

# KANSAS CORPORATION COMMISSION ONE POINT STABILIZED OPEN FLOW OR DELIVERABILITY TEST

Type Test:

(See Instructions on Reverse Side)

- Open Flow  
 Deliverability

Test Date:  
11-12-13

API No. 15  
15-119-21333-00-00

Company O'BRIEN ENERGY RESOURCES CORP.			Lease VAIL		Well Number 5-31
County MEAD	Location 1320 FNL & 1320 FWL	Section 31	TWP 33S	RNG (E/W) 29W	Acres Attributed
Field MORROW		Reservoir MORROW		Gas Gathering Connection DCP MIDSTREAM	
Completion Date 3-18-13		Plug Back Total Depth 5990		Packer Set at NONE	
Casing Size 4.5	Weight 10.5	Internal Diameter 4.090	Set at 6382	Perforations 5848	To 5872
Tubing Size 2.375	Weight 4.7	Internal Diameter 1.995	Set at	Perforations	To
Type Completion (Describe) SINGLE GAS		Type Fluid Production NONE		Pump Unit or Traveling Plunger? Yes / No NO	
Producing Thru (Annulus / Tubing) TUBING		% Carbon Dioxide 0.151		% Nitrogen 3.436	
Vertical Depth(H) 5860		Pressure Taps FLANGE		(Meter Run) (Prover) Size 3.068"	
Pressure Buildup: Shut in 11-8-13 20 at 0900 (AM) (PM)		Taken 11-11-13 20 at 0900 (AM) (PM)			
Well on Line: Started 11-11-13 20 at 0900 (AM) (PM)		Taken 11-12-13 20 at 0900 (AM) (PM)			

### OBSERVED SURFACE DATA

Duration of Shut-in 72.0 Hours

Static / Dynamic Property	Orifice Size (inches)	Circle one: Meter or Prover Pressure psig (Pm)	Pressure Differential in Inches H <sub>2</sub> O	Flowing Temperature t	Well Head Temperature t	Casing Wellhead Pressure (P <sub>w</sub> ) or (P <sub>1</sub> ) or (P <sub>c</sub> )		Tubing Wellhead Pressure (P <sub>w</sub> ) or (P <sub>1</sub> ) or (P <sub>c</sub> )		Duration (Hours)	Liquid Produced (Barrels)
						psig	psia	psig	psia		
Shut-In						490.7	505.1	490.4	504.8	72.0	
Flow	1.125	60.8	41.0	39	75	1.956	210.0	182.1	196.5	24.0	0

### FLOW STREAM ATTRIBUTES

Plate Coefficient (F <sub>o</sub> ) (F <sub>p</sub> ) Mcfd	Circle one: Meter or Prover Pressure psia	Press Extension $\sqrt{P_m \times h}$	Gravity Factor F <sub>g</sub>	Flowing Temperature Factor F <sub>tl</sub>	Deviation Factor F <sub>pv</sub>	Metered Flow R (Mcfd)	GOR (Cubic Feet/ Barrel)	Flowing Fluid Gravity G <sub>m</sub>
6.2507	75.20	55.53	1.2181	1.0208	1.0083	435.2	NONE	0.674

### (OPEN FLOW) (DELIVERABILITY) CALCULATIONS

(P<sub>c</sub>)<sup>2</sup> = 255.1 ; (P<sub>w</sub>)<sup>2</sup> = 44.1 ; P<sub>o</sub> = 41.6 % ; (P<sub>c</sub> - 14.4) + 14.4 = 505.1 ; (P<sub>o</sub>)<sup>2</sup> = 0.207 ; (P<sub>o</sub>)<sup>2</sup> =

(P <sub>c</sub> ) <sup>2</sup> - (P <sub>o</sub> ) <sup>2</sup> or (P <sub>c</sub> ) <sup>2</sup> - (P <sub>w</sub> ) <sup>2</sup>	(P <sub>c</sub> ) <sup>2</sup> - (P <sub>w</sub> ) <sup>2</sup>	Choose formula 1 or 2: 1. P <sub>c</sub> <sup>2</sup> - P <sub>o</sub> <sup>2</sup> 2. P <sub>c</sub> <sup>2</sup> - P <sub>w</sub> <sup>2</sup> divided by: P <sub>c</sub> <sup>2</sup> - P <sub>w</sub> <sup>2</sup>	LOG of formula 1. or 2. and divide by: P <sub>c</sub> <sup>2</sup> - P <sub>w</sub> <sup>2</sup>	Backpressure Curve Slope = "n" or Assigned Standard Slope	n x LOG	Antilog	Open Flow Deliverability Equals R x Antilog (Mcfd)
254.92	211.03	1.208	0.0821	0.854	0.0701	1.1751	511.38

Open Flow 511 Mcfd @ 14.65 psia Deliverability Mcfd @ 14.65 psia

The undersigned authority, on behalf of the Company, states that he is duly authorized to make the above report and that he has knowledge of the facts stated therein, and that said report is true and correct. Executed this the 12 day of NOVEMBER, 20 13

Copy to KCC Wichita  
Witness (if any)

KCC WICHITA Precision Wireline & Testing  
Company

For Commission

NOV 27 2013

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Checked by  
*Mark A. Bond*

I declare under penalty of perjury under the laws of the state of Kansas that I am authorized to request exempt status under Rule K.A.R. 82-3-304 on behalf of the operator \_\_\_\_\_ and that the foregoing pressure information and statements contained on this application form are true and correct to the best of my knowledge and belief based upon available production summaries and lease records of equipment installation and/or upon type of completion or upon use being made of the gas well herein named.

I hereby request a one-year exemption from open flow testing for the \_\_\_\_\_ gas well on the grounds that said well:

(Check one)

- is a coalbed methane producer
- is cycled on plunger lift due to water
- is a source of natural gas for injection into an oil reservoir undergoing ER
- is on vacuum at the present time; KCC approval Docket No. \_\_\_\_\_
- is not capable of producing at a daily rate in excess of 250 mcf/D

I further agree to supply to the best of my ability any and all supporting documents deemed by Commission staff as necessary to corroborate this claim for exemption from testing.

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

**Instructions:** If a gas well meets one of the eligibility criteria set out in KCC regulation K.A.R. 82-3-304, the operator may complete the statement provided above in order to claim exempt status for the gas well.

At some point during the current calendar year, wellhead shut-in pressure shall have been measured after a minimum of 24 hours shut-in/buildup time and shall be reported on the front side of this form under **OBSERVED SURFACE DATA**. Shut-in pressure shall thereafter be reported yearly in the same manner for so long as the gas well continues to meet the eligibility criterion or until the claim of eligibility for exemption **IS** denied.

The G-2 form conveying the newest shut-in pressure reading shall be filed with the Wichita office no later than December 31 of the year for which it's intended to acquire exempt status for the subject well. The form must be signed and dated on the front side as though it was a verified report of annual test results.

**STATE OF KANSAS - CORPORATION COMMISSION**  
**MULTIPOINT BACK PRESSURE TEST**

FORM CG-1 Rev.

TYPE TEST: <input checked="" type="checkbox"/> Initial		<input type="checkbox"/> Annual		<input type="checkbox"/> Special		TEST DATE: 11-11-13	
COMPANY: O'BRIEN ENERGY RESOURCES CORP.				LEASE: VAIL		WELL NO: 5-31	
COUNTY: MEAD	LOCATION: 1320FNL&1320FWL		SECTION: 31	TWP: 33S	RNG (E/W): 29W	ACRES:	
API WELL NUMBER: 15-119-21333-00-00	RESERVOIR: MORROW	PIPELINE CONNECTION: DCP MIDSTREAM					
COMPLETION DATE: 3-18-13		PLUG BACK TOTAL DEPTH: 5990	PACKER SET AT: NONE				
CASING SIZE: 4.5	WT: 10.5	ID: 4.090	SET AT: 6382	PERF: 5848-5872	TO: NONE		
TUBING SIZE: 2.375	WT: 4.7	ID: 1.995	SET AT:	PERF: TO			
TYPE COMPLETION (Describe): SINGLE GAS		TYPE FLUID PRODUCTION: NONE					
PRODUCING THRU: Tubing		RESERVOIR TEMPERATURE F: 139		BAR PRESS - Pa: 14.4 Psia			
GAS GRAVITY - Gg: .674		% CARBON DIOXIDE: 0.151	% NITROGEN: 3.436	API GRAVITY OF LIQUID:			
VERTICAL DEPTH (H): 5860		TYPE METER CONN.: Flange		METER RUN SIZE: 3.068"			
REMARKS:							

**OBSERVED DATA**

DURATION OF SHUT-IN 72.0 HR.

RATE No.	ORIFICE SIZE in.	METER PRESSURE psig	DIFF. (h <sub>w</sub> )	FLOWING TEMP. t	WELL-HEAD TEMP. t	CASING WELLHEAD PRESS.		TUBING WELLHEAD PRESS.		DURATION HOURS	LIQUID PROD. Bbls.
						psig	(P <sub>w</sub> ) (P <sub>c</sub> ) psia	psig	(P <sub>c</sub> ) psia		
SHUT IN											
1	1.125	50.4	2.2	50	75	490.70	505.10	490.40	504.80	72.0	
2	1.125	52.4	11.0	48	75	475.20	489.60	474.90	489.30	1.0	0
3	1.125	55.7	30.0	47	75	448.90	463.30	447.60	462.00	1.0	0
4	1.125	59.9	60.0	48	75	410.40	424.80	405.20	419.60	1.0	0
5						362.00	376.40	349.60	364.00	1.0	0

**RATE OF FLOW CALCULATIONS**

RATE No.	COEFFICIENT F <sub>b</sub> Mcfd	METER PRESSURE psia	EXTENSION $\sqrt{P_m \cdot h_w}$	GRAVITY FACTOR F <sub>g</sub>	FLOWING TEMP FACTOR F <sub>t</sub>	DEVIATION FACTOR F <sub>pv</sub>	RATE OF FLOW Q Mcfd	GOR (ft <sup>3</sup> /Bbl)	G <sub>m</sub>
1	6.2507	64.80	11.94	1.2181	1.0098	1.0067	92.4	None	0.674
2	6.2507	66.80	27.11	1.2181	1.0117	1.007	210.3	None	0.674
3	6.2507	70.10	45.86	1.2181	1.0127	1.0074	356.2	None	0.674
4	6.2507	74.30	66.77	1.2181	1.0117	1.0078	518.3	None	0.674
5									

**PRESSURE CALCULATIONS**

RATE No.	P <sub>t</sub> psia	P <sub>c</sub> psia	P <sub>w</sub> psia	(P <sub>c</sub> ) <sup>2</sup> THOUSANDS	(P <sub>w</sub> ) <sup>2</sup> THOUSANDS	PLOTING POINTS		% SHUT-IN 100 $\left[ \frac{P_w - P_a}{P_c - P_a} \right]$
						(P <sub>c</sub> ) <sup>2</sup> - (P <sub>w</sub> ) <sup>2</sup> THOUSANDS	Q Mcfd	
1		505.1	489.6	255.1	239.7	15.42	92.4	96.84
2		505.1	463.3	255.1	214.6	40.48	210.3	91.48
3		505.1	424.8	255.1	180.5	74.67	356.2	83.64
4		505.1	376.4	255.1	141.7	113.45	518.3	73.77
5								

INDICATED WELLHEAD OPEN FLOW 1,043 Mcfd @ 14.65 psia "n" = 0.8539

The undersigned authority, on behalf of the Company, states that he is duly authorized to make the above report and that he has knowledge of the facts stated therein, and that said report is true and correct. Executed this the 11 day of November, 2013

*Copy to KCC Wichita*  
 Witness (if any)

**KCC WICHITA**

**NOV 27 2013**

**PRECISION WIRELINE AND TESTING**  
 For Company

**MARK BROCK**  
 Checked by

For Commission

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(Rev. 10/96)

# BACK PRESSURE CURVE

OPERATOR: O'BRIEN ENERGY RESOURCES CORP.

DATE OF TEST: 11-11-13

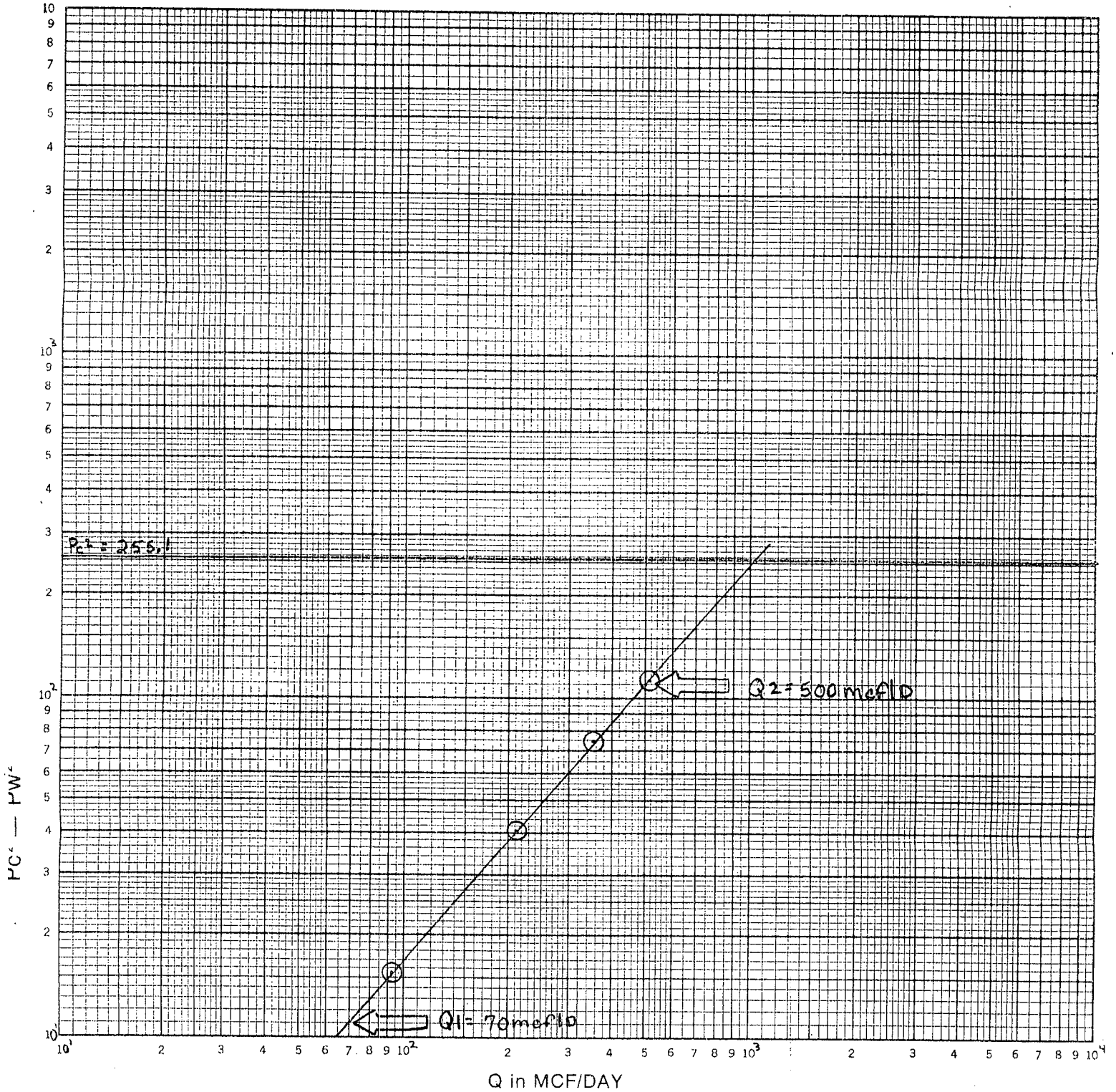
WELL NAME: VAIL 5-31

TYPE OF PLOT:

LOCATION: 1320' FNL & 1320' FWL 31-33S-29W

COUNTY: MEAD

STATE: KS



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LOG Q-2 = 2.6990

LOG Q-1 = 1.8451

'n' = 0.8539

PRECISION WIRELINE and TESTING  
P.O. BOX 560  
LIBERAL, KANSAS 67905-0560  
620-624-4505

PRODUCER O'BRIEN ENERGY RESOURCES CORP CSG 4.5 WT 10.5 SET @ 6382 TD 6408 PB 5990 GI 2671  
WELL NAME VAIL 5-31 TBG 2.375 WT 4.7 SET @          SN          PKR          KB           
LOCATION 1320 FNL & 1320 FWL 31-33S-29W PERFS 5848 TO 5872 TO          TO          TO           
COUNTY MEAD STATE KS PROVER          METER 3" TAPS FLANGE ORIFICE 1.125 PCR          TCR           
GG 674 API          @          GM          RESERVOIR MORROW

DATE TIME OF READING	ELAP TIME HOUR	WELLHEAD PRESSURE DATA						MEASUREMENT DATA				LIQUIDS		TYPE INITIAL _____ SPEICAL _____ ENDING _____ TEST: ANNUAL _____ RETEST _____ DATE <u>11-12-13</u>				
		CSG PSIG	Δ P CSG	TBG PSIG	Δ P TBG	BHP PSIA	Δ P BHP	PRESS PSIG	DIFF.	TEMP	Q MCFD	COND BBL.	WATER BBL.	REMARKS PERTINENT TO TEST DATA QUALITY				
MONDAY																		
11-11-13																		
0900	72.0	490.7		490.4														1ST RATE OF MULTI-PT. TEST THROUGH METER RUN 4/64
0915		476.7	-14.0	476.1	-14.3			50.5	2.3	48	95							
0930	0.5	476.8	+0.1	476.4	+0.3			50.1	1.1	49	65							
0945		476.4	-0.4	476.0	-0.4			50.8	2.3	50	95							
1000	1.0	475.2	-1.2	474.9	-1.1			50.4	2.2	50	92	0	0					
1000																		2ND RATE OF MULTI-PT. TEST THROUGH METER RUN 9/64
1015		460.8	-14.4	459.7	-15.2			51.9	10.3	50	203							
1030	1.5	456.1	-4.7	454.9	-4.8			52.0	12.8	50	226							
1045		451.5	-4.6	450.1	-4.8			52.6	11.5	48	215							
1100	2.0	448.9	-2.6	447.6	-2.5			52.4	11.0	48	210	0	0					3RD RATE OF MULTI-PT. TEST THROUGH METER RUN 12/64
1100																		
1115		427.3	-21.6	423.2	-24.4			56.2	35.0	46	386							
1130	2.5	421.6	-5.7	417.4	-5.8			55.1	36.5	47	391							
1145		412.9	-8.7	406.8	-10.6			57.0	33.0	47	377							
1200	3.0	410.4	-2.5	405.2	-1.6			55.7	30.0	47	356	0	0					
1200																		4TH RATE OF MULTI-PT. TEST THROUGH METER RUN 14/64
1215		388.9	-21.5	379.3	-25.9			58.8	51.6	46	477							
1230	3.5	382.1	-6.8	372.0	-7.3			59.3	53.0	47	485							
1245		368.7	-13.4	357.2	-14.8			60.1	58.7	48	513							
1300	4.0	362.0	-6.7	349.6	-7.6			59.9	60.0	48	518	0	0					OBTAIN GAS SAMPLE.
1300																		
TUESDAY																		
11-12-13																		
0900	24.0	195.6		182.1				60.8	41.0	39	435	0	0					END IPT. TEST 14/64 CHOKE

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