

**JAMES C. MUSGROVE**

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Mai Oil Operations  
FA Krug #5  
SW-SW-SW-NE (2476' FNL & 2695' FNL)  
Section 15-15s-14w  
Russell County, Kansas

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**5 1/2" Production Casing Set**

**Contractor:** Southwind Drilling Co. (rig #3)  
**Commenced:** December 5, 2014  
**Completed:** December 11, 2014  
**Elevation:** 1903' K.B., 1901' D.F., 1895' G.L.  
**Casing program:** Surface; 8 5/8" @ 515'  
Production, 5 1/2" @ 3407'  
**Sample:** Samples saved and examined 2300' to the Rotary Total Depth.  
**Drilling time:** One (1) foot drilling time recorded and kept 2300' to the Rotary Total Depth.  
**Measurements:** All depths measured from the Kelly Bushing.  
**Drill Stem Tests:** There were two (2) Drill Stem Tests ran by Trilobite Testing Co.  
**Electric Log:** By Nabors, Dual Induction, Compensated Density/Neutron Log and Micro Log.

<u>Formation</u>	<u>Log Depth</u>	<u>Sub-Sea Datum</u>
Anhydrite	913	+990
Base Anhydrite	943	+967
Grand Haven	2461	-558
1 <sup>st</sup> Tarkio Sand	2473	-570
Dover	2486	-583
2 <sup>nd</sup> Tarkio Sand	2492	-589
Tarkio Lime	2531	-628
Topeka	2803	-900
Heebner	3030	-1127
Toronto	3046	-1143
Lansing	3083	-1180
Base Kansas City	3296	-1393
Arbuckle	3339	-1436
Rotary Total Depth	3408	-1505
Log Total Depth	3408	-1505

All tops and zones corrected to Electric Log Measurement

**SAMPLE ANALYSIS, SHOWS OF OIL, TESTING DATA, ETC.**

**TARKIO SECTION**

**1<sup>ST</sup> SAND**

2473-2479' Poorly developed sand, poor samples; no visible shows.

**2<sup>nd</sup> SAND**

2493-2506' Sand; gray, white, very fine grained shaley, micaeous, no shows.

**TOPEKA SECTION**

2940-2947' Limestone, cream, finely crystalline, chalky, questionable stain, no free oil and no odor in fresh samples.

2978-2990' Limestone, cream, finely crystalline, chalky in part, trace brown stain, no free oil and no odor.

2992-3012' Limestone, cream finely crystalline, fossiliferous in part, light brown stain, show of free oil and faint odor in fresh samples.

**Drill Stem Test #1**

**2948-3020**

**Times: 30-30-30-45**

**Blow: Weak**

**Recovery: 5' mud**

**Pressures: ISIP 748 psi  
FSIP 757 psi  
IFP 41-50 psi  
FFP 50-52 psi  
HSH 1447-1367 psi**

**TORONTO SECTION**

3046-3056' Limestone, cream, white, chalky; no shows.

**LANSING SECTION**

3103-3113' Limestone, cream, fine and medium crystalline, scattered porosity, no shows.

3123-3134' Limestone, cream, finely crystalline, chalky, trace spotty stain, no free oil and no odor.

3131-3144' Limestone, cream, finely crystalline, oomoldic, scattered oomoldic porosity, no shows.

3161-3170' Limestone, cream, finely crystalline, cherty in part, scattered porosity, no shows.



- 3240-3250' Limestone, cream, finely crystalline, oomoldic in part, fair porosity, no shows.
- 3255-3265' Limestone, cream, finely crystalline oolitic, scattered porosity, trace stain, show of free oil and faint odor in fresh samples.
- 3275-3290' Limestone, cream, finely crystalline oomoldic, scattered oomoldic porosity; trace stain, show of free oil and fair odor in fresh samples.
- 3310-3320' Limestone, cream, finely crystalline, cherty, poor visible porosity, no shows.

**ARBUCKLE SECTION**

- 3339-3348' Dolomite, white, medium crystalline, good inter-crystalline porosity, light brown stain, show of free oil and good odor in fresh samples.

**Drill Stem Test #2 3290-3348**

**Times: 30-30-45-60**

**Blow: Strong**

**Recovery: 5' clean oil**  
**1741' gassy oil cut muddy water**  
**(20% oil; 50% water; 10% mud)**

**Pressures: ISIP 463 psi**  
**FSIP 491 psi**  
**IFP 20-198 psi**  
**FFP 199-325 psi**  
**HSH 1580-1569 psi**

- 3348-3360' Dolomite, as above, trace stain, show of free oil and odor in fresh samples.
- 3360-3380' Dolomite, white, cream, fine and medium crystalline, scattered inter-crystalline porosity, trace stain, show of free oil and good odor in fresh samples.
- 3380-3408' Dolomite, white/cream, medium crystalline, scattered porosity, no stain, no free oil and no odor in fresh samples.

**Rotary Total Depth 3408**  
**Log Total Depth 3408**

Mai Oil Operations  
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**Recommendations:**

The 5 1/2" production casing was set and cemented on Mai Oil Operation Inc., F.A. Krug #5.

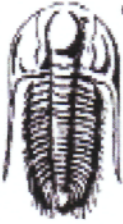
Respectfully yours,

*James C. & Clint Musgrove*

James C. and Clint Musgrove  
Petroleum Geologists







**TRILOBITE TESTING, INC.**

**DRILL STEM TEST REPORT**

Mai Oil Operations, Inc.  
 8411 Preston Rd STE. 800  
 Dallas TX 75225-5520  
 ATTN: Clint Musgrove

**15-15s-14w Russell,KS**  
**FA Krug #5**  
 Job Ticket: 60419 **DST#: 1**  
 Test Start: 2014.12.08 @ 13:55:00

**GENERAL INFORMATION:**

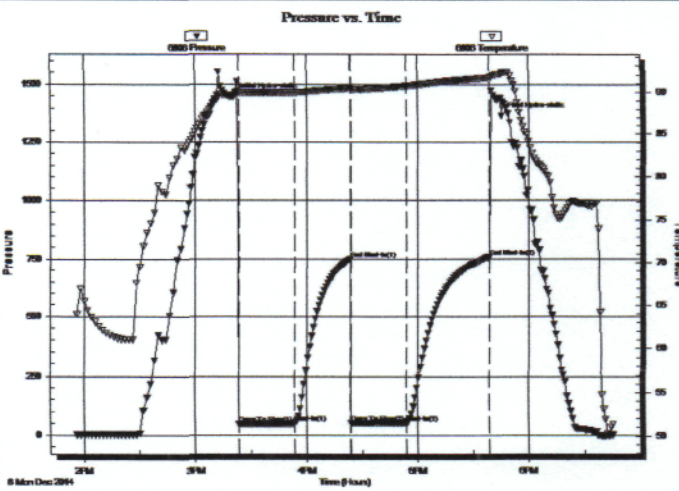
Formation: **Plattsmouth**  
 Deviated: No Whipstock: ft (KB)  
 Time Tool Opened: 15:23:30  
 Time Test Ended: 18:46:00  
 Interval: **2948.00 ft (KB) To 3020.00 ft (KB) (TVD)**  
 Total Depth: 3020.00 ft (KB) (TVD)  
 Hole Diameter: 7.88 inches Hole Condition: Fair  
 Test Type: Conventional Bottom Hole (Initial)  
 Tester: Shane Konzern  
 Unit No: S3  
 Reference Elevations: 1903.00 ft (KB)  
 1895.00 ft (CF)  
 KB to GR/CF: 8.00 ft

**Serial #: 6806**

**Inside**

Press@RunDepth: 52.71 psig @ 3016.18 ft (KB) Capacity: 8000.00 psig  
 Start Date: 2014.12.08 End Date: 2014.12.08 Last Calib.: 2014.12.08  
 Start Time: 13:56:00 End Time: 18:46:00 Time On Btm: 2014.12.08 @ 15:20:30  
 Time Off Btm: 2014.12.08 @ 17:45:00

**TEST COMMENT:** FFP 30 Minutes. Weak blow built to 1/2" into water.  
 ISI 30 Minutes. No blow back.  
 FFP 30 Minutes. No blow, flushed tool had good flush bubbles and gained no blow.  
 FSI 45 Minutes. No blow back.



**PRESSURE SUMMARY**

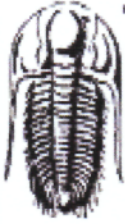
Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1447.16	89.67	Initial Hydro-static
3	47.16	89.89	Open To Flow (1)
33	50.28	89.93	Shut-In(1)
63	748.34	90.42	End Shut-In(1)
64	50.13	90.28	Open To Flow (2)
94	52.71	90.70	Shut-In(2)
138	757.63	91.67	End Shut-In(2)
145	1367.53	92.17	Final Hydro-static

**Recovery**

Length (ft)	Description	Volume (bbl)
10.00	100% Mud	0.14

**Gas Rates**

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



**TRILOBITE  
TESTING, INC.**

# DRILL STEM TEST REPORT

Mai Oil Operations, Inc.  
8411 Preston Rd STE. 800  
Dallas TX 75225-5520  
ATTN: Clint Musgrove

**15-15s-14w Russell,KS**  
**FA Krug #5**  
Job Ticket: 60420      **DST#: 2**  
Test Start: 2014.12.09 @ 19:55:00

## GENERAL INFORMATION:

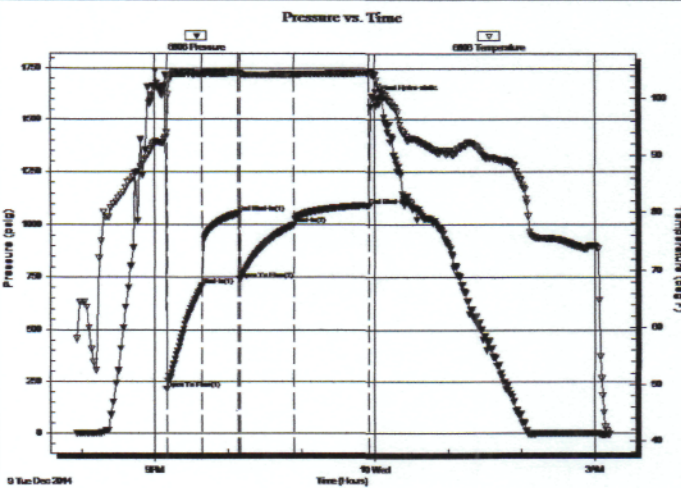
Formation: **Arbuckle**  
Deviated: No Whipstock: ft (KB)  
Time Tool Opened: 21:09:30  
Time Test Ended: 03:12:00  
Test Type: Conventional Bottom Hole (Initial)  
Tester: Shane Konzern  
Unit No: S3  
Interval: **3290.00 ft (KB) To 3348.00 ft (KB) (TVD)**  
Total Depth: 3348.00 ft (KB) (TVD)  
Reference Elevations: 1903.00 ft (KB)  
1895.00 ft (CF)  
Hole Diameter: 7.88 inches Hole Condition: Fair  
KB to GR/CF: 8.00 ft

## Serial #: 6806

## Inside

Press@RunDepth: 997.87 psig @ 3344.22 ft (KB)  
Start Date: 2014.12.09      End Date: 2014.12.10  
Start Time: 19:56:00      End Time: 03:12:00  
Capacity: 8000.00 psig  
Last Calib.: 2014.12.10  
Time On Btm: 2014.12.09 @ 21:06:30  
Time Off Btm: 2014.12.09 @ 23:59:30

TEST COMMENT: IFP 30 Minutes. BOB in 55 seconds.  
ISI 30 Minutes. No blow back.  
FFP 45 Minutes. BOB in 1 minute and 15 seconds.  
FSI 60 Minutes. No blow back.



## PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1663.96	92.24	Initial Hydro-static
3	214.82	93.98	Open To Flow (1)
32	711.17	104.45	Shut-In(1)
62	1053.28	104.57	End Shut-In(1)
63	739.25	104.49	Open To Flow (2)
107	997.87	104.30	Shut-In(2)
169	1091.21	104.50	End Shut-In(2)
173	1605.47	104.27	Final Hydro-static

## Recovery

Length (ft)	Description	Volume (bbl)
5.00	100% Clean Oil	0.07
126.00	OOCMW 20% oil, 20% mud, 60% water	1.77
126.00	GOCMW 15% gas, 20% oil, 15% mud,	01.77 at
252.00	GOCMW 20% gas, 20% oil, 10% mud,	03.53 at
504.00	GOCMW 25% gas, 20% oil, 10% mud,	05.07 at
378.00	GOCMW 20% gas, 20% oil, 20% mud,	05.30 at

## Gas Rates

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







# QUALITY OILWELL CEMENTING, INC.

Federal Tax I.D.# 20-2886107

Phone 785-483-2025  
Cell 785-324-1041

Home Office P.O. Box 32 Russell, KS 67665

No. 8845

Date	Sec.	Twp.	Range	County	State	On Location	Finish
12-10-14	15	15	14	Russell	KS		9:45 PM

Location Russell stowinterset 1/2 W N. 10

Lease <u>F. A. Krug</u>	Well No. <u>5</u>	Owner To Quality Oilwell Cementing, Inc. You are hereby requested to rent cementing equipment and furnish cementer and helper to assist owner or contractor to do work as listed.
Contractor <u>Catherine</u>	<u>3</u>	
Type Job <u>Production</u>		
Hole Size <u>7 7/8</u>	T.D. <u>3408'</u>	Charge To <u>ma oil</u>
Csg. <u>5 1/2 14"</u>	Depth <u>3399'</u>	Street
Tbg. Size	Depth	City State
Tool	Depth	The above was done to satisfaction and supervision of owner agent or contractor.
Cement Left in Csg. <u>20.32'</u>	Shoe Joint <u>20.32'</u>	Cement Amount Ordered <u>160 gal 60% 40% 10% salt 2% gel 1/2"</u>

Meas Line	Displace <u>82 1/2</u>	1000 gal mud clear
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**EQUIPMENT**

Pumptrk <u>18</u>	No.	Cementer Helper	(ody)	Common
Bulktrk <u>1</u>	No.	Driver	Rick	Poz. Mix
Bulktrk <u>PU</u>	No.	Driver	Billy	Gel.
		Driver		Calcium

**JOB SERVICES & REMARKS**

Remarks:	Hulls
Rat Hole <u>30sx</u>	Salt
Mouse Hole	Flowseal
Centralizers <u>1-7 9210</u>	Kol-Seal
Baskets	Mud CLR 48 <u>1000 gal</u>
D/V or Port Collar	CFL-117 or CD110 CAF 38

Pipe on bottom broke circulation  
Pumped 1000 gal mud clear. Plug rat hole  
w 30sx plug to 5 1/2 csg. Pumped 130sx  
unhooked from 5 1/2 csg washed pump and  
lines. Released plug and displaced  
w 92% brk of water 7 and cc plug. Released  
and plug held.

List PSI: <u>600</u>	Mileage
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Plug Load PSI: <u>1600</u>	Guide Shoe
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X Signature <u>[Signature]</u>	Pumptrk Charge Mileage Tax Discount Total Charge
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**FLOAT EQUIPMENT**

Pipe on bottom broke circulation	Centralizer <u>9</u>
Pumped 1000 gal mud clear. Plug rat hole	Baskets
w 30sx plug to 5 1/2 csg. Pumped 130sx	AFU Inserts
unhooked from 5 1/2 csg washed pump and	Float Shoe <u>1</u>
lines. Released plug and displaced	Latch Down <u>1</u>
w 92% brk of water 7 and cc plug. Released	
and plug held.	