

TESTING OPERATIONS REVIEW



**KGS Marvin Blain # 1
Hancock County, KY**



**Prepared By: ConocoPhillips
Lexington, KY – July 21, 2009**

AGENDA

1. Overview

1. HASP & Objectives
2. Test Intervals
3. Well Schematics
4. Cost & Timing

2. Program Walk Through

1. Pre-work
2. Move in & Rig up
3. Rig Information
4. Location Layout
5. Preparing the Borehole
6. TAM International BHA
7. Formation Water Sampling
8. KGS Fluid Analyzer & Sampling Protocol (KGS to present)
9. Injection Testing
10. CO₂ Injection – (Praxair to present)
11. P&A

3. Additional Information

1. Well Control
2. Public Relations & Well Site Visits
3. Reports and Protocols

Health And Safety Plan

- Establishes Personnel Protection Standards
- Specifies Safe Operating Procedures
- Assigns Emergency Responsibilities
- Provides a Program for Contingencies

WELL OBJECTIVES

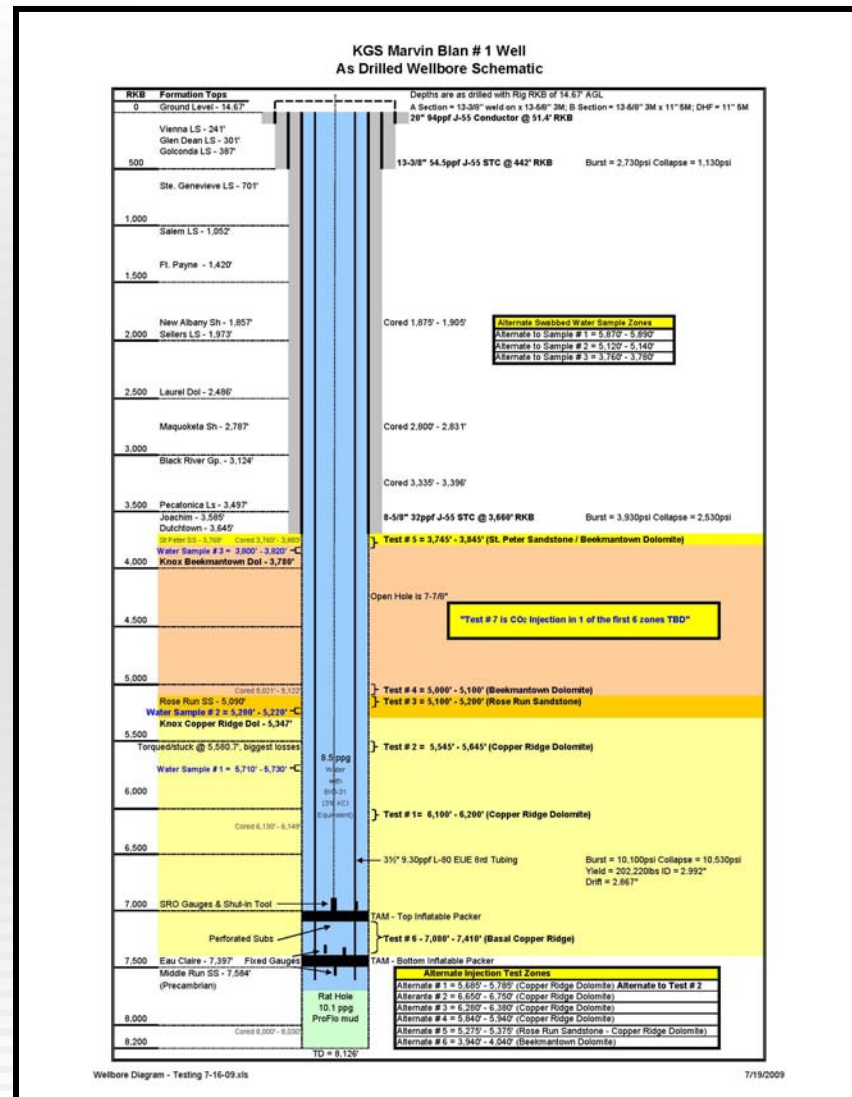
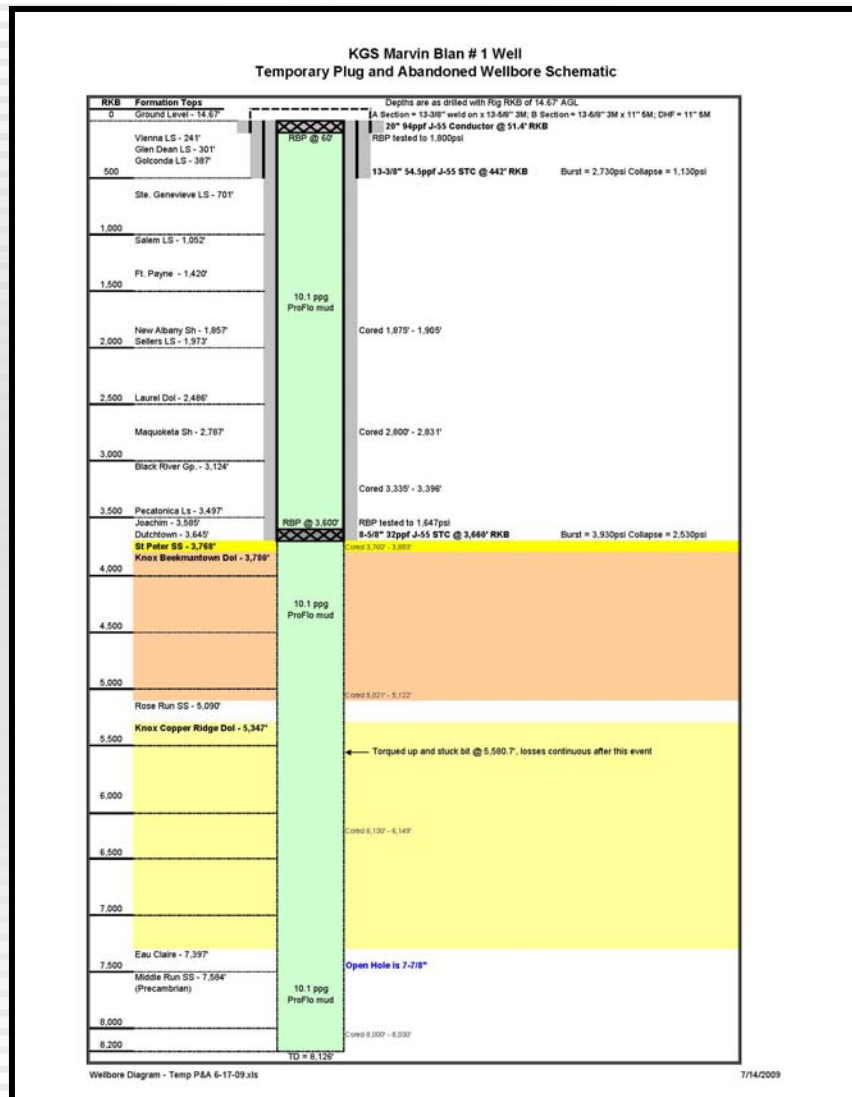
- To safely test the KGS Marvin Blain #1 well efficiently and in an environmentally acceptable manner
- To obtain formation data (water sampling & injection data) to quantify the capability and capacity of the Knox & St. Peter formations for CO₂ sequestration
- Perform the above objectives in a highly cost effective manner.

Testing Intervals

Injection Test Intervals					
Test #	Interval Top - ft	BTM - ft	Interval ft	Fluid	Formation
1	6,100	6,200	100	3% BIO-31	Copper Ridge Dolomite
2	5,545	5,645	100	3% BIO-31	Copper Ridge Dolomite
3	5,100	5,200	100	3% BIO-31	Rose Run Sandstone
4	5,000	5,100	100	3% BIO-31	Beekmantown Dolomite
5	3,745	3,845	100	3% KCI	Saint Peter / Beekmantown Dolomite
6	7,080	7,410	330	3% BIO-31	Copper Ridge Dolomite
7	TBD	TBD	TBD	CO2	TBD based on results from above tests
Alt. 1	5,685	5,785	100	3% BIO-31	Copper Ridge Dolomite (Atl to Test #2
Alt. 2	6,650	6,750	100	3% BIO-31	Copper Ridge Dolomite
Alt. 3	6,280	6,380	100	3% BIO-31	Copper Ridge Dolomite
Alt. 4	5,840	5,940	100	3% BIO-31	Copper Ridge Dolomite
Alt. 5	5,275	5,375	100	3% BIO-31	Rose Run Sandstone / Copper Ridge Dolomite
Alt. 6	3,940	4,040	100	3% BIO-31	Beekmantown Dolomite

Water Sample Intervals					
Test #	Interval Top - ft	BTM - ft	Interval ft	Method	Formation
1	5710	5730	20	swab	Copper Ridge Dolomite
2	5200	5220	20	swab	Rose Run Sandstone
3	3800	3820	20	swab	Beekmantown Dolomite
Alt. 1	5870	5890	20	swab	Copper Ridge Dolomite
Alt. 2	5120	5140	20	swab	Rose Run Sandstone
Alt. 3	3760	3780	20	swab	Saint Peter

Current & Testing Wellbore Schematic



Testing depths subject to change based on field operations.

Cost & Timing

- Phase 5 Budget = ~ \$ 2 MM
- Testing Phase ~ July 20th – Aug 20th

Pre-Work

- Drilling Rig departed June 24th – 25th
- Cleaned, repaired location
- Moved in 20 frac tanks and filled with water from July 6th – 20th
- Office still on location from drilling phase

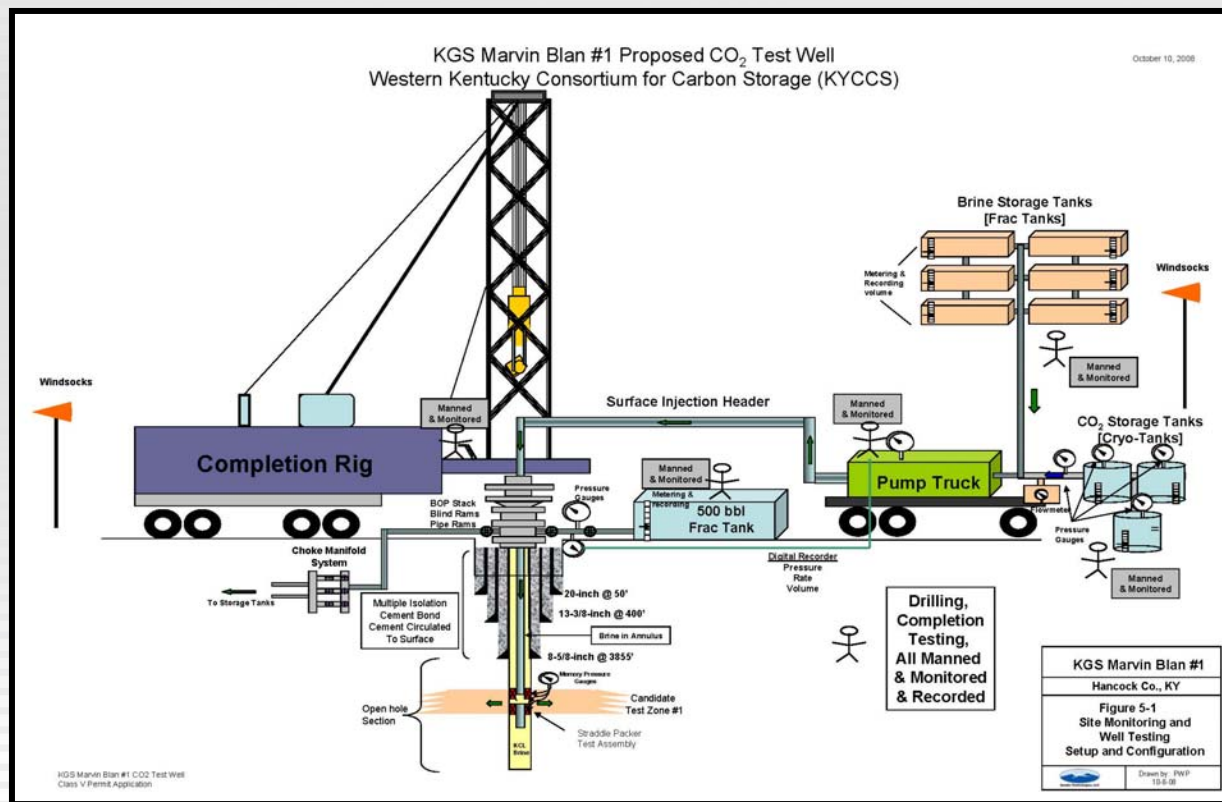
Move In & Rig Up

- Rig will Mobilize from Laurel, MS July 20th
- Move in and rig up July 21st - 22nd
- Install BOPE and test
- Offload and strap 3½" tubing

Nabors Well Service Rig Data

Completion Rig

- Series 500 Model 5C National Oilwell Millennium Double
- 104' mast rated @ 250k pounds hookload
- TGH Gardner Denver 4½" x 8" stroke pump w/ 180bbl pit
- Has sand line



[illegible]

Preparing the Borehole

- PU RBP retrieving tool and pull RBP's at 60' and 3,600'
- Run temperature profile survey (with GR & CCL) from TD to surface (note: run as deep as possible)
- Run PKR to 3,640' and perform MIT to 1,760'
- Run in with 7-7/8" bit to 7,600' and displace FloPro mud to 3% BIO-31 water
- Pickle TBG with 10bbbls of 7½% HCl acid
- POH

Down-Hole Tools Assembly (BHA)

TAM International



TAM INTERNATIONAL
Houston, Texas
Inflatable Packers

Sandia Technologies 700-PW-03



Description	OD	ID	Length
550-TD-01 TAMDUMP 2 7/8" EU box x pin	5.50	2.00	2.97
Crossover, 2 7/8" EU box x 4 1/2" IF pin	6.38	2.50	2.00
4 1/2" IF box x pin Pup Joint	6.38	2.81	10.00
700-PW-03 Premium Wash Tool 4 1/2" IF box x pin (Top Packer)	7.00	1.88	16.73
Crossover, 4 1/2" IF box x 3 1/2" EU pin (Customer Supplied)	6.38	2.35	2.00
Perforated Interval Tubing, 3 1/2" EU (Customer Supplied)	TBA	TBA	TBA
Crossover, 3 1/2" EU box x 4 1/2" IF pin (Customer Supplied)	6.38	2.35	2.00
700-PW-03 Premium Wash Tool 4 1/2" IF box x pin (Bottom Packer)	7.00	3.00	8.39
2 7/8" EU Perf. Pup Joint w/ Bull Plug	2.88	2.44	6.00
TOTAL TAM BHA LENGTH (Ft.)			50.08

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Formation Water Sampling Highlights

- PU TAM inflatable straddle packer BHA spaced @ ~ 20'
- RIH to sample interval
- Run WL plug, set plug and inflate packers / test tubing, Pull WL plug and RD
- RU and acidize zone w/ 1,000 gals 15% HCl
- Flow back and RU swabbing equipment
- Swab formation water until representative sample is obtained (Note: KGS water analyzer will be testing returned fluid to determine when a representative sample is obtained)
- Release packers and move to next sampling zone and repeat procedure

KGS Fluid Analyzer & Sampling Protocol

- KGS to Present

Injection Testing Highlights

- Make up TAM Intl. BHA to proper spacing for test and install memory gauges
- RIH to Test Interval
- Run WL plug, set plug and inflate packers / test tubing, Pull WL plug and RD
- Acidize zone with 50gal/ft of 15% HCL acid
- RUN SRO to special ID sub just above top packer
- Perform Step Rate Test to determine formation parting pressure
- Run Injection test (~ 3,000 bbls of 3% BIO-31)
- Lower SRO to standing valve seat to SI well
- Record fall off
- Pull SRO
- Release packers and move to next test zone and repeat procedures
- CO2 interval to be selected based on previous 5 tests
- After last test, run temperature survey

Injection Testing Highlights - Continued

- NOTES:
 - All zones won't have Step Rate tests
 - All zones won't be over a 100' interval
 - Setting depths are approximate (may be adjusted for surface space out)
 - All depths are RKB of the drilling rig = 14.7' above GL
 - Well Tester / Reservoir Engineer to determine actual test times
 - If budget gets tight, testing program will be cut short

CO₂ Injection

- Praxair to Present

Plug & Abandonment

- Run 3½" tubing with cement diffuser to 7,640'
- Displace BIO-31 fluid with stored FloPro mud
- POH to 3,830' and spot 270' cement plug to cover top 50' of Beekmantown, St. Peter plus 100' into 8-5/8" CSG shoe. Weight test plug
- Test casing to 1,760 psi
- POH to 400' and spot cement plug from 400' – 5' below GL. Weight test plug
- ND BOPE, wellhead and cut casing off 5' below GL and weld on marker plate
- Release rig
- Initiate location remediation & Sweet Road repairs



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**Back up slides & Additional
Information**

Additional Information - 1

- Well Control
 - Using COP Well Control Manual for equipment design and procedures
- Public Relations & Wellsite Visits
 - Need to be coordinated with well operations as best possible
 - Visitors will need safety briefing and will have to wear hard hat, safety glasses and closed toe shoes
 - Visitors will have to be escorted around the wellsite and without steel toes shoes will be restricted to non-activity areas
 - Currently planned visits
 - None

Additional Information - 2

- Reports and Protocols – All times are Rig time which is CDT
 - Reports (00:00 – 24:00 hrs w/ 00:00 – 06:00 update)
 - Daily Testing Report - Drilling Supervisor
 - Daily Executive Summary & Forecast – Drilling Supervisor
 - Daily Afternoon Update – Drilling Supervisor
 - Post Test Summary (each interval) – Test Engineer
 - Live Data
 - None
 - Report Sending
 - Rig to send DDR to: Heard for 6:30 am review/discussion
 - Rig to send DES to: KGS, COP, PE, E On US, TVA, EPA , DOGC, key vendors
 - Rig or PWH to sent DDR to: KGS, COP, PE, E On US, TVA
 - Propose to designated individuals and for then to share internally as needed
 - Bowersox to post on secure KGS site (?)
 - Rig to send DAU to: same as DES
 - Bowersox/Williams to send contractually required reports to R&B Resources LLC with transmittal

Additional Information 3

- Reports and Protocols – Continued (all times CDT)
 - Morning Calls
 - 7am Conference call (KGS conference line)
 - Moderated by Bowersox & Heard
 - » Drilling Supervisor to summarize activities (1 min)
 - » Test Engineer to summarize test if applicable (2 min)
 - » Drilling Supervisor to summarize forecast (2 min)
 - Needs to be “short and sweet” with important items discussed briefly and issues handled offline between affected parties. Remember, the wellsite personnel have to get back to work.
 - Other call-ins to be designated by their companies
 - Contacting
 - EPA / DOGR – Bowersox is duly authorized representative
 - Rig
 - Bowersox & Heard are primary contacts
 - For others, call Bowersox or Heard, not the rig
 - Please don’t call to chat or just check on things, the supervisors out there will be very busy with HSE, operations and forward planning
 - Site visits need to be worked (initial planning) through Bowersox & Heard