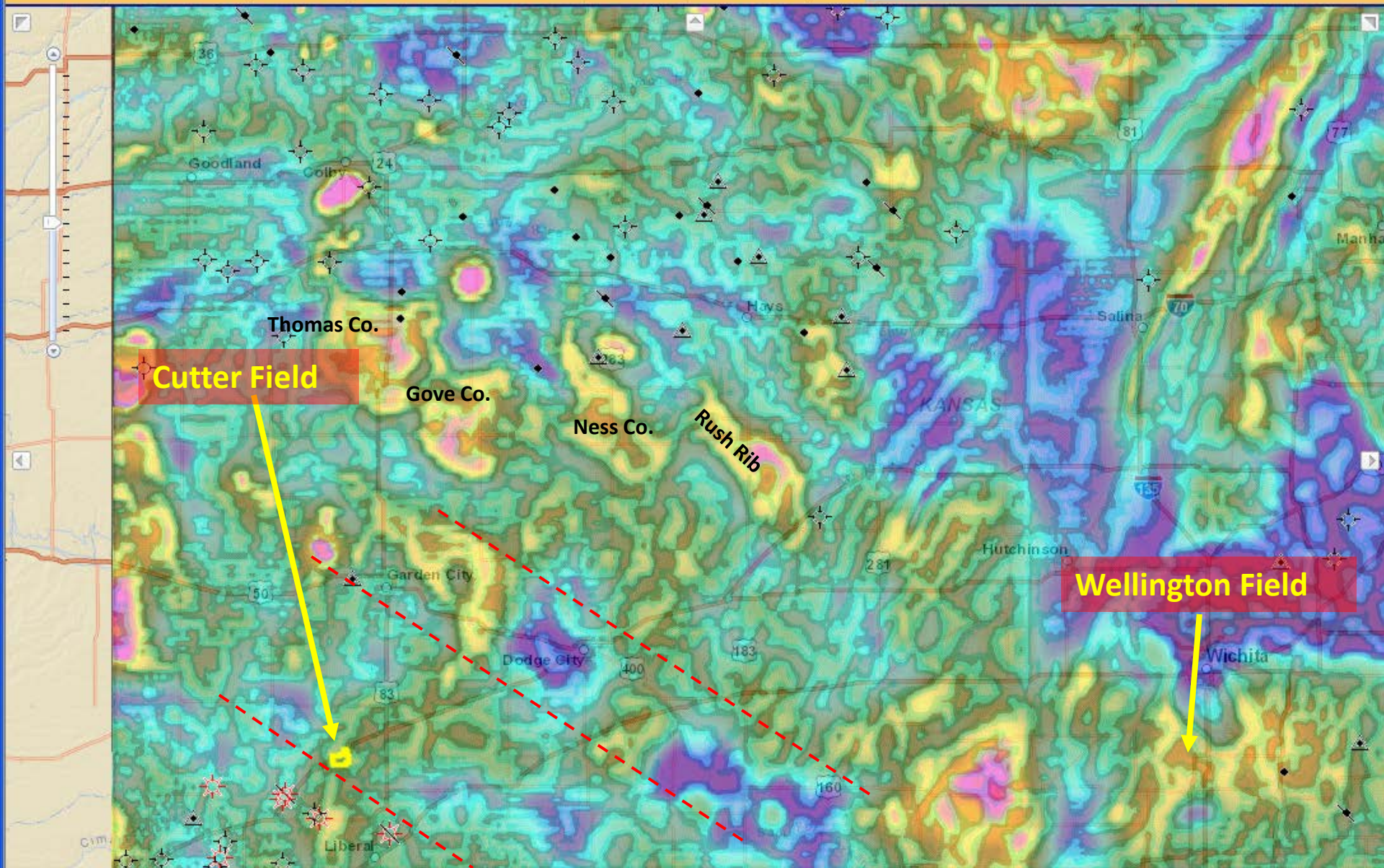
Zone of flexure between wells =
Arbuckle appears to be correlatable
(~300 ft deeper on South)

South-to-North Stratigraphic Cross Section
KGS test near Mobil William Cutter #1

Example of Interactive Mapper with Reprocessed Kansas Magnetics -- Tilt Angle, Total Magnetic 2-10 mi +
Total Magnetic Reduced to Pole (910m) (M. Killion, KGS)

Modeling Carbon Dioxide Sequestration Potential in Kansas

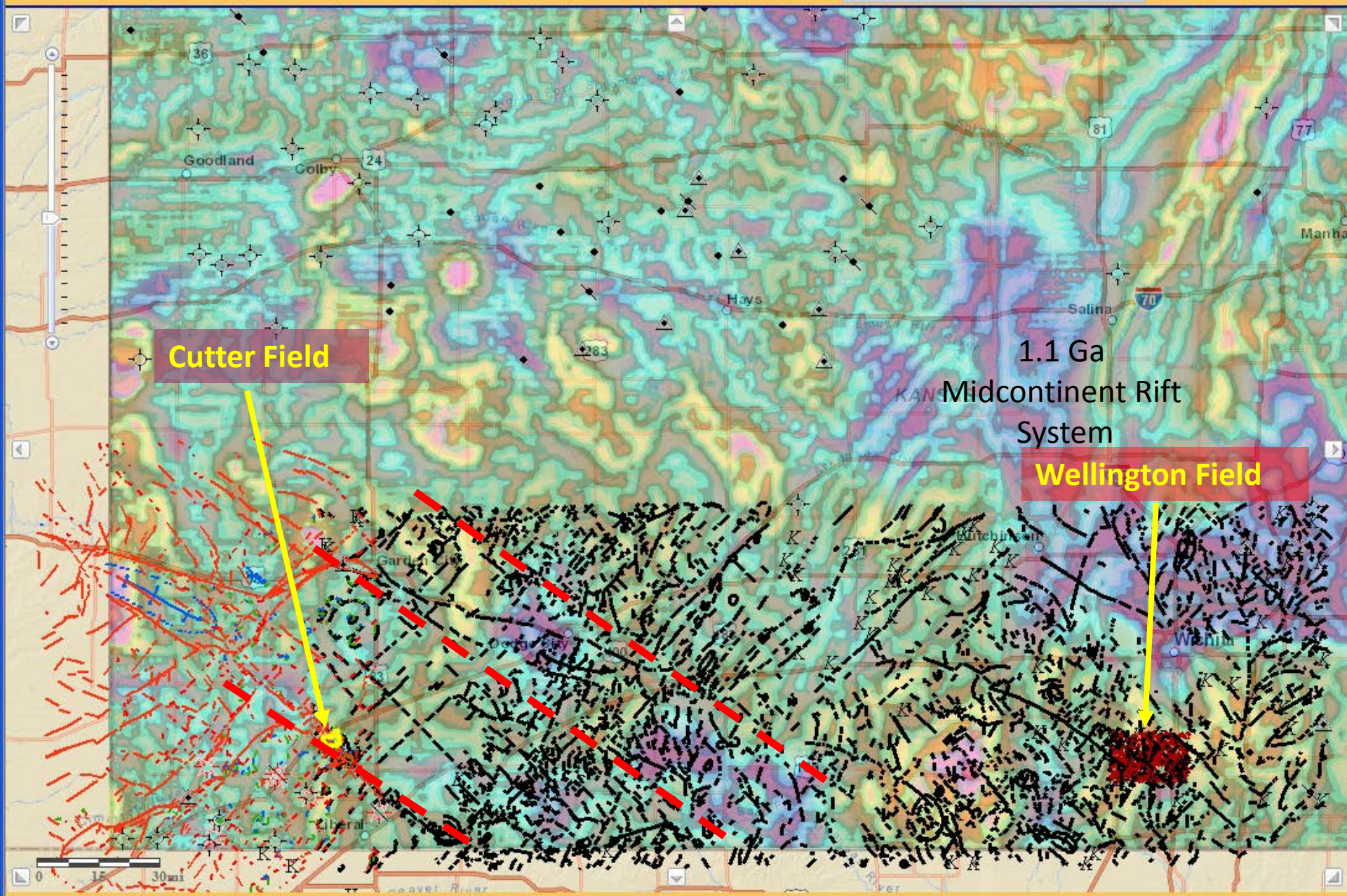
Study Area | Zoom to Location | Filter Wells | Label Wells | Download Wells | Print to PDF | Clear Highlight | Help | Cross Section Tools



Surface Lineaments, Tilt Angle, Total Magnetic 2-10 mi + Total Magnetic Reduced to Pole (910m)

Modeling Carbon Dioxide Sequestration Potential in Kansas

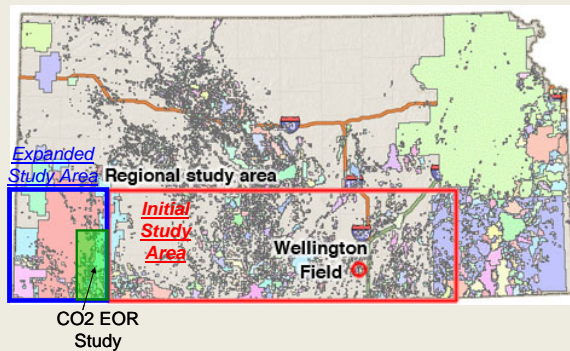
Study Area | Zoom to Location | Filter Wells | Label Wells | Download Wells | Print to PDF | Clear Highlight | Help | Cross Section Tools



Cutter Field is part of SW KS CO2 Initiative

Evaluate CO₂ sequestration potential in Arbuckle Group saline aquifer and CO₂-EOR in four fields in southwestern Kansas

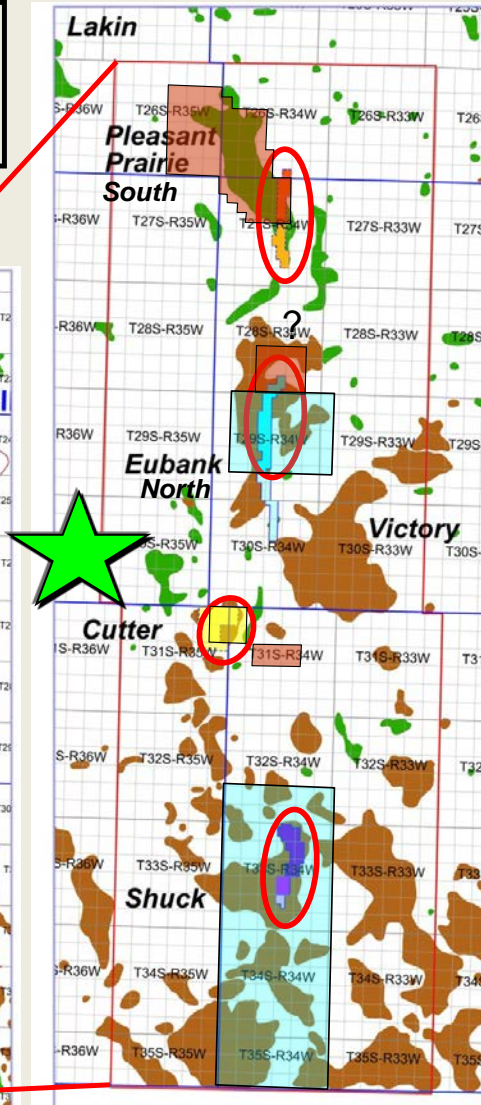
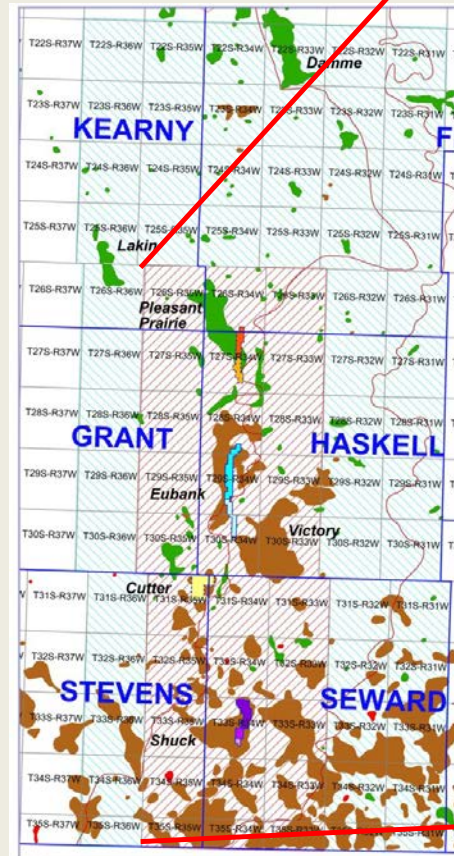
Southwest Kansas CO2 Consortium (Western Annex)



Chester/Morrow
Sandstone (IVF) &

Deep saline Arbuckle
aquifer

Seismic blocks are color
coded by operator
(~120 mi² of 3D seismic)



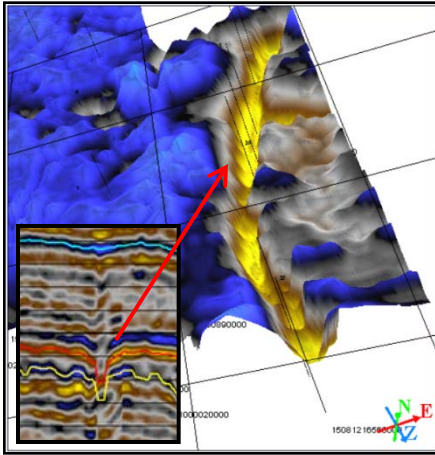
Southwest Kansas CO₂-EOR Initiative

Integrated Multi-Discipline Project for CO₂-EOR Evaluation

Static Model

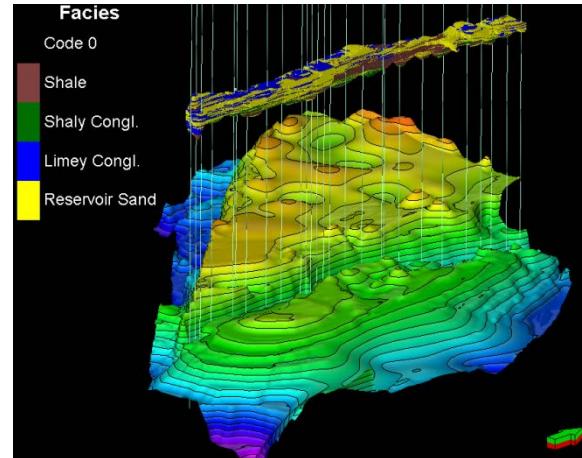
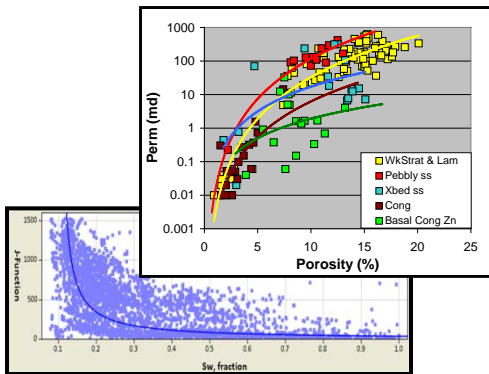
Geophysics:

structure, attributes, faults



Petrophysics:

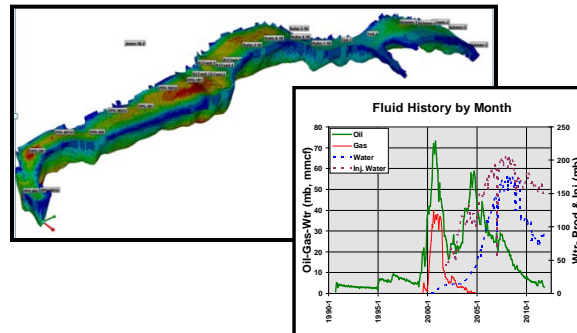
Core K-Phi, corrected porosity, free water level, J-function



Engineering:

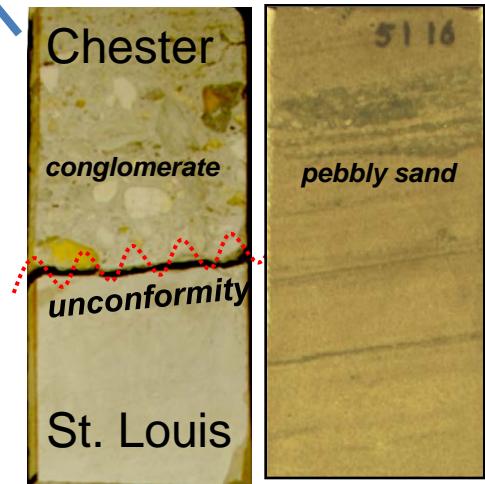
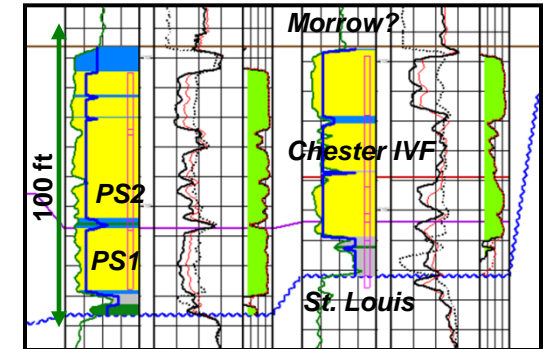
PVT and fluid analysis, recurrent histories, dynamic modeling

Dynamic Model



Geology:

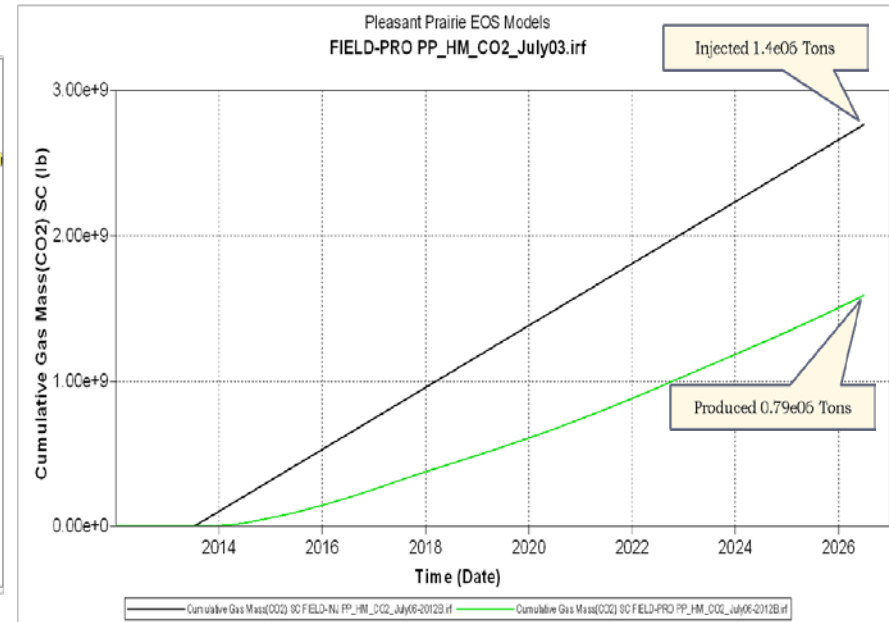
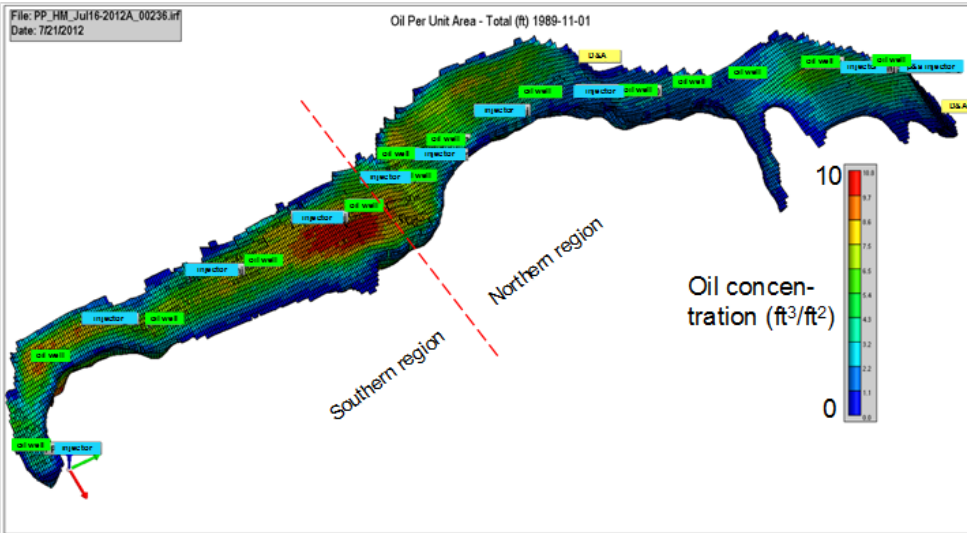
Formation tops, sequence stratigraphy, core lithofacies, lithofacies prediction (NNet)



Dubois, 2012

Example from modeling of Pleasant Prairie South

Simulated CO₂ cumulative volumes
for the CO₂ injection case in EOR Chester sandstone
Pleasant Prairie South -- 1.38 million tons CO₂ injected



Cumulative oil 2011 (mmbo)	4.48
NFA cum. oil 2026 (mmbo)	4.64
Cum. oil CO2 case (mmbo)	6.59
Incremental oil CO2 (Cum.-NFA) (mmbo)	1.95
Cumulative oil 2012-2026 (mmbo)	2.11

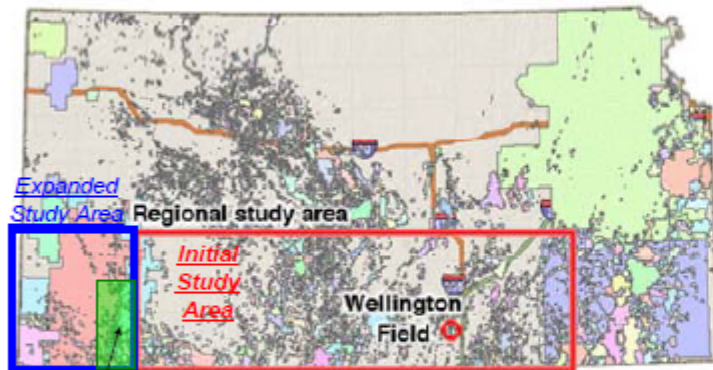
		<i>mm tons</i>
CO2 injected (mmcf)	23.7	1.38
CO2 produced (mmcf)	13.2	0.77
CO2 sequestered (mmcf)	10.5	0.61
Gross utilization (mcf/bo)	11.2	
Net utilization (mcf/bo)	5.0	

Organizational chart SW Kansas CO2 EOR Initiative

Southwest Kansas CO2 EOR Initiative

Chester and Morrow Reservoirs

Western Annex to Regional CO2 Sequestration Project (DE-FE0002056) run by the Kansas Geological Survey



CO2 EOR Study

Six Industry partners:

- Anadarko Petroleum Corp.
- Berexco LLC
- Cimarex Energy Company
- Glori Oil Limited
- Elm III, LLC
- Merit Energy Company

Support by:

Sunflower Electric Power Corp.

The SW Kansas part of project

- CO2 EOR technical feasibility study – Chester IVF and Morrow
- Part of larger KGS-industry CCS and EOR study
- Will not inject CO2 – paper study only
- Get fields in study “CO2-ready”

Technical Team:

	Project Role	Company
Martin Dubois	Team Lead, geo-model	IHR LLC
John Youle	Core and depo-models	Sunflower Energy
Ray Sorenson	Data sleuth and advisor	Consultant
Eugene Williams	Reservoir engineering	Williams Petroleum
Dennis Hedke	Geophysicist	Hedke & Saenger
Peter Senior	Reservoir modeling	MS student, KU
Susan Nissen	Geophysicist	Consultant
Lynn Watney	Project PI	KGS
Jason Rush	Project PI	KGS
John Doveton	Log Petrophysics	KGS
Tom Hansen	Subcontract mngr., aquifer	Bittersweet Energy
Paul Gerlach	Regional stratigraphy, data	Charter Consulting
Larry Nicholson	Regional stratigraphy, data	Consultant

Organizational Chart – DE-FE0002056

SW Kansas CO2 Initiative staffing on previous page

W. Lynn Watney & Jason Rush, Joint PIs,
Kansas Geological Survey

Kansas Center for Research (KUCR) – contracting, financial assurance, compliance

UNIVERSITY OF KANSAS

Kansas Geological Survey

Co-Principal Investigators

Kerry D. Newell, Co-PI -- structure and diagenesis
Jason Rush, Co-PI -- Petrel geomodeling and data integration
Richard Miller, Co-PI -- seismic interpretation, shearwave analysis
John Doveton, Co-PI -- log petrophysics and core-log modeling
Jianghai Xia, Co-PI -- gravity-magnetics modeling & interpretation
Marios Sophocleous, Co-PI -- aquifer modeling & well testing

Key Personnel

John Victorine -- Java web app development
David Laflen -- manage core & curation
Mike Killion -- modify ESRI map service for project
Database Manager (TBD) -- manage and integrate data

KU Department of Geology

Evan Franseen, Co-PI -- stratigraphy and diagenesis of OPAS
Robert Goldstein, Co-PI -- diagenesis, fluid inclusion
Grad Research Asst 2 years
David Fowle, Co-PI -- reactive pathways, microbial catalysis
Jennifer Roberts, Co-PI -- reactive pathways, microbial catalysis
Geology Technician (TBD) - fluid/rock handling
Grad Research Asst - 1 year

Services

LOGDIGI, LLC, Katy, TX - wireline log digitizing
Petrographics, Montrose, CO - thin section preparation
KOGAR, Dallas, TX - remote sensing data and analysis

SUBCONTRACTS

Kansas State University - Seismic and Geochemical Services

PI- Saugata Datta -- reactive pathways and reaction constants
PI- Abdelmoneam Raef -- seismic analysis and modeling
GRA 1- Datta- aqueous geochemistry
GRA 2- Raef - seismic analysis and modeling

Bittersweet Energy, Inc., Wichita, KS

Tom Hansen, Principal, Wichita, Geological Supervision - regional data, hydrogeology of Arbuckle
Geological Consultant 1 -- regional data acquisition
Geological Consultant 2 -- regional data acquisition
Student Consultant -- regional data acquisition
Ken Cooper, Petrotek Engineering, Littleton, CO- engineer, well injection, hydrogeology
John Lorenz, FractureStudies, Edgewood, NM -- structural analysis

CMG - Simulation Services, Calgary, Alberta

simulation software and Greenhouse Gas Simulation Consultancy

Weatherford Laboratories, Houston, TX

core analyses

Berexco, Beredco Drilling -- Wichita, KS

access to Wellington Field; drilling, coring, completion and testing; participation in modeling and simulation

Key Berexco staff

Dana Wreath - manager, reservoir and production engineer
Randy Koudele - reservoir engineer
Bill Lamb - reservoir engineer

Halliburton, Liberal, KS -- wireline logging services

Hedke-Saenger Geoscience, LTD., Wichita, KS - geophysical acquisition design, seismic interpretation

Susan E. Nissen, McLouth, KS -- Geophysical Consultant - volumetric curvature

Lockhart Geophysical, Denver, CO -- 2D shear wave acquisition, gravity & mag acquis. & interpret

Fairfield Industries, Inc., Denver, CO -- 2D, 3D multicomponent processing

Paragon Geophysical Services, Wichita, KS -- 3D seismic acquisition

Echo Geophysical, Denver, CO -- 3D processing

Converging Point - QC seismic acquisition

Noble Energy, Houston, TX; Denver, CO -- collaborating company, fields adjoining Wellington



Partners
FE0002056



DEPARTMENT OF
GEOLOGY

KANSAS STATE UNIVERSITY

KU THE UNIVERSITY OF
KANSAS

Department of Geology



Wellington
Field
Operator



BEREXCO



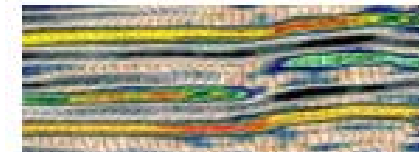
Devilbiss Coring Service
Basic Energy Services



HALLIBURTON

HEDKE-SAENGER GEOSCIENCE, LTD

Bittersweet Energy Inc.



Petrotek



LOGDIGI
A LEADING CONSULTING COMPANY

Southwest Kansas CO₂-EOR Initiative

Industry Partners (modeling 4 Chester/Morrowan oil fields to make CO₂ ready)



HEDKE-SAENDER GEOSCIENCE, LTD



+drilling and seismic contractors TBN



Dawson-Markwell Exploration Co.



Industrial and Electrical Power Sources of CO₂



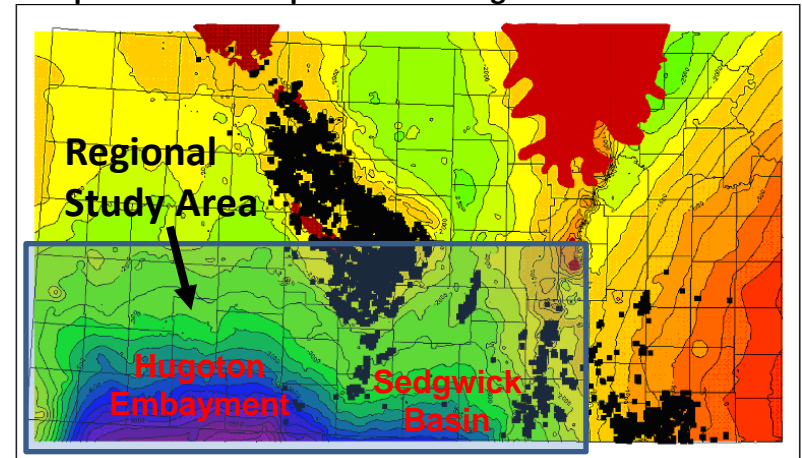
Abengoa Bioenergy : The Global Ethanol Company



Technical Status (DE-FE0002056)

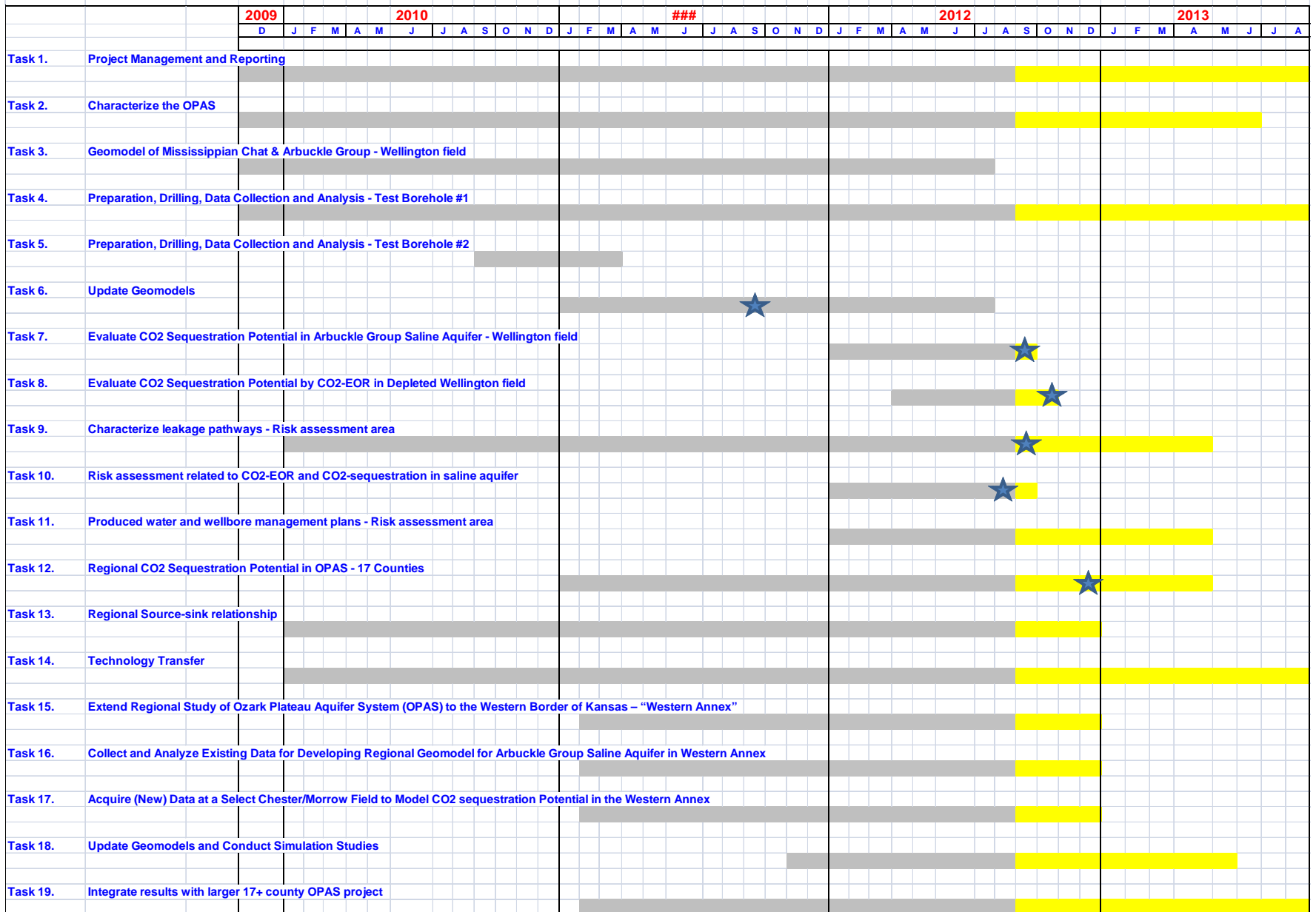
- Start Date - Dec 2009; End date: Aug 2013
- Build static and dynamic geomodels
 - Wellington field (Sumner County, KS)
 - Mississippian oil field, CO₂-EOR
 - Underlying Arbuckle saline aquifer
 - Four Chester/Morrow field in SW KS
- Conduct characterization and simulation studies to estimate regional CO₂ storage capacity of Arbuckle saline aquifer – 33 county area
 - Drill, core, log, and test Western Kansas Site (Cutter)
 - Simulate 8 additional sites for commercial CO₂ storage & improve estimates of capacity
- Risk analysis related to CO₂ sequestration
 - Caprock integrity
 - Rock heterogeneity including stratigraphy, petrofacies, and fault mapping
- Technology transfer

Top Arbuckle Group and Producing Wells in Arbuckle



Project Gantt Chart DE-FE0002056

Gant Chart - August 2012



Accomplishments to Date

DE-FE0002056

- KGS Milestone 1.2: Acquire/analyze seismic, geologic and engineering data - Wellington field -- COMPLETED
- KGS Milestone 1.3: Develop initial geomodel for Wellington field -- COMPLETED
- KGS Milestone 1.4: Locate and initiate drilling of Well #1 at Wellington field -- COMPLETED
- KGS Milestone 2.1: Complete Well#1 at Wellington - DST, core, log, case, perforate, test zones -- COMPLETED
- KGS Milestone 2.2: Complete Well#2 at Wellington - Drill, DST, log, case, perforate, test zones -- COMPLETED
- KGS Milestone 2.3: Update Wellington geomodels - Arbuckle & Mississippian – 85%
- KGS Milestone 2.4: Evaluate CO2 Sequestration Potential of Arbuckle Group Saline Aquifer - Wellington field – 85%
- KGS Milestone 3.1: CO2 sequestration & EOR potential - Wellington field – 85%
- KGS Milestone 3.2: Characterize leakage pathways - Risk assessment area – 85%
- KGS Milestone 3.3: Risk assessment related to CO2-EOR and CO2-sequestration – 70%
- KGS Milestone 3.4: Regional CO2 Sequestration Potential - 33 Counties – 50%

Summary – DE-FE0002056

- **Key findings**

- 1. Initial estimates of CO₂ P10 & P90 Arbuckle aquifer storage are 8.8 and 75.5 billion metric tons.
- 2. Core, logs, seismic, DST, geochemical and microbial analysis, and step-rate test at Wellington Field indicates that lower Arbuckle is *a primary injection interval* (~200 ft thick) overlain by widespread thick (400 ft) *baffle/barrier in mid Arbuckle*.
- 3. Geochemical and microbial analyses indicate that upper and lower portions of the Arbuckle saline aquifer are not in hydraulic communication.
- 4. Thick (~120 ft) primary caprock in lower Mississippian (“Pierson Fm.”) augments the Chattanooga Shale in south-central Kansas.
- 5. Simulation of Pleasant Prairie South, indicates 1.38 million tons of CO₂ could be injected during CO₂-EOR at ~5 mcf CO₂/bbl of oil.

- **Lessons Learned**

- Seismic processing and interpretation is an iterative process.
- Working with enthusiastic and engaged petroleum industry partners incorporates local knowledge and extend ownership of CCUS in Kansas.

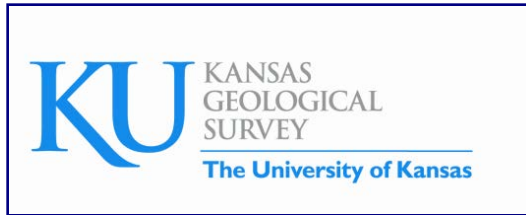
- **Future Plans**

- Complete geomodels and simulations in SW Kansas fields and Wellington
- Refine regional CO₂ storage estimates from quantitative analysis of LAS log files and static and dynamic modeling at 8 sites
- **Complete drilling and evaluation of Cutter KGS #1**
- Complete project 8-7-13

Project Team

Small Scale Field Test at Wellington Field

DOE-NETL Contract #FE0006821



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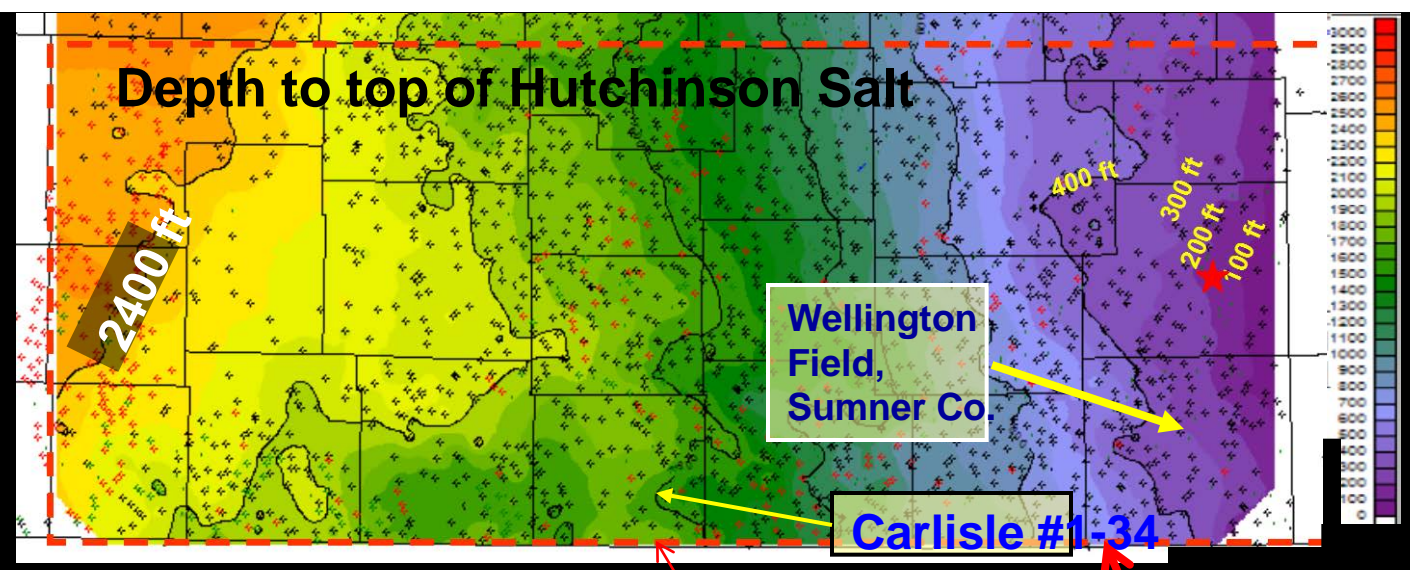
Mike Taylor, Ross Black, George Tsoflias



Dan Collins, David Freeman

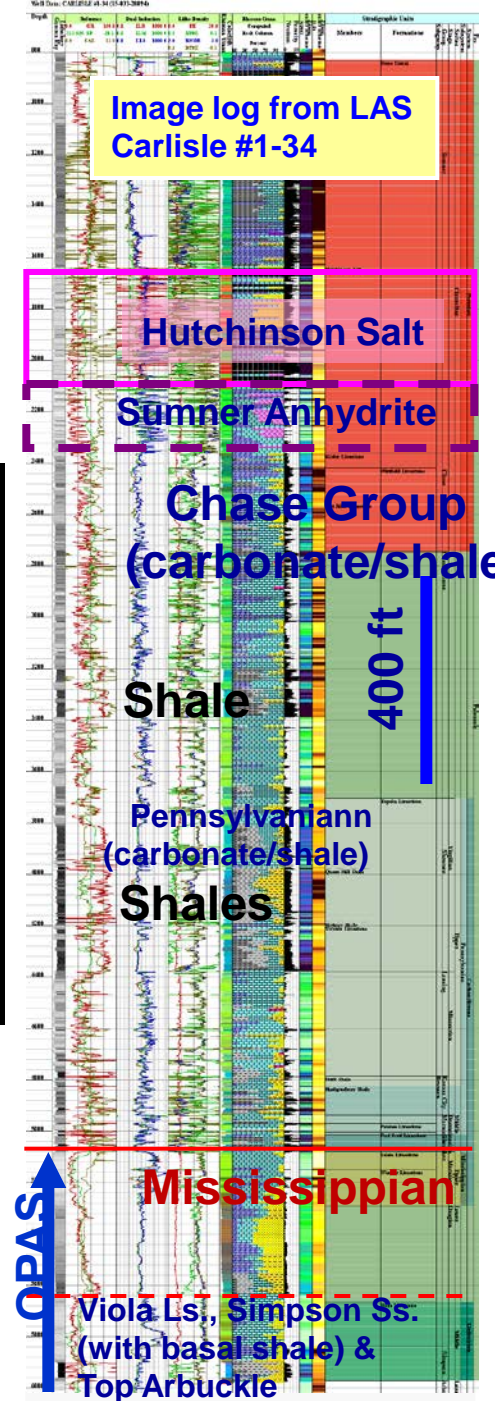
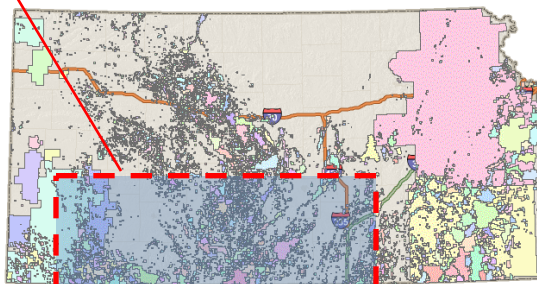
Area of Potential CO₂ Storage in Southern Kansas Overlain by Thick Evaporites (Salt/Halite & Anhydrite)

Multiple shales and evaporite seals

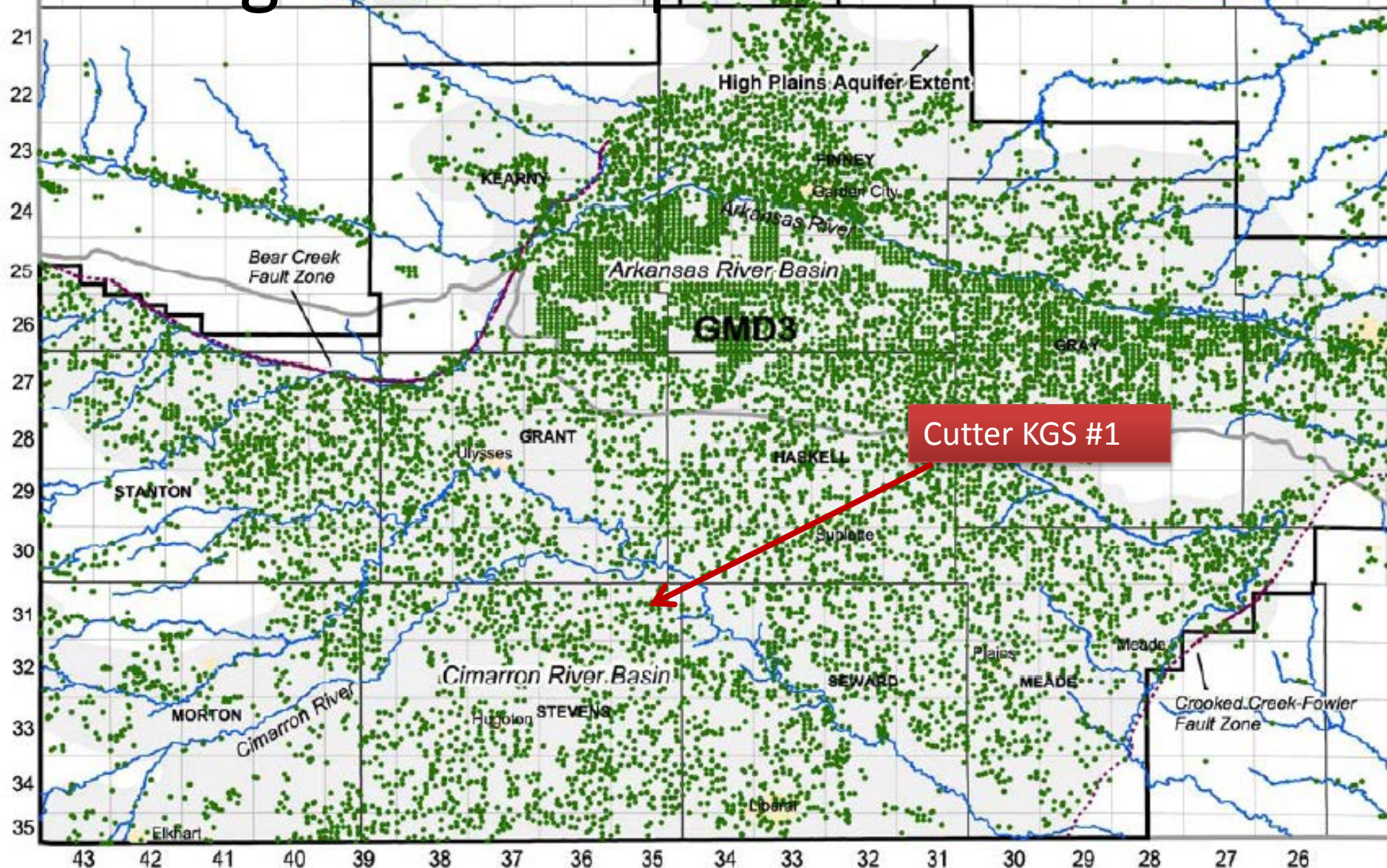


Regional study area of CO₂ project in southern Kansas: 230 mi x 85 mi

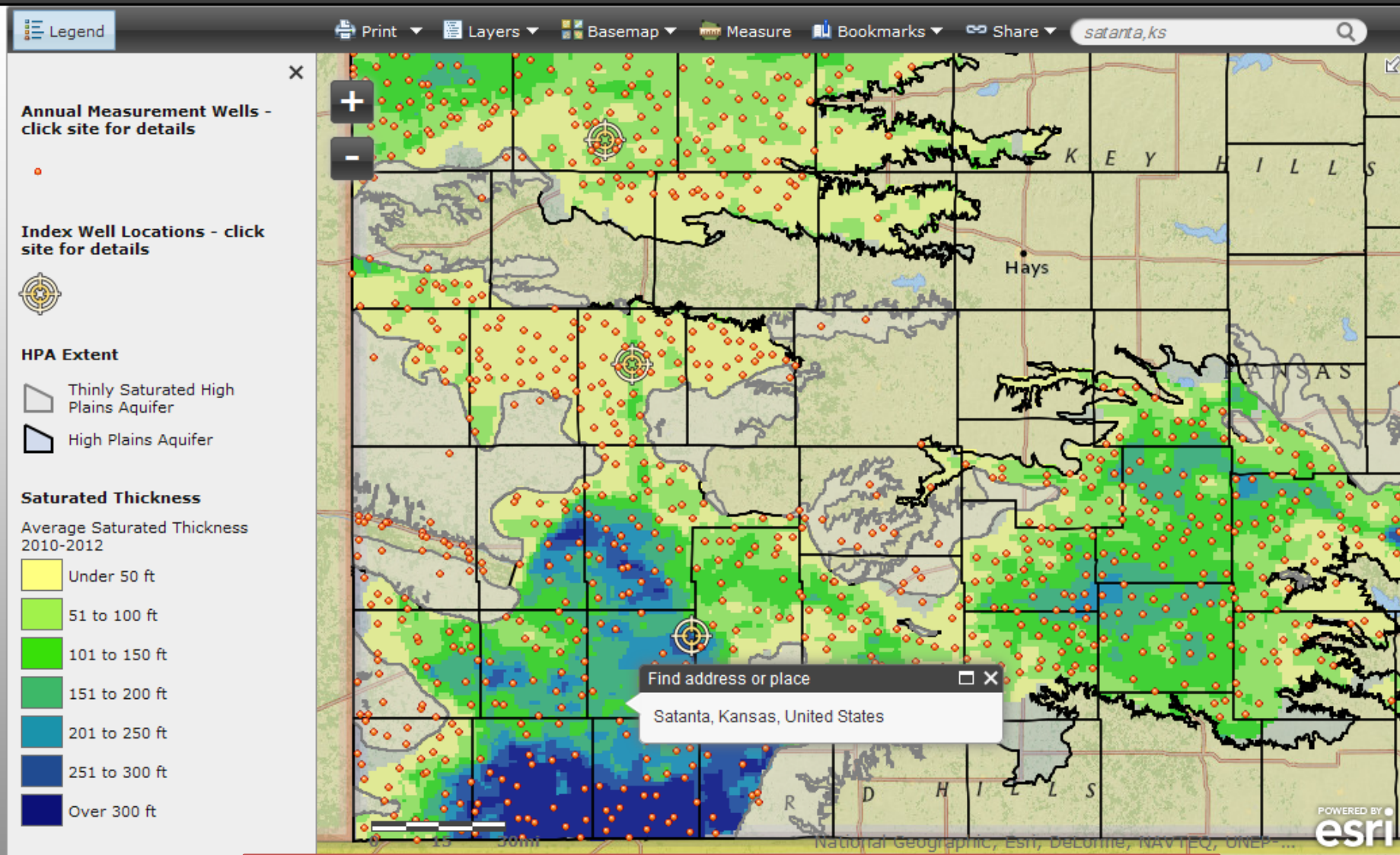
Total Permian evaporite thickness ranges from **400 to 2000 feet** in south-central Kansas



High Plains Aquifer SW Kansas



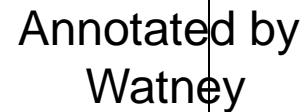
Kansas Geological Survey - Geohydrology Section

[Instructions](#)

http://www.kgs.ku.edu/General/News/2012/hp_atlas.html

*Disclaimer: Data in this atlas is for general information only, no scientific conclusions are implied.
Atlas may take a few moments to load depending upon your internet connection speed.*

(Based on ground water trends from 1991 to 2001 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days of pumping with wells on 1/4 section)



Acknowledgements & Disclaimer

Acknowledgements

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