

Confidentiality Requested:

Yes No

KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION

Form ACO-1

January 2018

Form must be Typed

Form must be Signed

All blanks must be Filled

WELL COMPLETION FORM
WELL HISTORY - DESCRIPTION OF WELL & LEASE

OPERATOR: License # _____

Name: _____

Address 1: _____

Address 2: _____

City: _____ State: _____ Zip: _____ + _____

Contact Person: _____

Phone: (_____) _____

CONTRACTOR: License # _____

Name: _____

Wellsite Geologist: _____

Purchaser: _____

Designate Type of Completion:

New Well Re-Entry Workover

Oil WSW SWD

Gas DH EOR

OG GSW

CM (Coal Bed Methane)

Cathodic Other (Core, Expl., etc.): _____

If Workover/Re-entry: Old Well Info as follows:

Operator: _____

Well Name: _____

Original Comp. Date: _____ Original Total Depth: _____

Deepening Re-perf. Conv. to EOR Conv. to SWD

Plug Back Liner Conv. to GSW Conv. to Producer

Commingled Permit #: _____

Dual Completion Permit #: _____

SWD Permit #: _____

EOR Permit #: _____

GSW Permit #: _____

Spud Date or Date Reached TD Completion Date or Recompletion Date

API No.: _____

Spot Description: _____

_____ - _____ - _____ Sec. _____ Twp. _____ S. R. _____ East West

_____ Feet from North / South Line of Section

_____ Feet from East / West Line of Section

Footages Calculated from Nearest Outside Section Corner:

NE NW SE SW

GPS Location: Lat: _____, Long: _____
(e.g. xx.xxxxx) (e.g. -xxx.xxxxx)

Datum: NAD27 NAD83 WGS84

County: _____

Lease Name: _____ Well #: _____

Field Name: _____

Producing Formation: _____

Elevation: Ground: _____ Kelly Bushing: _____

Total Vertical Depth: _____ Plug Back Total Depth: _____

Amount of Surface Pipe Set and Cemented at: _____ Feet

Multiple Stage Cementing Collar Used? Yes No

If yes, show depth set: _____ Feet

If Alternate II completion, cement circulated from: _____

feet depth to: _____ w/ _____ sx cmt.

Drilling Fluid Management Plan

(Data must be collected from the Reserve Pit)

Chloride content: _____ ppm Fluid volume: _____ bbls

Dewatering method used: _____

Location of fluid disposal if hauled offsite:

Operator Name: _____

Lease Name: _____ License #: _____

Quarter _____ Sec. _____ Twp. _____ S. R. _____ East West

County: _____ Permit #: _____

AFFIDAVIT

I am the affiant and I hereby certify that all requirements of the statutes, rules and regulations promulgated to regulate the oil and gas industry have been fully complied with and the statements herein are complete and correct to the best of my knowledge.

Submitted Electronically

KCC Office Use ONLY

Confidentiality Requested

Date: _____

Confidential Release Date: _____

Wireline Log Received Drill Stem Tests Received

Geologist Report / Mud Logs Received

UIC Distribution

ALT I II III Approved by: _____ Date: _____

Operator Name: _____ Lease Name: _____ Well #: _____

Sec. _____ Twp. _____ S. R. _____ East West County: _____

INSTRUCTIONS: Show important tops of formations penetrated. Detail all cores. Report all final copies of drill stems tests giving interval tested, time tool open and closed, flowing and shut-in pressures, whether shut-in pressure reached static level, hydrostatic pressures, bottom hole temperature, fluid recovery, and flow rates if gas to surface test, along with final chart(s). Attach extra sheet if more space is needed.

Final Radioactivity Log, Final Logs run to obtain Geophysical Data and Final Electric Logs must be emailed to kcc-well-logs@kcc.ks.gov. Digital electronic log files must be submitted in LAS version 2.0 or newer AND an image file (TIFF or PDF).

Drill Stem Tests Taken <input type="checkbox"/> Yes <input type="checkbox"/> No <i>(Attach Additional Sheets)</i> Samples Sent to Geological Survey <input type="checkbox"/> Yes <input type="checkbox"/> No Cores Taken <input type="checkbox"/> Yes <input type="checkbox"/> No Electric Log Run <input type="checkbox"/> Yes <input type="checkbox"/> No Geologist Report / Mud Logs <input type="checkbox"/> Yes <input type="checkbox"/> No List All E. Logs Run: _____	<input type="checkbox"/> Log Formation (Top), Depth and Datum <input type="checkbox"/> Sample Name Top Datum
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CASING RECORD <input type="checkbox"/> New <input type="checkbox"/> Used							
Report all strings set-conductor, surface, intermediate, production, etc.							
Purpose of String	Size Hole Drilled	Size Casing Set (In O.D.)	Weight Lbs. / Ft.	Setting Depth	Type of Cement	# Sacks Used	Type and Percent Additives

ADDITIONAL CEMENTING / SQUEEZE RECORD				
Purpose:	Depth Top Bottom	Type of Cement	# Sacks Used	Type and Percent Additives
<input type="checkbox"/> Perforate <input type="checkbox"/> Protect Casing <input type="checkbox"/> Plug Back TD <input type="checkbox"/> Plug Off Zone				

1. Did you perform a hydraulic fracturing treatment on this well? Yes No *(If No, skip questions 2 and 3)*
2. Does the volume of the total base fluid of the hydraulic fracturing treatment exceed 350,000 gallons? Yes No *(If No, skip question 3)*
3. Was the hydraulic fracturing treatment information submitted to the chemical disclosure registry? Yes No *(If No, fill out Page Three of the ACO-1)*

Date of first Production/Injection or Resumed Production/Injection:	Producing Method: <input type="checkbox"/> Flowing <input type="checkbox"/> Pumping <input type="checkbox"/> Gas Lift <input type="checkbox"/> Other <i>(Explain)</i> _____			
Estimated Production Per 24 Hours	Oil Bbls.	Gas Mcf	Water Bbls.	Gas-Oil Ratio Gravity

DISPOSITION OF GAS: <input type="checkbox"/> Vented <input type="checkbox"/> Sold <input type="checkbox"/> Used on Lease <i>(If vented, Submit ACO-18.)</i>	METHOD OF COMPLETION: <input type="checkbox"/> Open Hole <input type="checkbox"/> Perf. <input type="checkbox"/> Dually Comp. <input type="checkbox"/> Commingled <i>(Submit ACO-5)</i> <i>(Submit ACO-4)</i>	PRODUCTION INTERVAL: Top Bottom
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Shots Per Foot	Perforation Top	Perforation Bottom	Bridge Plug Type	Bridge Plug Set At	Acid, Fracture, Shot, Cementing Squeeze Record <i>(Amount and Kind of Material Used)</i>

TUBING RECORD:	Size:	Set At:	Packer At:	
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Form	ACO1 - Well Completion
Operator	Arrowhead Exploration, LLC
Well Name	SANDER-WITT UNIT 1
Doc ID	1363270

All Electric Logs Run

DUAL INDUCTION LOG
COMPENSATED DENSITY/NEUTRON LOG
COMPENSATED BOREHOLE SONIC LOG
MICRO RESISTIVITY LOG

Form	ACO1 - Well Completion
Operator	Arrowhead Exploration, LLC
Well Name	SANDER-WITT UNIT 1
Doc ID	1363270

Tops

Name	Top	Datum
ANHYDRITE	903	+974
DOVER LIME	2460	-586
TARKIO LIME	2502	-629
TOPEKA	2758	-881
HEEBNER SHALE	2983	-1106
TORONTO	3002	-1125
LKC	3036	-1159
BKC	3266	-1389
GRANITE WASH	3267	-1390
RTD	3300	-1423

OPERATOR

Company: ARROWHEAD EXPLORATION LLC
 Address: 2919 HALL STREET
 HAYS, KANSAS 67601

Contact Geologist: MATT MORRIS
 Contact Phone Nbr: 785-259-6738
 Well Name: SANDER-WITT UNIT # 1
 Location: SE NE SE NE SEC. 9-T14S-R15W
 API: 15-167-24,064-00-00
 Pool: WILDCAT
 State: KANSAS
 Field:
 Country: USA

Scale 1:240 Imperial

Well Name: SANDER-WITT UNIT # 1
 Surface Location: SE NE SE NE SEC. 9-T14S-R15W
 Bottom Location:
 API: 15-167-24,064-00-00
 License Number: 35439
 Spud Date: 8/8/2017 Time: 7:00 AM
 Region: RUSSELL COUNTY
 Drilling Completed: 8/13/2017 Time: 1:46 PM
 Surface Coordinates: 1800' FNL & 200' FEL
 Bottom Hole Coordinates:
 Ground Elevation: 1869.00ft
 K.B. Elevation: 1877.00ft
 Logged Interval: 1900.00ft To: 3300.00ft
 Total Depth: 3300.00ft
 Formation: LANSING-KANSAS CITY
 Drilling Fluid Type: CHEMICAL

SURFACE CO-ORDINATES

Well Type: Vertical
 Longitude: -98.9845191
 Latitude: 38.8512519
 N/S Co-ord: 1800' FNL
 E/W Co-ord: 200' FEL

LOGGED BY

Company: SOLUTIONS CONSULTING, INC.
 Address: 108 W 35TH
 HAYS, KS 67601

Phone Nbr: (785) 639-1337
 Logged By: GEOLOGIST Name: HERB DEINES

CONTRACTOR

Contractor: SOUTHWIND DRILLING INC.
 Rig #: 3
 Rig Type: MUD ROTARY
 Spud Date: 8/8/2017 Time: 7:00 AM
 TD Date: 8/13/2017 Time: 1:46 PM
 Rig Release: 8/14/2017 Time: 1:45 PM

ELEVATIONS

K.B. Elevation: 1877.00ft Ground Elevation: 1869.00ft
 K.B. to Ground: 8.00ft

NOTES

RECOMMENDATION TO PLUG AND ABANDON WELL BASED ON NEGATIVE RESULTS OF TWO DSTS.

OPEN HOLE LOGGING BY GEMINI WIRELINE: DUAL INDUCTION LOG, COMPENSATED DENSITY/NEUTRON LOG, MICRO RESISTIVITY LOG, BOREHOLE COMPENSATED SONIC LOG

DRILL STEM TESTING BY EAGLE TESTERS: ONE (1) STANDARD TEST, ONE FAILED STRADDLE TEST AND ONE (1) SUCCESSFUL STRADDLE TEST

SANDER WITT #1	SANDER #2 WD	WITT G #61 O
SE NE SE NE	S2 SW NE	NE NW
SEC.9-14S-15W	SEC.9-14-15W	SEC.10-14-15W
1877'KB	KB 1858'	KB 1876'

<u>FORMATION</u>	<u>LOG TOPS</u>	<u>LOG TOPS</u>	<u>LOG TOPS</u>
Anhydrite	903 +974		+ 962
B-Anhydrite	942 +935		+ 924
Dover Lime	2460 - 583		- 586
Tarkio Lime	2502 - 625	- 628	- 629
Topeka	2758 - 881	- 881	- 883
Heebner Sh.	2983-1106	-1108	-1111
Toronto	3002-1125	-1128	-1131
LKC	3036-1159	-1164	-1167
BKC	3266-1389	-1392	-1397
Granite Wash	3267-1390	-1393	
RTD	3300-1423	-1559	-1417

SUMMARY OF DAILY ACTIVITY

8-08-17 Spud 7:00 AM, drilling

8-09-17 900', set 8 5/8" surface casing to 897' w/ 350 sxs Common 2%gel 3%CC, WOC 12 hrs, slope 3/4 degree @900'

8-10-17 1404' drilling

8-11-17 2348', drilling, displaced 2314' to 2337'

8-12-17 2925', drilling, CFS 2940', short trip, TOWB, DST # 1 2922' to 2940', TIWB, drilling

8-13-17 3193' RTD 3300' @1:46 PM, Slope survey 1 degree, TOWB, logs, Straddle test # 2 3010' to 3138'-packer failure, TOWT and reconfigure intervals, Straddle test # 3 3046' to 3137', decision to plug and abandon well.



DRILL STEM TEST REPORT

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas,67601

Sander Witt Unit #1

Job Ticket: 01182 **DST#: 1**

ATTN: herb Deines

Test Start: 2017.08.12 @ 10:12:00

GENERAL INFORMATION:

Formation: **Oread & Topeka**

Deviated: No Whipstock: ft (KB)

Time Tool Opened: 11:27:00

Time Test Ended: 00:00:00

Test Type: Conventional Bottom Hole (Initial)

Tester: Gene Budig

Unit No: 1-90

Interval: **2922.00 ft (KB) To 2940.00 ft (KB) (TVD)**

Reference Elevations: 1877.00 ft (KB)

Total Depth: 2940.00 ft (KB) (TVD)

1869.00 ft (CF)

Hole Diameter: 7.88 inches Hole Condition: Fair

KB to GR/CF: 8.00 ft

Serial #: 91716 Outside

Press@RunDepth: 120.84 psig @ 2935.00 ft (KB)

Capacity: 5000.00 psig

Start Date: 2017.08.12

End Date: 2017.08.12

Last Calib.: 1899.12.30

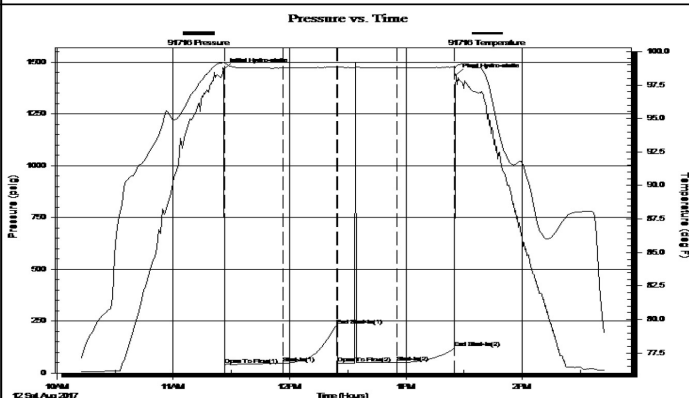
Start Time: 10:12:00

End Time: 14:43:00

Time On Btm: 2017.08.12 @ 11:26:00

Time Off Btm: 2017.08.12 @ 13:26:00

TEST COMMENT: 1st Opening 30 Minutes very weak surface blow
1st Shut-In 30 Minutes no blow back
2nd opening 30 Minutes no blow flushed tool no help
2nd shut-in 30 Minutes no blow back



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1466.40	99.20	Initial Hydro-static
1	39.23	99.17	Open To Flow (1)
31	46.70	98.79	Shut-In(1)
59	230.65	98.86	End Shut-In(1)
59	47.66	98.85	Open To Flow (2)
90	49.92	98.81	Shut-In(2)
119	120.84	98.83	End Shut-In(2)
120	1439.41	98.88	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
25.00	Drilling Mud	0.35

Gas Rates

Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

Eagle Testers

Ref. No: 01182

Printed: 2017.08.12 @ 15:13:42



DRILL STEM TEST REPORT

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas,67601

Sander Witt Unit #1

Job Ticket: **DST#: 2**

ATTN: herb Deines

Test Start: 2017.08.14 @ 00:00:00

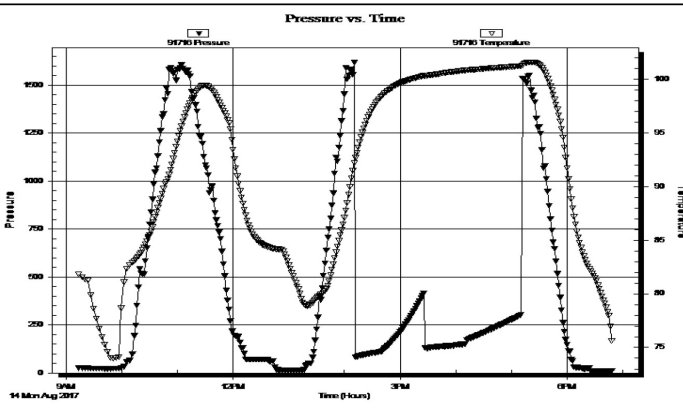
GENERAL INFORMATION:

Formation: No Whipstock: ft (KB) Test Type: (Initial)
 Deviated: No Whipstock: ft (KB) Tester:
 Time Tool Opened: Unit No:
 Time Test Ended: Reference Elevations: 1877.00 ft (KB)
 Interval: ft (KB) To ft (KB) (TVD) 1869.00 ft (CF)
 Total Depth: ft (KB) (TVD) KB to GR/CF: 8.00 ft
 Hole Diameter: 7.88 inches Hole Condition:

Serial #: 91716

Press@RunDepth: psig @ ft (KB) Capacity: psig
 Start Date: 2017.08.14 End Date: 2017.08.14 Last Calib.: 1899.12.30
 Start Time: 09:13:30 End Time: 18:48:29 Time On Btm:
 Time Off Btm:

TEST COMMENT:



PRESSURE SUMMARY			
Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation

Recovery		
Length (ft)	Description	Volume (bbl)
600.00	Drilling Mud	8.42

Gas Rates			
	Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

Eagle Testers Ref. No: Printed: 2017.08.14 @ 07:51:14

Empty data entry fields for additional test parameters.

ROCK TYPES

Lmst fw<7
 shale, grn
 Carbon Sh
 Ss
 Ignebasic
 Lmst fw>7
 shale, gry
 shale, red
 Cgl/Sandy

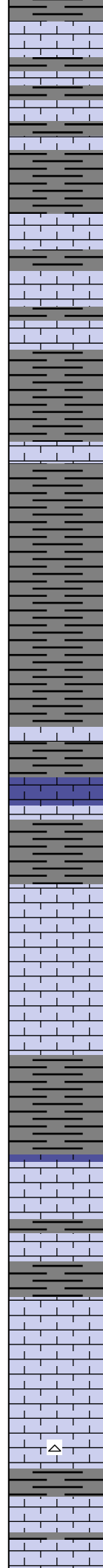
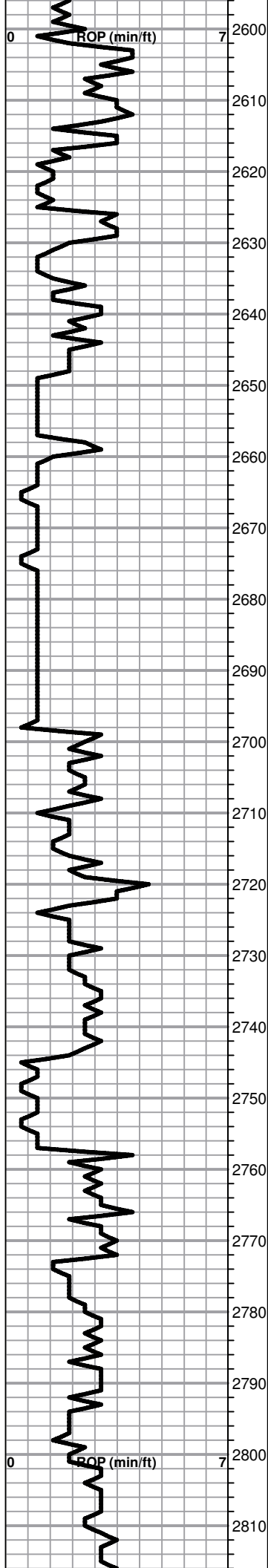
ACCESSORIES

MINERAL
 P Pyrite
 △ Chert White

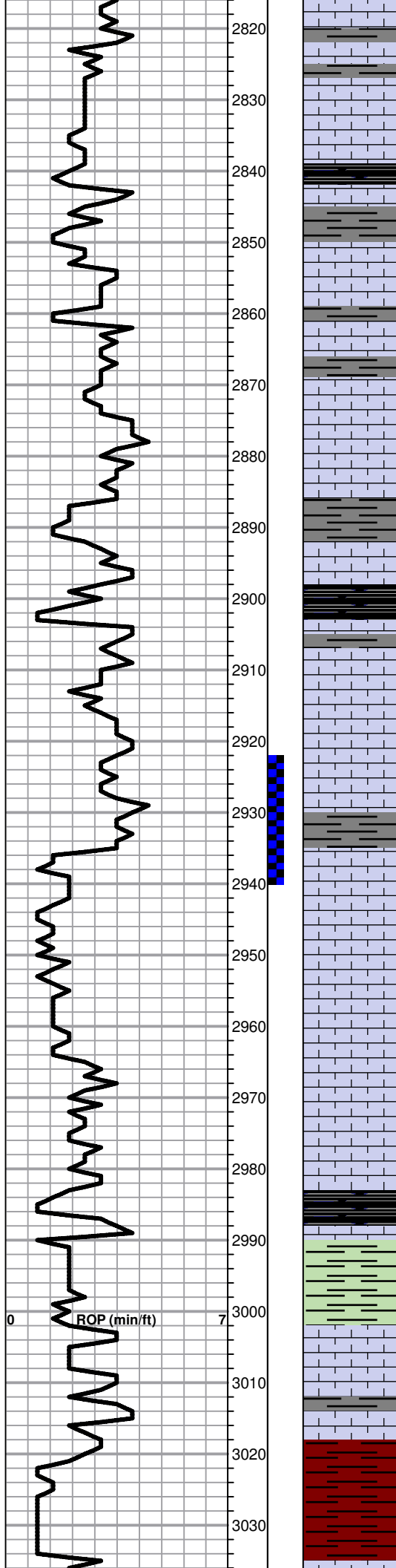
FOSSIL
 ☛ Oomoldic

Curve Track #1 ROP (min/ft)	Intervals	Log	Now	Curve Track #3
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1:240 Imperial		Depth	DST	Lithol	Oil S	Geological Descriptions	1:240 Imperial
Cored Interval		DST Interval					
0	ROP (min/ft)	7				BEGIN 1' DRILL TIME FROM 2400' TO RTD BEGIN 10' WET AND DRY SAMPLES FROM 2400' TO RTD	SET 8 5/8" SURFACE CASING TO 897' W/350 SXS COMMON 2%GEL 3%CC
0	ROP (min/ft)	7	2400			ANHYDRITE TOP 903+974 ANHYDRITE BASE 942+935	SLOPE 3/4 DEGREE @ 898'
			2410				
			2420				
			2430			GRAND HAVEN LIME Lime, lt gray, fnxln	
			2440				
			2450		●	1ST TARKIO SAND Sandstone, quartz, fine grained, poorly sorted, micaceous, spotty stain with fair wet cut	
			2460	P		DOVER LIME 2460-583	
			2470		●	2ND TARKIO SAND Sandstone, quartz, finegrained with better sorting in part with lt saturated staining, good streaming wet cut	
			2480				
			2490			Shale, lt-med gray, soft blocky with sticky clumps in part	
			2500			TARKIO LIME/STOTLER 2502-625	
			2510			Lime, lt-med brn, fnxln, slightly fossiliferous, slight bed chalk	
			2520			Lime, lt-med brn, fn-vfxln	
			2530				
			2540			3RD TARKIO SAND	Bit trip-samples lost
			2550			Shale, lt gray, soft sticky mud	
			2560			Lime, lt-med brn, fnxln	
			2570			Lime, lt brn, fnxln, slight bedded chalk	
			2580			Lime, lt brn-lt grayish brn, fn-vfxln	
			2590			Lime, lt brn-lt grayish brn, fn-vfxln slightly fossiliferous	



- Lime, lt brn-lt gray, fnxln
- Lime, lt brn, fossiliferous-fusulinids
- Shale, lt gray, soft sticky
- Lime, lt brn, fnxln, chalky
- Lime, lt gray, fn-vfxln
- Shale, lt gray, soft sticky clumps
- Lime, lt-med brn, fn-vfxln
- Shale, dove gray, soft mud
- Shale, lt gray, soft mud
- Lime, offwhite to cream, chalky
- Lime, med brn, fn-vfxln
- Shale, lt gray, soft sticky
- Lime, lt-med brn, fnxln, very chalky
- Lime, white-lt brn, fnxln
- Lime, lt-med brn, fnxln, chalky
- Shale, dove gray, soft sticky mud
- TOPEKA 2758-881**
- Lime, crm-lt brn, fn-micro xln, slightly fossiliferous
- Lime, lt brn-lt grayish brn, fnxln
- Lime, lt brn-lt gray, fn-vfxln
- Lime, lt brn-lt gray, fnxln
- Lime, crm-lt gray, fnxln, slightly fossiliferous
- Lime, lt brn-lt gray, fn-micro xln



Lime, lt brn-lt gray, fn-micro xlnz

Lime, crm-lt brn, fnxln

KING HILL SHALE

Shale, black carbonaceous, blocky

Lime, crm, fnxln-micro xln, lithographic in part

○ Lime, crm-tan, fn-vfxln, few chips with trace of lt stain in pinpoint vugs, NFO, no odor

Lime, crm-tan, fn-micro xln

Lime, lt brn-med grayish brn, fn-micro xln

Lime, crm-lt brn-lt gray, fn-micro xln, slightly fossiliferous

Lime, crm-lt brn, fnxln-micro xln

QUEEN HILL SHALE

Shale, black carbonaceous, blocky

○ Lime, crm-lt brn, fn-micro xln , 2 chips with fine scattered vugs with trace of staining, no odor, NFO

Lime, crm-lt brn, fn-micro xln, slightly chalky

Lime, crm-lt brn, fn-micro xln

● Lime, crm-tan, fnxln with zone of fossil fragments and oolites with saturated dark staining, very lt odor, NFO

Lime, offwhite-lt brn, fnxln

Lime, crm-lt brn, fnxln, bedded chalk in part

Lime, crm-lt brn, fn-vfxln

HEEBNER SHALE 2983-1106

Shale, black carbonaceous, fissile, blocky
Lime, med brn, vfxln

Shale, lime green, soft sticky mud

TORONTO 3002-1125

Lime, white-crm, fn-vfxln, bedded chalk, NS

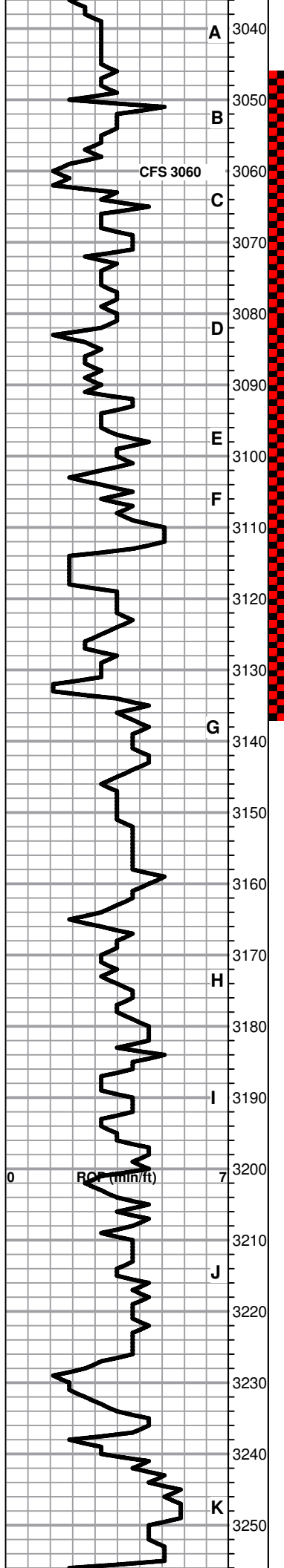
Lime, crm, fnxln

Lime, crm-lt brn, fn-micro xln

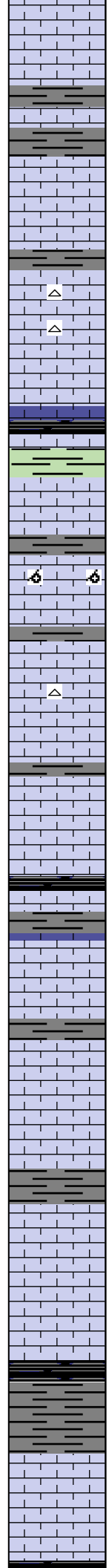
Shale, red soft mud to soft blocky

LKC 3036-1159

DST # 1 2922' TO 2940' SEE
HEADER FOR TEST
SUMMARY



A 3040
 B 3050
 CFS 3060 3060
 C 3070
 D 3080
 E 3090
 F 3100
 G 3110
 3120
 3130
 3140
 H 3150
 3160
 3170
 I 3180
 3190
 J 3200
 3210
 3220
 K 3230
 3240
 3250

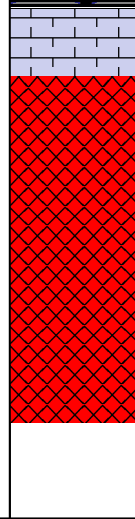
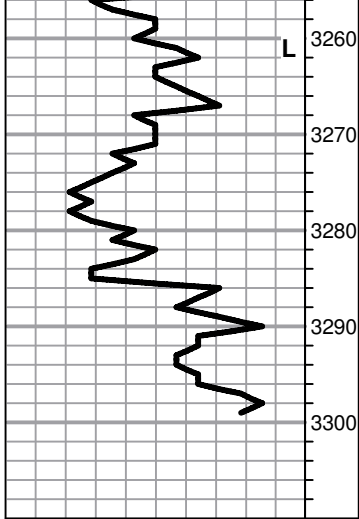


* Lime, lt brn, fnxln, lt odor, no staining or SFO, scattered fine vugs.
 Lime, crm-lt brn, fn-vfxln
 Lime, crm-lt brn, fnxln, bedded chalk
 O Lime, crm-tan, fnxln, bedded chalk in part, very lt odor, NFO or staining noted
 Lime, white-cream, fn-vfxln
 Lime, crm-lt brn-lt gray, fn-micro xln
 O
 Lime, white-cream, fn-micro xln, 2 chips with trace of staining and very lt odor, NFO
 Shale, gray-black carbonaceous, blocky
 O
 Lime, offwhite, fn-micro xln, few chips with trace of lt staining in fine vugs, very lt odor, NFO
 O
 Lime, white-cream, fn-vfxln, oomoldic in part with trace of lt staining, very lt odor, NFO
 Lime, white-cream, fnxln, bedded chalk
 Lime, white-cream, fn-micro xln
 Lime, white-cream, fn-micro xln
 Lime, white-cream, fn-micro xln
 Shale, gray-black carbonaceous, blocky
 Lime, lt gray-white-cream, fn-micro xln
 Lime, crm-lt brn, fn-micro xln
 Lime, crm-lt brn-gray, fn-vfxln
 O
 Lime, crm-tan, mostly fn-vfxln, trace of light scattered staining, no odor, NFO
 Lime, offwhite-cream, fn-micro xln
 Lime, white-cream, fn-vfxln, slight bedded chalk, NS
 Lime, crm-lt brn, fn-vfxln
 Shale, gray-black carbonaceous, firm blocky
 Lime, crm-lt brn, fn-micro xln
 Lime, lt-med brn, fn-micro xln. lt white chalk wash

DST # 2 STRADDLE TEST-
 PACKER FAILURE

DST # 3 STRADDLE TEST
 3026' TO 3137' SEE HEADER
 FOR TEST SUMMARY

RCP (min/ft)



Lime, lt-med brn, fn-vfxln

BKC 3266-1389

GRANITE WASH 3267-1390

Quartz, red feldspars and black mica, few specks of green glauconite in part, NS

As Above, NS

As Above, NS

RTD 3300-1423 LTD 3301-1424

1ST PLUG @925' W/ 50 SXS
 2ND PLUG @425' W/100 SXS
 3RD PLUG @40' W/ 10 SXS
 RATHOLE W/30 SXS

ORDERED 190 SXS 60/40 POS
 4%GEL 1/4# FLOCELE PER
 SX

SLOPE 1 DEGREE @3300'



DRILL STEM TEST REPORT

Prepared For: **Arrowhead Exploration LLC.**

2919 Hall Street
Hayas Kansas, 67601

ATTN: herb Deines

Sander Witt Unit #1

9-14s-15w Russell

Start Date: 2017.08.12 @ 10:12:00

End Date: 2017.08.12 @ 00:00:00

Job Ticket #: 01182 DST #: 1

Eagle Testers
1309 Patton Road Great Bend, Kansas 67530
620-791-7394

Printed: 2017.08.12 @ 15:13:41



DRILL STEM TEST REPORT

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas, 67601

Sander Witt Unit #1

ATTN: herb Deines

Job Ticket: 01182

DST#: 1

Test Start: 2017.08.12 @ 10:12:00

GENERAL INFORMATION:

Formation: **Oread & Topeka**

Deviated: No Whipstock: ft (KB)

Time Tool Opened: 11:27:00

Time Test Ended: 00:00:00

Test Type: Conventional Bottom Hole (Initial)

Tester: Gene Budig

Unit No: 1-90

Interval: 2922.00 ft (KB) To 2940.00 ft (KB) (TVD)

Reference Elevations: 1877.00 ft (KB)

Total Depth: 2940.00 ft (KB) (TVD)

1869.00 ft (CF)

Hole Diameter: 7.88 inches Hole Condition: Fair

KB to GR/CF: 8.00 ft

Serial #: 91716 Outside

Press@RunDepth: 120.84 psig @ 2935.00 ft (KB)

Capacity: 5000.00 psig

Start Date: 2017.08.12

End Date: 2017.08.12

Last Calib.: 1899.12.30

Start Time: 10:12:00

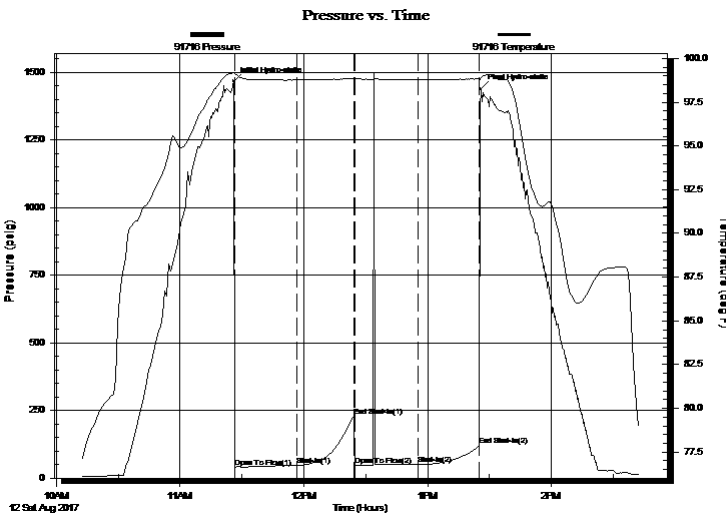
End Time: 14:43:00

Time On Btm: 2017.08.12 @ 11:26:00

Time Off Btm: 2017.08.12 @ 13:26:00

TEST COMMENT: 1st Opening 30 Minutes very weak surface blow
1st Shut-In 30 Minutes no blow back
2nd opening 30 Minutes no blow flushed tool no help
2nd shut-in 30 Minutes no blow back

PRESSURE SUMMARY



Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1466.40	99.20	Initial Hydro-static
1	39.23	99.17	Open To Flow (1)
31	46.70	98.79	Shut-In(1)
59	230.65	98.86	End Shut-In(1)
59	47.66	98.85	Open To Flow (2)
90	49.92	98.81	Shut-In(2)
119	120.84	98.83	End Shut-In(2)
120	1439.41	98.88	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
25.00	Drilling Mud	0.35

Gas Rates

Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)



DRILL STEM TEST REPORT

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas, 67601

Sander Witt Unit #1

Job Ticket: 01182

DST#: 1

ATTN: herb Deines

Test Start: 2017.08.12 @ 10:12:00

GENERAL INFORMATION:

Formation: **Oread & Topeka**

Deviated: No Whipstock: ft (KB)

Time Tool Opened: 11:27:00

Time Test Ended: 00:00:00

Test Type: Conventional Bottom Hole (Initial)

Tester: Gene Budig

Unit No: 1-90

Interval: 2922.00 ft (KB) To 2940.00 ft (KB) (TVD)

Reference Elevations: 1877.00 ft (KB)

Total Depth: 2940.00 ft (KB) (TVD)

1869.00 ft (CF)

Hole Diameter: 7.88 inches Hole Condition: Fair

KB to GR/CF: 8.00 ft

Serial #: 9119

Inside

Press@RunDepth: 125.11 psig @ 2935.00 ft (KB)

Capacity: 5000.00 psig

Start Date: 2017.08.12 End Date: 2017.08.12

Last Calib.: 2017.08.12

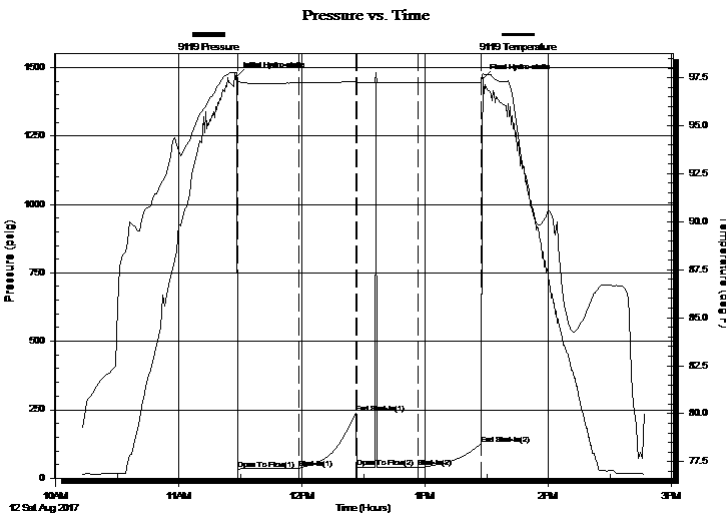
Start Time: 10:12:00 End Time: 14:47:00

Time On Btm: 2017.08.12 @ 11:28:00

Time Off Btm: 2017.08.12 @ 13:28:00

TEST COMMENT: 1st Opening 30 Minutes very weak surface blow
1st Shut-In 30 Minutes no blow back
2nd opening 30 Minutes no blow flushed tool no help
2nd shut-in 30 Minutes no blow back

PRESSURE SUMMARY



Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1464.97	97.76	Initial Hydro-static
1	32.21	97.33	Open To Flow (1)
31	36.70	97.23	Shut-In(1)
59	238.16	97.30	End Shut-In(1)
59	38.25	97.25	Open To Flow (2)
89	41.04	97.23	Shut-In(2)
119	125.11	97.25	End Shut-In(2)
120	1460.32	97.70	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
25.00	Drilling Mud	0.35

Gas Rates

Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)



DRILL STEM TEST REPORT

TOOL DIAGRAM

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas, 67601

Sander Witt Unit #1

Job Ticket: 01182

DST#: 1

ATTN: herb Deines

Test Start: 2017.08.12 @ 10:12:00

Tool Information

Drill Pipe:	Length: 2919.00 ft	Diameter: 3.80 inches	Volume: 40.95 bbl	Tool Weight: 2000.00 lb
Heavy Wt. Pipe:	Length: 0.00 ft	Diameter: 0.00 inches	Volume: 0.00 bbl	Weight set on Packer: 20000.00 lb
Drill Collar:	Length: 0.00 ft	Diameter: 0.00 inches	Volume: 0.00 bbl	Weight to Pull Loose: 44000.00 lb
			<u>Total Volume: 40.95 bbl</u>	Tool Chased 0.00 ft
Drill Pipe Above KB:	17.00 ft			String Weight: Initial 30000.00 lb
Depth to Top Packer:	2922.00 ft			Final 30000.00 lb
Depth to Bottom Packer:	ft			
Interval between Packers:	18.00 ft			
Tool Length:	38.00 ft			
Number of Packers:	2	Diameter: 6.75 inches		

Tool Comments:

Tool Description	Length (ft)	Serial No.	Position	Depth (ft)	Accum. Lengths
------------------	-------------	------------	----------	------------	----------------

Shut In Tool	5.00			2907.00	
Hydraulic tool	5.00			2912.00	
Top Packer	5.00			2917.00	
Packer	5.00			2922.00	20.00 Bottom Of Top Packer
Anchor	13.00			2935.00	
Recorder	0.00	9119	Inside	2935.00	
Recorder	0.00	91716	Outside	2935.00	
Bullnose	5.00			2940.00	18.00 Anchor Tool

Total Tool Length: 38.00



DRILL STEM TEST REPORT

FLUID SUMMARY

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas, 67601

Sander Witt Unit #1

Job Ticket: 01182

DST#: 1

ATTN: herb Deines

Test Start: 2017.08.12 @ 10:12:00

Mud and Cushion Information

Mud Type: Gel Chem
Mud Weight: 9.00 lb/gal
Viscosity: 47.00 sec/qt
Water Loss: 8.00 in³
Resistivity: ohm.m
Salinity: 4000.00 ppm
Filter Cake: 1.00 inches

Cushion Type:
Cushion Length: ft
Cushion Volume: bbl
Gas Cushion Type:
Gas Cushion Pressure: psig

Oil API: deg API
Water Salinity: ppm

Recovery Information

Recovery Table

Length ft	Description	Volume bbl
25.00	Drilling Mud	0.351

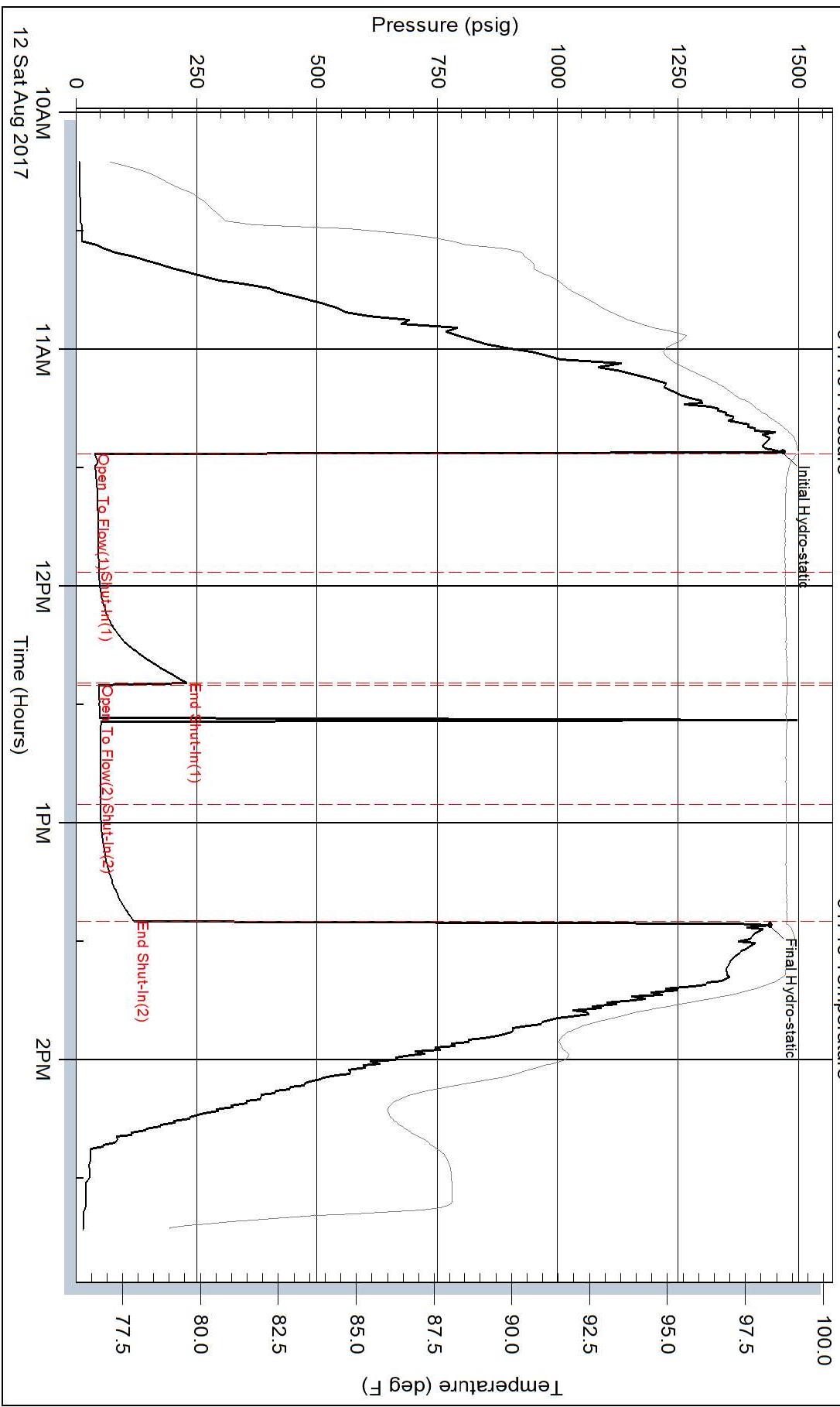
Total Length: 25.00 ft Total Volume: 0.351 bbl

Num Fluid Samples: 0 Num Gas Bombs: 0 Serial #:

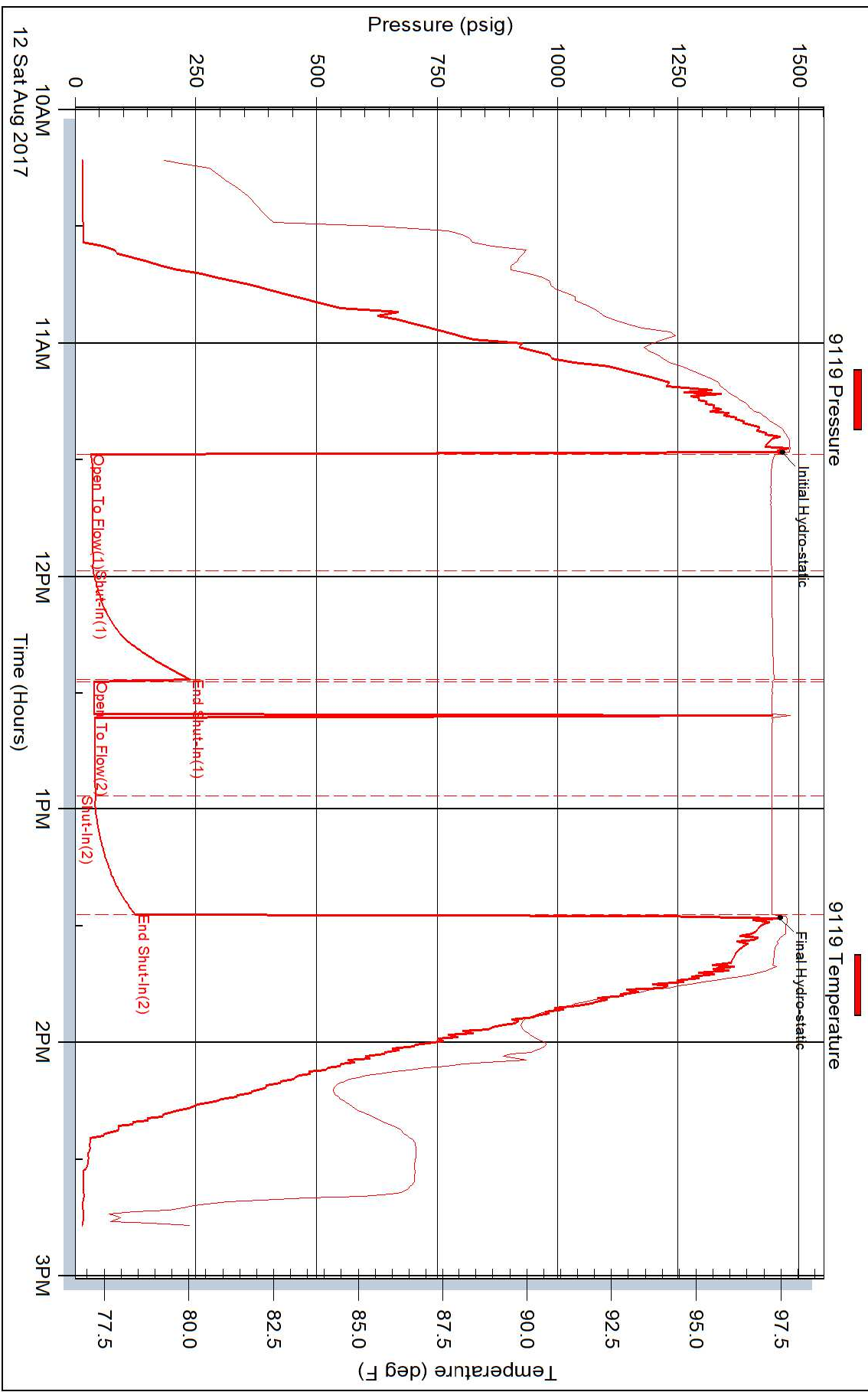
Laboratory Name: Laboratory Location:

Recovery Comments:

Pressure vs. Time



Pressure vs. Time





DRILL STEM TEST REPORT

Prepared For: **Arrowhead Exploration LLC.**

2919 Hall Street
Hayas Kansas, 67601

ATTN: herb Deines

Sander Witt Unit #1

9-14s-15w Russell

Start Date: 2017.08.14 @ 00:00:00

End Date:

Job Ticket #:

DST #: 2

Eagle Testers
1309 Patton Road Great Bend, Kansas 67530
620-791-7394

Printed: 2017.08.14 @ 07:51:13



DRILL STEM TEST REPORT

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas, 67601

Sander Witt Unit #1

ATTN: herb Deines

Job Ticket: **DST#: 2**

Test Start: 2017.08.14 @ 00:00:00

GENERAL INFORMATION:

Formation:

Deviated: No Whipstock: ft (KB)

Test Type: (Initial)

Time Tool Opened:

Tester:

Time Test Ended:

Unit No:

Interval: ft (KB) To ft (KB) (TVD)

Reference Elevations: 1877.00 ft (KB)

Total Depth: ft (KB) (TVD)

1869.00 ft (CF)

Hole Diameter: 7.88 inches Hole Condition:

KB to GR/CF: 8.00 ft

Serial #: 91716

Press@RunDepth: psig @ ft (KB)

Capacity: psig

Start Date: 2017.08.14 End Date: 2017.08.14

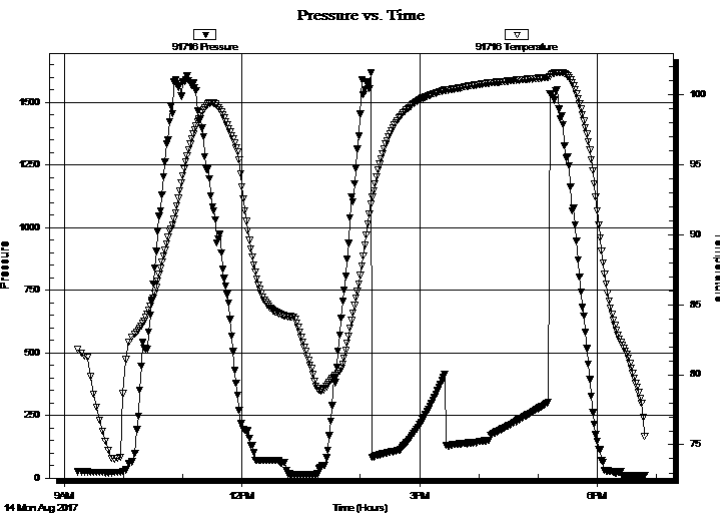
Last Calib.: 1899.12.30

Start Time: 09:13:30 End Time: 18:48:29

Time On Btm:

Time Off Btm:

TEST COMMENT:



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation

Recovery

Length (ft)	Description	Volume (bbl)
600.00	Drilling Mud	8.42

Gas Rates

Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)



DRILL STEM TEST REPORT

TOOL DIAGRAM

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas, 67601

Sander Witt Unit #1

ATTN: herb Deines

Job Ticket: **DST#: 2**

Test Start: 2017.08.14 @ 00:00:00

Tool Information

Drill Pipe:	Length: 2996.00 ft	Diameter: 3.80 inches	Volume: 42.03 bbl	Tool Weight: 2000.00 lb
Heavy Wt. Pipe:	Length: 0.00 ft	Diameter: 0.00 inches	Volume: 0.00 bbl	Weight set on Packer: 20000.00 lb
Drill Collar:	Length: 0.00 ft	Diameter: 0.00 inches	Volume: 0.00 bbl	Weight to Pull Loose: 35000.00 lb
			<u>Total Volume: 42.03 bbl</u>	Tool Chased 0.00 ft
Drill Pipe Above KB:	16.00 ft			String Weight: Initial 35000.00 lb
Depth to Top Packer:	3000.00 ft			Final 35000.00 lb
Depth to Bottom Packer:	ft			
Interval between Packers:	0.00 ft			
Tool Length:	326.19 ft			
Number of Packers:	1	Diameter:	inches	
Tool Comments:				

Tool Description	Length (ft)	Serial No.	Position	Depth (ft)	Accum. Lengths
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Shut In Tool	5.00			2985.00	
Hydraulic tool	5.00			2990.00	
Top Packer	5.00			2995.00	
Packer	5.00			3000.00	20.00 Bottom Of Top Packer
Anchor	32.00			3032.00	
Change Over Sub	0.75		Inside	3032.75	
Drill Pipe	93.71			3126.46	
Change Over Sub	0.75			3127.21	
Recorder	0.00	9119	Inside	3127.21	
Recorder	0.00	91716	Outside	3127.21	
Blank Off Sub	1.00			3128.21	0.00 Tool Interval
Packer	5.00		Outside	3133.21	
Change Over Sub	0.75			3133.96	
Drill Pipe	157.48			3291.44	
Change Over Sub	0.75			3292.19	
Anchor	9.00			3301.19	
Recorder	0.00	9139	Outside	3301.19	
Bullnose	5.00			3306.19	1000325.19 Bottom Packers & Anchor

Total Tool Length: 326.19



DRILL STEM TEST REPORT

FLUID SUMMARY

Arrow head Exploration LLC.

9-14s-15w Russell

2919 Hall Street
Hayas Kansas, 67601

Sander Witt Unit #1

Job Ticket: **DST#: 2**

ATTN: herb Deines

Test Start: 2017.08.14 @ 00:00:00

Mud and Cushion Information

Mud Type: Gel Chem	Cushion Type:	Oil API:	deg API
Mud Weight: 9.00 lb/gal	Cushion Length: ft	Water Salinity:	ppm
Viscosity: 50.00 sec/qt	Cushion Volume: bbl		
Water Loss: 10.60 in ³	Gas Cushion Type:		
Resistivity: ohm.m	Gas Cushion Pressure: psig		
Salinity: 6500.00 ppm			
Filter Cake: inches			

Recovery Information

Recovery Table

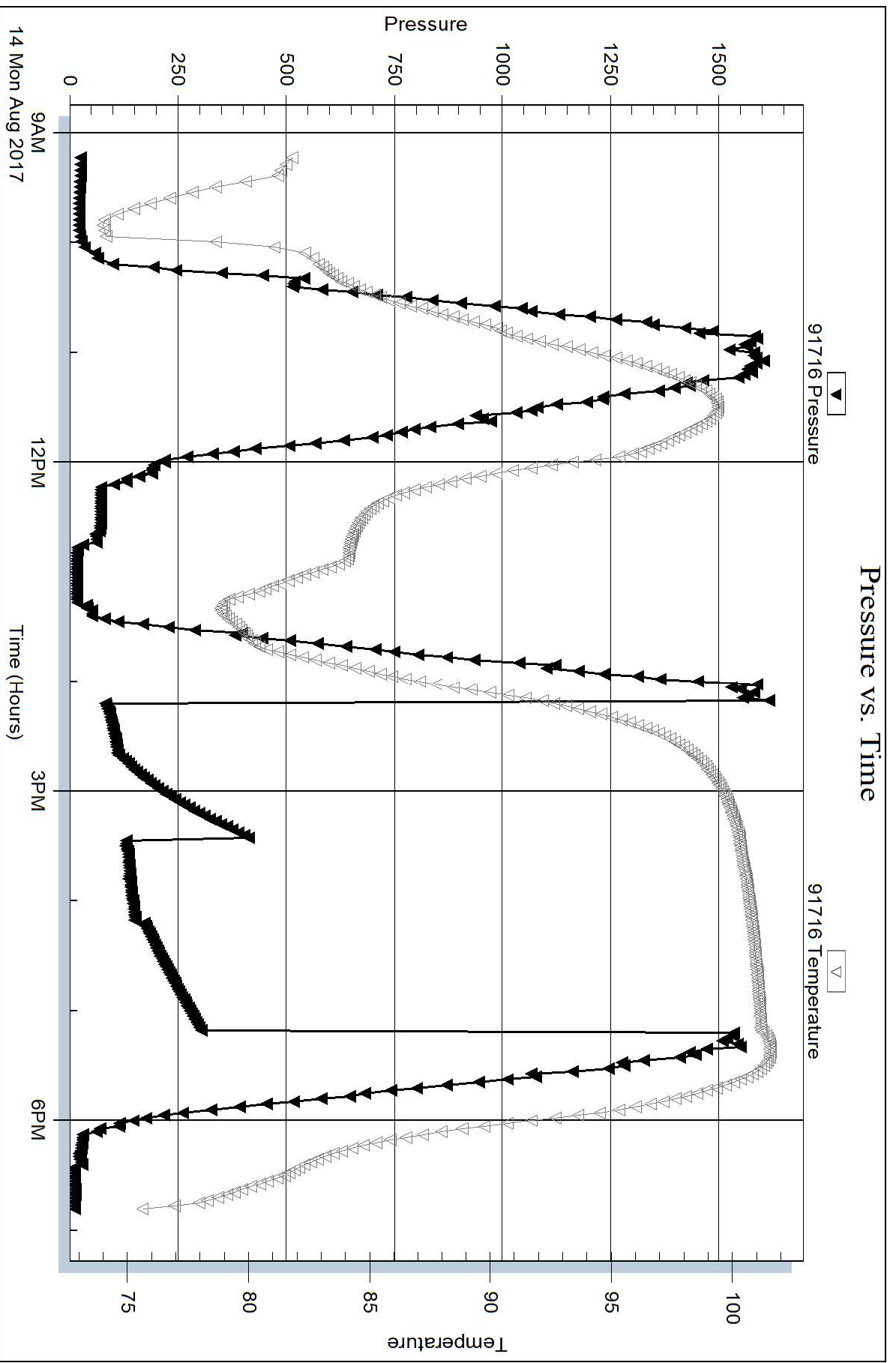
Length ft	Description	Volume bbl
600.00	Drilling Mud	8.416

Total Length: 600.00 ft Total Volume: 8.416 bbl

Num Fluid Samples: 0 Num Gas Bombs: 0 Serial #:

Laboratory Name: Laboratory Location:

Recovery Comments:



GLOBAL OIL FIELD SERVICES, LLC

24 S. Lincoln
RUSSELL, KS 67665

Invoice

Date	Invoice #
8/11/2017	3073

Bill To
ARROWHEAD EXPLORATION 2919 HALL STREET HAYS, KS 67601

P.O. No.	Terms	Project
SANDER WITT#1	Due on receipt	

Quantity	Description	Rate	Amount
210	COMMON	16.00	3,360.00
140	POZ	9.50	1,330.00
12	CALCIUM	59.00	708.00
6	GEL	21.50	129.00
368	HANDLING	1.90	699.20
	BULK MILEAGE	368.00	368.00
1	TRI-PLEX PUMP CHARGE FOR SURFACE	750.00	750.00
10	PUMP TRUCK MILEAGE	7.00	70.00
10	PICKUP FOR TRANSPORTATION OF GOODS TO JOB SITE	3.00	30.00
	25% DISCOUNT IF PAID WITHIN 15 DAYS FROM INVOICE new sales tax rate as of 7-1-2015	8.50%	0.00

I thank you for your business.

Total \$7,444.20

GLOBAL OIL FIELD SERVICES, LLC

3073

REMIT TO 24 S. Lincoln
Russell, KS 67665

SERVICE POINT:
RUSSELL, KS

DATE <u>8-9-17</u>	SEC. <u>9</u>	TWP. <u>14</u>	RANGE <u>15W</u>	CALLED OUT	ON LOCATION	JOB START	JOB FINISH
SAWDER WITH LEASE		WELL #. <u>1</u>	LOCATION <u>GORHAM, KS</u>			COUNTY <u>RUSSELL</u>	STATE <u>KS</u>
OLD OR <input checked="" type="radio"/> NEW (CIRCLE ONE)							

CONTRACTOR <u>SOUTH WIND DRILLING PLC #1</u>	
TYPE OF JOB <u>SURFACE</u>	
HOLE SIZE <u>12 1/4</u>	I.D. <u>9 5/8</u>
CASING SIZE <u>8 5/8</u>	DEPTH <u>897.33</u>
TUBING SIZE	DEPTH
DRILL PIPE	DEPTH
TOOL	DEPTH
PRES. MAX.	MINIMUM
MEAS. LINE	SHOE JOINT <u>42.20</u>
CEMENT LEFT IN CSG. <u>42.20</u>	
PERFS	
DISPLACEMENT <u>54.5 BBL</u>	
EQUIPMENT	
PUMP TRUCK # <u>417</u>	CEMENTER <u>BRAD</u> HELPER <u>JASON</u>
BULK TRUCK # <u>473</u>	DRIVER <u>Tom</u>
BULK TRUCK #	DRIVER

OWNER	
CEMENT AMOUNT ORDERED: <u>335 5X 60/40 P02 3% cc 2% cc</u>	
COMMON	@
POZMIX	@
GEL	@
CHLORIDE	@
ASC	@
	@
	@
	@
	@
	@
	@
	@
	@
	@
	@
	@
HANDLING	@
MILEAGE	@
TOTAL	

REMARKS:
RUN IN 22 JTS. 8 5/8 CASING, CIRCULATE MUD, MIX 350 5X, LAUNCH PLUG, WASH UP DISPLACE W/ 54.5. BBL H2O, SHUT IN @ 200 PSI, CEMENT DID CIRCULATE.

CHARGE TO: ARROWHEAD EXP.
STREET _____
CITY _____ STATE _____ ZIP _____

Global Oil Field Services, LLC
You are hereby requested to rent cementing equipment and furnish cementer and helper(s) to assist owner or contractor to do work as is listed. The above work was done to satisfaction and supervision of owner agent or contractor. I have read and understand the "GENERAL TERMS AND CONDITIONS" listed on the reverse side.

PRINTED NAME _____
SIGNATURE Jay Price

SERVICE	
DEPTH OF JOB	
PUMP TRUCK CHARGE	
EXTRA FOOTAGE	@
MILEAGE	@
MANIFOLD <u>8 5/8 SURFACE</u>	@
	@
	@
TOTAL	

PLUG & FLOAT EQUIPMENT	
<u>RUBBER PLUG</u>	1 @
	@
	@
	@
	@
TOTAL	

SALES TAX (If Any) _____
TOTAL CHARGES _____
DISCOUNT _____ IF PAID IN 30 DAYS

GLOBAL OIL FIELD SERVICES, LLC

Invoice

24 S. Lincoln
RUSSELL, KS 67665

Date	Invoice #
8/14/2017	3021

Bill To
ARROWHEAD EXPLORATION 2919 HALL STREET HAYS,KS 67601

P.O. No.	Terms	Project
SANDERS WITT#1	Due on receipt	

Quantity	Description	Rate	Amount
114	COMMON	16.00	1,824.00
76	POZ	9.50	722.00
7	GEL	21.50	150.50
47.5	FLO-SEAL	2.00	95.00
197	HANDLING	1.90	374.30
	BULK MILEAGE	197.00	197.00
1	TRI-PLEX PUMP CHARGE FOR PLUG	750.00	750.00
5	PUMP TRUCK MILEAGE	7.00	35.00
5	PICKUP FOR TRANSPORTATION OF GOODS TO JOB SITE	3.00	15.00
1	DRY HOLE PLUG	62.50	62.50
	25% DISCOUNT IF PAID WITHIN 15 DAYS FROM INVOICE new sales tax rate as of 7-1-2015	8.50%	0.00

Thank you for your business.

Total

\$4,225.30

GLOBAL OIL FIELD SERVICES, LLC

3021

REMIT TO 24 S. Lincoln
Russell, KS 67665

SERVICE POINT: Russell, KS

DATE <u>8-14-17</u>	SEC. <u>7</u>	TWP. <u></u>	RANGE <u></u>	CALLED OUT <u></u>	ON LOCATION <u></u>	JOB START <u></u>	JOB FINISH <u>1:45pm</u>
LEASE <u>Sandens w.H</u>	WELL #. <u>1</u>	LOCATION <u></u>			COUNTY <u>Russell</u>	STATE <u>KS</u>	
OLD OR <input checked="" type="radio"/> NEW (CIRCLE ONE)							

CONTRACTOR Southwind #3
 TYPE OF JOB Rotary Plug
 HOLE SIZE _____ T.D. _____
 CASING SIZE _____ DEPTH _____
 TUBING SIZE _____ DEPTH _____
 DRILL PIPE _____ DEPTH _____
 TOOL _____ DEPTH _____
 PRES. MAX _____ MINIMUM _____
 MEAS. LINE _____ SHOE JOINT _____
 CEMENT LEFT IN CSG. _____
 PERFS _____
 DISPLACEMENT _____

OWNER _____
 CEMENT AMOUNT ORDERED 190sy 60/40 4% gel
14# F10

EQUIPMENT _____
 PUMP TRUCK # 409 CEMENTER Heath HELPER Heath
 BULK TRUCK # 410 DRIVER Leroy London
 BULK TRUCK # _____ DRIVER _____

COMMON _____ @ _____
 POZMIX _____ @ _____
 GEL _____ @ _____
 CHLORIDE _____ @ _____
 ASC _____ @ _____
 _____ @ _____
 _____ @ _____
 _____ @ _____
 _____ @ _____
 _____ @ _____
 _____ @ _____
 HANDLING _____ @ _____
 MILEAGE _____ @ _____

REMARKS:
925' = 50sy
425' = 100sy
40' = 10sy
Plug RH = 30sy

TOTAL _____
 SERVICE
 DEPTH OF JOB _____
 PUMP TRUCK CHARGE _____
 EXTRA FOOTAGE _____ @ _____
 MILEAGE _____ @ _____
 MANIFOLD _____ @ _____
 _____ @ _____
 _____ @ _____

CHARGE TO: Arrowhead
 STREET _____
 CITY _____ STATE _____ ZIP _____

TOTAL _____

Global Oil Field Services, LLC
 You are hereby requested to rent cementing equipment and furnish cementer and helper(s) to assist owner or contractor to do work as is listed. The above work was done to satisfaction and supervision of owner agent or contractor. I have read and understand the "GENERAL TERMS AND CONDITIONS" listed on the reverse side.

PLUG & FLOAT EQUIPMENT
Dry Hole Plug @ _____
 _____ @ _____
 _____ @ _____
 _____ @ _____
 _____ @ _____
 TOTAL _____

PRINTED NAME Jay Krier
 SIGNATURE Jay Krier

SALES TAX (If Any) _____
 TOTAL CHARGES _____
 DISCOUNT _____ IF PAID IN 30 DAYS