

**KYCCS - Western Kentucky Project Planning Meeting
KGS Lexington Core Library, November 6, 2008, 9 AM**

Persons present at the meeting:

EMS

Dale Honn

E.ON US

Roger Medina

Doug Schetzel

Big Rivers Electric

Mike Thompson

TVA

Ed Stephens

Suzanne Fisher

Peabody Energy

Diana Tickner

ConocoPhillips

Scott Rennie

Paul Heard

Smith Management Group

Sara Smith

Karen Thompson

Core Lab

Keith Hudson

Kentucky Geological Survey

Dave Williams

Rick Bowersox

Jim Drahovzal

Jerry Weisenfluh

Jim Cobb

Dave Harris

UK CAER

Jim Hower

Energy and Environment Cabinet

Brandon Nuttall

Sandia Technologies

Phil Papadeas

1. Welcome, Introductions, and Announcements

Dave Williams convened the meeting at 9:20 Am with introductions.

Jim Cobb discussed state budget issues with the group and noted that the Governor is very interested in sequestration in Kentucky. He stated that the Energy Committee is investigating ways to address the liability issue of CO₂ storage. Project partners discussed the possibility of additional funding from the Commonwealth additional reflection seismic surveys, an aeromagnetic survey, and additional drilling elsewhere in the state.

Dave Harris distributed the abstract to be submitted by KGS to the 2009 American Association of Petroleum Geologists annual meeting.

2. Status of Project Tasks

A. Title opinion, balance of Blan farm

The title opinion for the balance of the Blan lands is completed and title is clear.

B. Seismic program

A map of the final line locations and the existing seismic line in the area was distributed by KGS. The route has been driven by Dave Williams and Doug Allan, WesternGeco, and permits have been obtained from the state highway department and County and all but four landowners. Equipment should be on-site on November 16 with acquisition beginning on November 17. Dave Harris requested that the Foundation waive being named as an additional insured on the WesternGeco contract and Diana Tickner stated that this waiver was in progress. Modifications to the data acquisition parameters suggested by Doug Allan were discussed and forwarded to Ron Sfara, ConocoPhillips, for review.

C. 4D seismic survey proposal

The potential of conducting a 4D seismic program over the wellsite was discussed by Rick Bowersox. Discussion was tabled pending completion of the 2D seismic program.

D. Reprocessed Line 7 interpretation

Jim Drahovzal discussed the progress of interpretation of the reprocessed Line 7 with the project committee. Reprocessing has improved imaging of this line, especially in the Rough Creek Graben. Most improvement appears in the elimination of apparent faulting due line bends and better imaging of the Mount Simon Sandstone.

E. Soil gas monitoring

Dave Harris discussed the progress of the soil gas monitoring program in-progress by Marty

Parris. Three trips have been made to the wellsite. Six monitoring sites have been established and baseline soil gases collected from three of these in October. Equipment damage has delayed baseline measurements from the remaining three sites. Isotopic composition are comparable to soil gasses collected in eastern Kentucky although somewhat enriched in ^{13}C . There is no evidence of coals at the wellsite that might affect measurements.

F. Budget and Funding Review

Dave Harris discussed the current budget status and upcoming funding request with the committee (see the attached summary). Expenditures to date are ~\$46,000, paid from the Kentucky Geological Survey account, and are well-under estimates except in the area of drilling services procurement. Eight invoices have been received from Sandia Technologies and are being processed for payment. Costs associated with the seismic acquisition program and wellsite construction, large-expenditure items funded by the Foundation, are likely to be invoiced before year-end. The request for approval of drilling cost funding will be submitted to the foundation by mid-December with Sandia providing the AFE (authorization for expenditure) cost estimates to KGS by the first week of December. It was noted by the Foundation representatives that any over-funding of drilling costs could be applied to testing and thus reduce the amount of that funding. KGS will provide budget reviews at each subsequent project planning meeting.

3. Drilling Project Status

A. Water well location near drillsite

Survey and sampling of the domestic water well on the Blan property will be completed by a hydrologist from the KGS Henderson office. Sampling the well will be made using a consistent protocol provided by Sandia to allow replication of the sampling at a later date. KGS will replace the

B. Drillsite preparations and drilling contractor

Bids for drilling services were submitted to two contractors with equipment capable of the well depth. Only one bid was received, from Les Wilson Drilling, with a tentative spud date of February 1, 2009, pending the completion of drilling of the ADM well in Illinois by this rig. All costs are within the range of previous estimates and the contract with Les Wilson will be executed by November 15. Drilling will be conducted under a Kentucky Department of Oil and Gas Conservation drilling permit as a wildcat well. Wellsite construction is estimated to cost \$136,000. Pre-construction walkthrough is scheduled for November 12 with construction commencing on November 13. A purchase order for casing has been issued for evaluation.

C. Final well design and costs

Scott Rennie reported that the well design has been completed and the testing program is near-completion. Well costs will come from bids received during the next month. Logging and testing bid packages are being prepared.

D. Well permitting

- a. EPA injection well permit:** Phil Papadeas reported that the EPA permit application was submitted October 10, following a meeting at the EPA Region IV office in Atlanta on October 7 to resolve technical issues. George Ford, the EPA analyst reviewing the application has contacted Rick Bowersox by telephone and email to clarify technical points and request materials missing from the permit application package. Missing materials included the plugging report on the Langford Oil and Gas well Knight Bothers #1 and analyses of the brine and CO₂ injectates. Pending the receipt by EPA of the original UK Treasurer's certification of financials and auditor's certification, the application appears to be complete and ready to be published in the Federal Register for public comment. At that time the surrounding landowners would be notified of the pending injection permit application.

- b. KY DOGC permit**

Dave Williams reported that the well permit application was submitted for a wildcat well and is at KGS for spacing compliance review. (The permit was subsequently issued as 104925.)

4. Status of Public Outreach

A. Meeting in the Hancock County Fiscal Court, October 27, 2008

The meeting was hosted by the Hancock County Fiscal Court with Dave Williams, Jim Cobb, Jim Drahovzal, and Mike Lynch from KGS, Doug Allan of WesternGeco, Brad Stone of the Energy and Environment Cabinet, and Sara Smith of Smith Management. State Senator Boswell was also in attendance and voiced support of the project. Overall it was a good meeting with only one resident voicing strong objection to the project. Questions again arose on the purpose of the test well, earthquake safety, and relationship to the coal industry.

B. Pending news release

Tabled pending completion of drilling and testing.

5. CO₂ Legal and Regulatory Working Group

Sara Smith reported on the first meeting of the CO₂ Legal and Regulatory Working Group. Two questions were addressed by the working group: What is the direction from existing law?; and What have other states done to address sequestration? Discussion followed by government and industry representatives based on these assumptions: *i.*) some kind of CO₂ regulation is coming, *ii.*) CO₂ sequestration will be required and geologic sequestration and EOR will be used, *iii.*) sequestration is safe and will be successful, *iv.*) the topic is urgent, *v.*) sequestration is in the public good, *vi.*) there will be some future use of the sequestered CO₂, and *vii.*) that sequestration is commodity storage rather than waste disposal. Some issues were identified were *i.*) access and control of the storage site and *ii.*) who will be responsible for the stored CO₂ from transport to storage field and long-term storage, *iii.*) when is the storage phase completed and monitoring ends? Minutes of the meeting are being prepared for posting on the EEC website and a subsequent meeting is set for December 1 at the KGS Lexington Core Library.

6. Action Items

- a. **Dave Harris** will prepare a statement representing the KGS position on sequestration for the next CO₂ Legal and Regulatory Working Group meeting on December 1.
- b. **The Foundation** will provide a waiver of additional insured for the WesternGeco contract.
- c. **Dave Harris** will prepare a budget review for the next meeting.
- d. **Dave Harris** with the help of **Phil Papadeas** will prepare a budget submittal for construction and drilling by December 12.
- e. **Rick Bowersox** will prepare a log of public outreach efforts to date.
- f. **Dave Harris** will research CO₂ and water purchase contracts.

Carbon storage potential in the southern Illinois Basin: preliminary results of the KYCCS test well, Hancock County, Kentucky

Bowersox, J.R., Williams, D.A. (KGS), Pittenger, M. A., Heard, P. (COP), Drahovzal, J. A., Harris, D. C. (KGS), Rennie, S. B. (COP), Sundheimer, G. (E.ON)

The Kentucky Consortium for Carbon Storage (KYCCS), co-funded by the Commonwealth of Kentucky and industry through the Western Kentucky Carbon Storage Foundation, is testing geologic CO₂ storage potential of the southern Illinois Basin. Identification of commercial-scale carbon sequestration targets in the deeper portion of the basin is challenging because this area lacks a thick, uniform porous reservoir zone. The Upper Cambrian Mt. Simon Sandstone has significant CO₂ storage potential in Illinois, Indiana, and parts of Michigan and Ohio, but in western Kentucky it is thin and deeply buried, with poor reservoir quality at depths greater than 8,000 ft. Other clastic reservoirs, such as the Ordovician St. Peter Sandstone are thin and lack regional continuity, but may be viable targets in some areas. KYCCS is focusing its efforts on the CO₂ storage potential of a ~4,000 ft thick carbonate sequence, the Cambrian-Ordovician Knox Group. Knox dolostones are heterogeneous, containing porous zones up to 50 ft thick, separated by impermeable dolostone confining layers. Porosity ranges from solution vugs to intercrystalline pores, with a variable fracture component.

KYCCS will drill and evaluate an ~8,300 ft research well in Hancock County, Kentucky, in the spring of 2009. Data from this well will characterize the St. Peter, Knox and Mt. Simon at this location, and test their CO₂ injection capacity. Previous waste disposal and gas storage wells indicate good injectivity and containment in the Knox at depths of 3,000 to 6,400 ft, including a site where ~4,000 tons of supercritical CO₂ accumulated after acid dissolution of dolostone. Extensive cores and geophysical logs will be taken to characterize both the reservoir zones and the confining layers in the well. Geophysical characterization includes 26 miles of new 2-D seismic data that will be integrated with geologic data obtained from the well. Injection tests using brine and CO₂ will be conducted in open hole, using straddle packer assemblies. Modeling the fate of injected CO₂ in the Knox will be difficult due to the complex nature of the carbonate pore system.

If the Hancock County test shows the Knox to be a viable sequestration target in the southern Illinois Basin, further evaluation will be justified. The Knox occurs at depths suitable for supercritical CO₂ injection in the Illinois and Appalachian Basins, and comparable strata are present in west Texas (Ellenberger), and Kansas and Oklahoma (Arbuckle).

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Abstract Deadline Monday, Dec. 8. Please obtain approvals and make any final edits by Wednesday, Dec. 3. I need approvals from Conoco-Phillips, E.ON and WKCSF. Send to: Dave Harris, dcharris@uky.edu

KYCCS Western Kentucky Deep Saline CO2 Injection Test Well				
Sandia Technologies, LLC Cost Summary				
Nov. 6, 2008				
Task	Expenditures to Date	Cost Estimate (Time & Materials)	Cost Estimate (Lump Sum)	Difference
Project Management & Misc	\$10,088.52	\$34,840.00		\$24,751.48
EPA Permit Application	\$11,018.54		\$20,950.00	\$9,931.46
Well Design/Engineering	\$1,840.00		\$19,950.00	\$18,110.00
Well Procurement	\$17,913.47	\$19,700.00		\$1,786.53
Subcontract Handling Fees	\$612.18	\$20,000.00		\$19,387.82
Well Drilling/Field Supervision	\$0.00	\$234,150.00		\$234,150.00
Well Testing	\$0.00	\$74,250.00		\$74,250.00
Reservoir Evaluation	\$0.00	\$22,500.00		\$22,500.00
Final Well Report	\$0.00		\$14,700.00	\$0.00
Third Party Invoices	\$4,895.47	N/A	N/A	N/A
Total	\$46,368.18			

Invoices Paid		
Sandia Invoice #	Date	Amount
3910	9/8/2008	\$5,507.65
3911	9/8/2008	\$8,407.01
3912	9/8/2008	\$2,007.04
3913	9/8/2008	\$9,946.02
3945	10/23/2008	\$1,681.51
3946	10/7/2008	\$5,880.50
3947	10/7/2008	\$2,250.00
3948	10/23/2008	\$10,688.45
	TOTAL PAID	\$46,368.18

Western KYCCS Project			
Sandia: Project Management			
Nov. 6, 2008	KGS/JK	Foundation	
Labor	\$6,356.00	\$0.00	
Travel	\$3,732.52	\$0.00	
Total	\$10,088.52	\$0.00	
Cost to Date	\$10,088.52	\$0.00	
Estimate	\$34,840.00		
Balance	\$24,751.48		

Project Management

Date								
From	To	Invoice Date	Sandia Invoice #	Description	Funding Phase	KGS Amount	Foundation Amount	Total Amount
7/11/2008	8/29/2008	9/8/2008	3911	Project Man. labor	3	\$5,901.00	\$0.00	\$5,901.00
8/13/2008		9/8/2008	3911	Travel- Papadeas, Lexington, KY	3	\$1,262.39	\$0.00	\$1,262.39
9/4/2008		9/8/2008	3911	Travel- Papadeas, Lexington, KY	3	\$1,243.62	\$0.00	\$1,243.62
9/8/2008	9/30/2008	10/23/2008	3945	Project Man. labor	3	\$455.00	\$0.00	\$455.00
10/23/2008		10/23/2008	3945	Travel- Papadeas, Lexington, KY	3	\$1,226.51	\$0.00	\$1,226.51

Western KYCCS Project		
Sandia: EPA Permit Application		
Nov. 6, 2008	KGS/UK	Foundation
Labor	\$9,430.50	\$0.00
Travel	\$1,588.04	\$0.00
Total	\$11,018.54	\$0.00
Task Total	\$11,018.54	
Estimate	\$20,950.00	
Balance	\$9,931.46	

EPA Permit Application

Date		Invoice Date	Sandia Invoice #	Description	Funding Phase	KGS Amount	Foundation Amount	Total Amount
From	To							
8/11/2008	8/12/2008	9/8/2008	3912	EPA Permit Meeting labor	4a	\$1,300.00	\$0.00	\$1,300.00
9/3/2008	9/30/2008	10/7/2008	3946	EPA Permit labor	4a	\$5,880.50	\$0.00	\$5,880.50
9/4/2008		9/8/2008	3912	Travel- Papadeas, Atlanta, GA	4a	\$707.04	\$0.00	\$707.04
9/8/2008	9/26/2008	10/7/2008	3947	EPA Permit labor	4a	\$2,250.00	\$0.00	\$2,250.00
10/23/2008		10/23/2008	3948	Travel- Papadeas, Atlanta, GA	4a	\$881.00	\$0.00	\$881.00

Western KYCCS Project

Sandia: Well Design-Engineering		
Nov. 6, 2008	KGS/UK	Foundation
Labor	\$1,840.00	\$0.00
Travel	\$0.00	\$0.00
Total	\$1,840.00	\$0.00
Task Total	\$1,840.00	
Estimate	\$19,950.00	
Balance	\$18,110.00	

Well Design/Engineering

Date		Invoice	Sandia	Description	Funding	KGS	Foundation	Total
From	To	Date	Invoice #		Phase	Amount	Amount	Amount
9/1/2008	9/30/2008	10/23/2008	3948	Engineering- Well design labor	4a	\$1,840.00	\$0.00	\$1,840.00

Western KYCCS Project

Sandia: Well Procurement		
Nov. 6, 2008	KGS/UK	Foundation
Labor	\$8,530.00	\$0.00
Travel	\$9,383.47	\$0.00
Total	\$17,913.47	\$0.00
Task Total	\$17,913.47	
Estimate	\$19,700.00	
Balance	\$1,786.53	

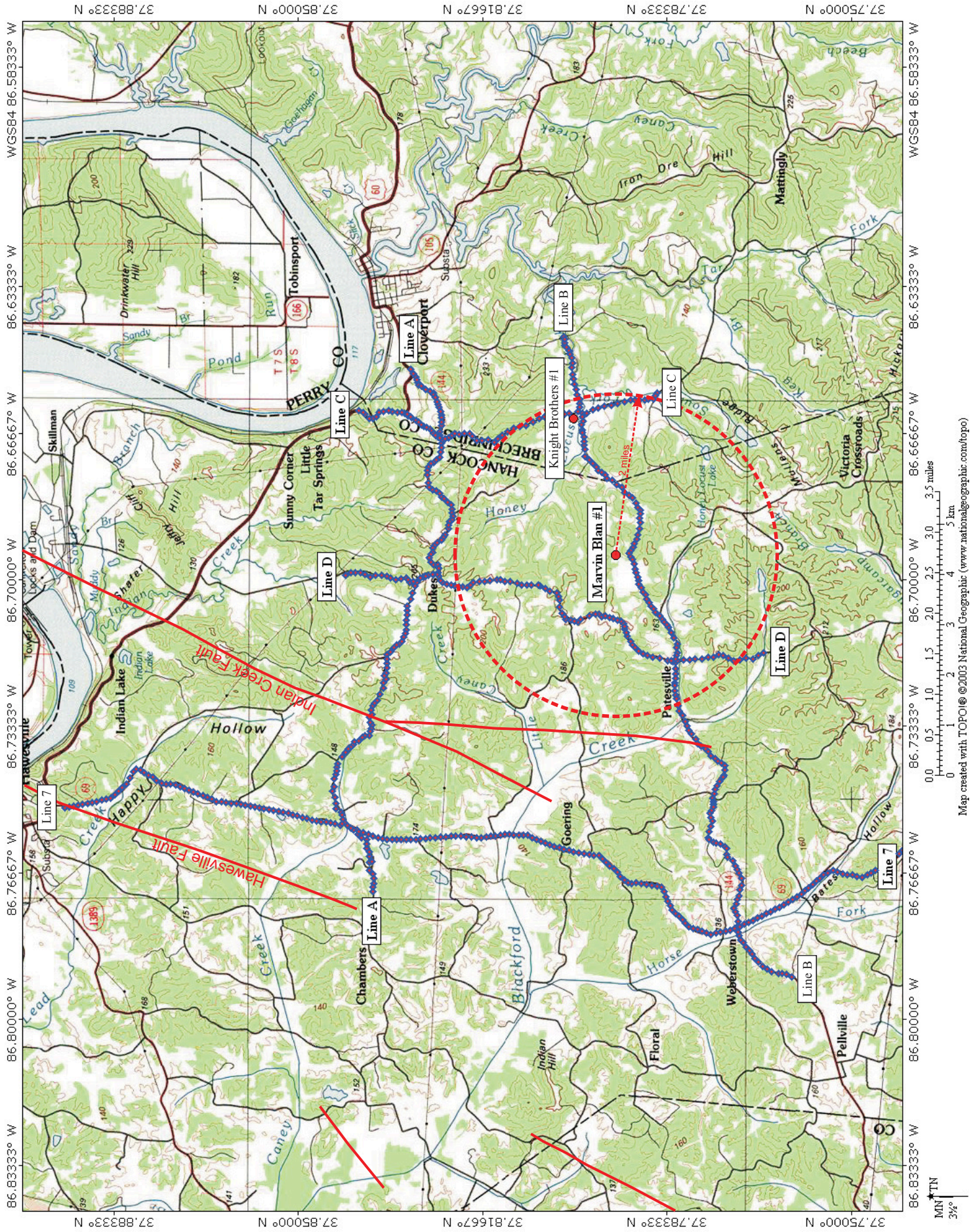
Well Procurement

Date		Invoice Date	Sandia Invoice #	Description	Funding Phase	KGS Amount	Foundation Amount	Total Amount
From	To							
7/14/2008	8/23/2008	9/8/2008	3913	Engineering- Drilling labor	4a	\$7,995.00	\$0.00	\$7,995.00
8/27/2008		9/8/2008	3913	Travel- Armstrong, Pittsburgh & Mich. RFB, SOW, rig	4a	\$1,951.02	\$0.00	\$1,951.02
9/1/2008	9/18/2008	10/23/2008	3948	inspection labor	4a	\$6,046.25	\$0.00	\$6,046.25
9/11/2008		10/23/2008	3948	Travel- Armstrong, Michigan	4a	\$535.00	\$0.00	\$535.00
9/24/2008		10/23/2008	3948	Travel- Armstrong, Carmi, IL	4a	\$1,386.20	\$0.00	\$1,386.20

Western KYCCS Project		
Sandia: Third Party Invoices		
Nov. 6, 2008	KGS/UK	Foundation
3rd Party Invoices	\$4,895.47	\$0.00
Handling Fees	\$612.18	\$0.00
Total	\$5,507.65	\$0.00
Task Total	\$5,507.65	\$0.00
Estimate (fees)	\$20,000.00	
Balance	\$19,387.82	

Third Party Invoices

Date	Sandia Invoice #	3rd Party Contractor	Description	Funding phase	Third Party Charge	Handling Fee	KGS Amount	Foundation Amount	Total Amount
4/7/2008	3911	Document Technologies	Dupont data scanning	3	\$249.47	\$31.18	\$280.65	\$0.00	\$280.65
8/29/2008	3911	Madden & Madden Associated	Title search tract 48	3	\$3,000.00	\$375.00	\$3,375.00	\$0.00	\$3,375.00
9/4/2008	3911	Engineers	well location survey	3	\$1,560.70	\$195.09	\$1,755.79	\$0.00	\$1,755.79
9/4/2008	3911	Hancock Co. PVA	ownership request fee	4a	\$85.30	\$10.91	\$96.21	\$0.00	\$96.21



11/06/08 WKY Project Meeting

<u>Name</u>	<u>Affiliation</u>	<u>Contact Information</u>
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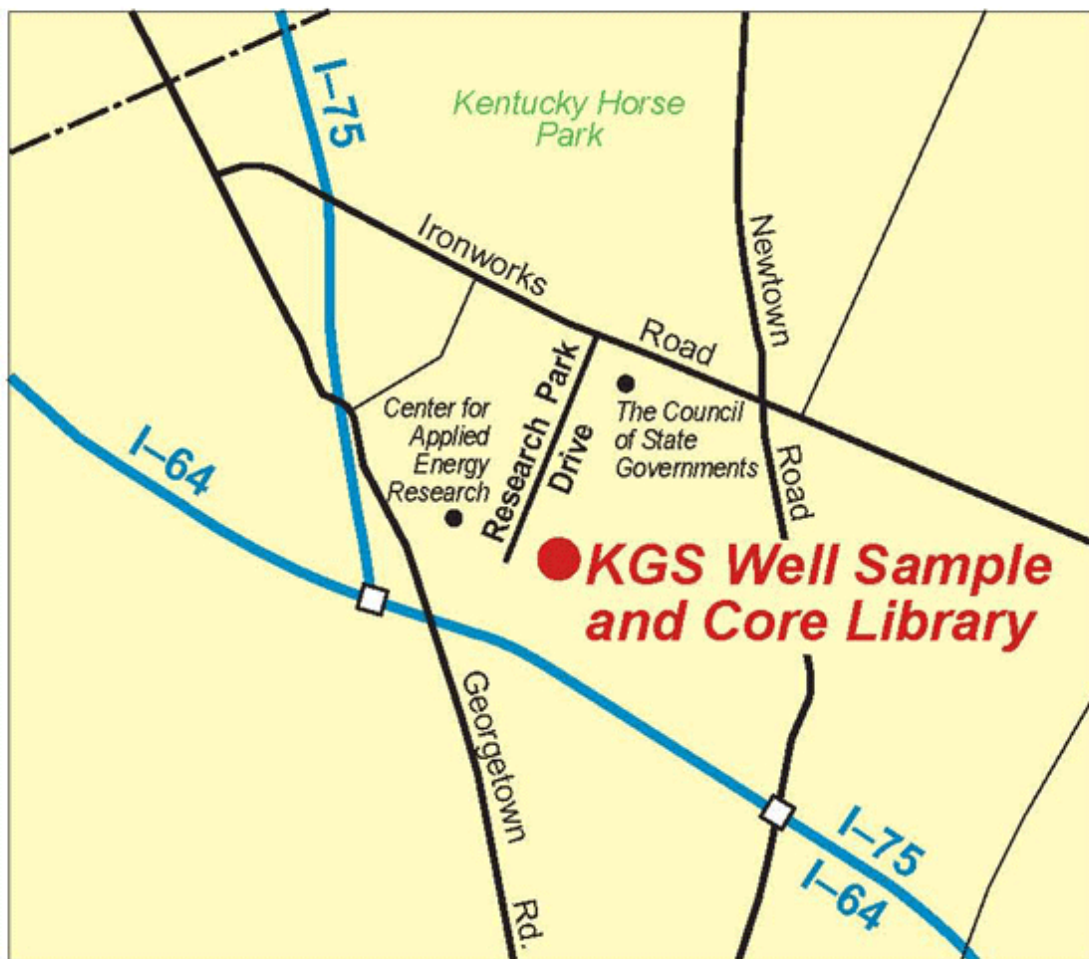
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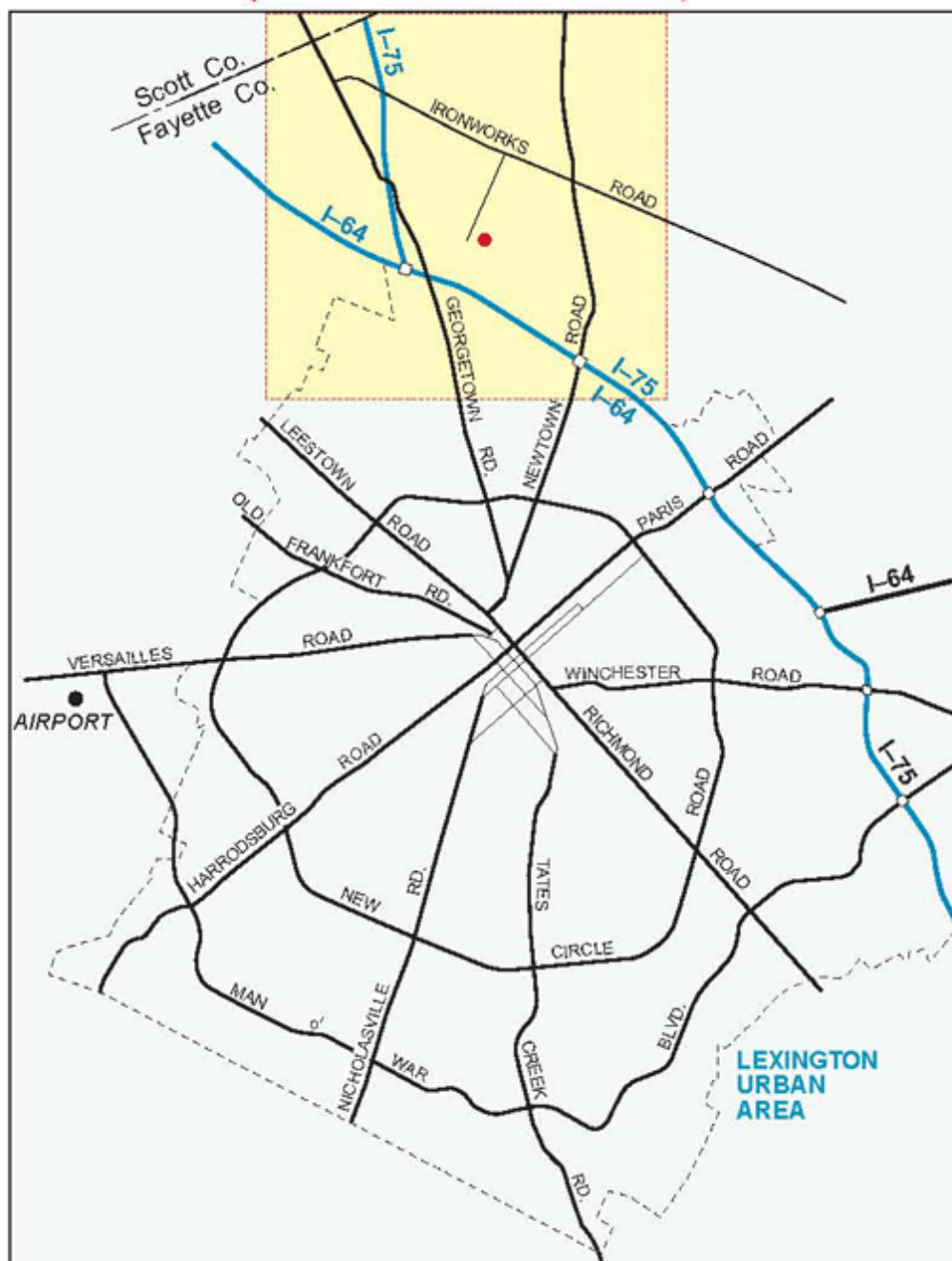
Agenda

- 1. Welcome, introductions, and announcements** – Dave Williams
- 2. Status of project tasks:**
 - A. Title opinion, balance of Blan farm – Dave Williams
 - B. Seismic program – Doug Allen, WesternGeco
 - C. 4D seismic survey proposal – Rick Bowersox
 - D. Reprocessed Line 7 interpretation – Jim Drahovzal, Michelle Pittenger
 - E. Soil gas monitoring – Dave Harris
 - F. Budget and Funding Review – Dave Harris
 - a. Phase 4a-4b funding approval
 - b. Budget review
- 3. Drilling project status:**
 - A. Water well location near drillsite – Dave Williams
 - B. Drillsite preparations and drilling contractor – Paul Heard
 - C. Final well design and costs – Scott Rennie
 - D. Well Permitting:
 - a. EPA injection well permit – Phil Papadeas
 - b. KY DOG – Dave Williams
 - E. Mud gas isotopic analysis proposal – Rick Bowersox
- 4. Status of Public Outreach** – Mike Lynch
 - A. Meeting in the Hancock County Fiscal Court, October 27, 2008
 - B. Pending news release
- 5. CO2 legal and regulatory working group** – Karen Thompson
- 6. Recap and action items**



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KGS Well Sample and Core Library location map.