

KANSAS CORPORATION COMMISSION

ONE POINT STABILIZED OPEN FLOW OR DELIVERABILITY TEST

Type Test:

- Open Flow
 Deliverability

(See Instructions on Reverse Side)

Test Date: July-04

API No. 15 ZWEYGARDT 31-5

023-20547-00-00

Company <u>NOBLE ENERGY, INC</u>		Lease <u>S</u>	Well Number <u>40</u>
County <u>CHERRY CREEK</u>	Location <u>NIORARA</u>	TWP <u>41W</u>	RNG (E/W) <u>BITTER CREEK</u>
Field <u>6/1/04</u>	Reservoir <u>1556</u>	Gas Gathering Connection <u>N/A</u>	
Completion Date <u>4.5"</u>	Plug Back Total Depth <u>10.5"</u>	Packer Set at <u>1410 - 1440</u>	
Casing Size <u>N/A</u>	Weight	Internal Diameter	Set at
Tubing Size <u>GAS</u>	Weight	Internal Diameter <u>GAS</u>	Set at
Type Completion (Describe) <u>CASING</u>		Type Fluid Production <u>0</u>	Pump Unit or Traveling Plunger? <u>NO</u>
Producing Thru (Annulus / Tubing)		% Carbon Dioxide	% Nitrogen <u>4.5</u>
Vertical Depth(H)		Pressure Taps	Gas Gravity - G _s <u>0.600</u>
Pressure Buildup: Shut in <u>June 1</u> 20 <u>04</u> at <u>7</u> (AM) (PM)		Taken <u>June 7</u> 20 <u>04</u> at <u>7</u> (AM) (PM)	
Well on Line: Started _____ 20____ at _____ (AM) (PM)		Taken _____ 20____ at _____ (AM) (PM)	

OBSERVED SURFACE DATA

Duration of Shut-in 168 Hours

Static / Dynamic Property	Orifice Size (inches)	Circle one: <u>Meter</u> Prover Pressure psig (P _m)	Pressure Differential in Inches H ₂ O	Flowing Temperature t	Well Head Temperature t	Casing Wellhead Pressure (P _w) or (P ₁) or (P _c)		Tubing Wellhead Pressure (P _w) or (P ₁) or (P _c)		Duration (Hours)	Liquid Produced (Barrels)
						psig	psia	psig	psia		
Shut-In							<u>278</u>				
Flow	<u>0.50</u>	<u>156</u>	<u>6.6</u>	<u>71</u>	<u>71</u>			<u>156</u>	<u>744</u>	<u>0</u>	

FLOW STREAM ATTRIBUTES

Plate Coefficient (F _b) (F _p) Mcfd	Circle one: <u>Meter</u> Prover Pressure psia	Press Extension $\sqrt{P_m \times h}$	Gravity Factor F _g	Flowing Temperature Factor F _{tt}	Deviation Factor F _{pv}	Metered Flow R (Mcfd)	GOR (Cubic Feet/ Barrel)	Flowing Fluid Gravity G _m
						<u>53.7</u>	<u>N/A</u>	<u>0.6</u>

(OPEN FLOW) (DELIVERABILITY) CALCULATIONS

(P_c)² = _____ : (P_w)² = _____ : P_d = _____ % (P_c - 14.4) + 14.4 = _____ :

(P _c) ² - (P _s) ² or (P _c) ² - (P _d) ²	(P _c) ² - (P _w) ²	Choose formula 1 or 2: 1. P _c ² - P _a ² 2. P _c ² - P _d ² divided by: P _c ² - P _w ²	LOG of formula 1. or 2. and divide by: $\left[\frac{P_c^2 - P_w^2}{P_c^2 - P_w^2} \right]$	Backpressure Curve Slope = "n" Assigned Standard Slope	n x LOG $\left[\frac{P_c^2 - P_w^2}{P_c^2 - P_w^2} \right]$	Antilog
				<u>0.93</u>		
<u>SEE ATTACHED SHEET FOR JULY, 2004</u>						

Open Flow 76 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 13 day of August, 2004.

Witness (if any)

For Company

Checked by

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Open Flow Deliverability
Equals R x Antilog
CONSERVATION DIVISION
WICHITA, KS

100 Glenborough Drive
Suite 100
Houston, TX 77067-3610

Tel: 281.872.3100
Fax: 281.872.3111
www.nobleenergyinc.com



August 13, 2004

Jim Hemmen
Kansas Corporation Commission
130 S. Market
Room 2078
Wichita, KS 67202-3802

Subject: Open flow test of Noble Energy gas wells
Cheyenne County, KS

Dear Mr. Hemmen:

This letter is in response to correspondence dated July 16, 2004 from the KCC. The four wells in question produce from the Niobrara formation. The Niobrara is a chalk with very low permeability, usually 1 md or less. In order for a Niobrara gas well to produce, it must be stimulated with a hydraulic fracture treatment that uses proppant to keep the fracture open.

These four wells were all perforated and frac'd in the Niobrara. Following the frac treatments, the wells were flowed to atmosphere for about 5 days to recover load fluid from the frac and ensure that the wells were not flowing back excessive sand. They were then shut in for 3 days. After 72 hours, a 2" orifice plate tester was installed and a four-point test with a 24-hour extended flow test was conducted. A copy of these results were reported to KCC and are referenced in the 7/16/04 letter.

This initial four-point test is used by Noble only as a qualitative assessment of the well's potential. We look at the initial shut in pressure and whether or not the well is misting or producing water during the test. We typically take the 24-hour one-point rate and divide it by four as an initial estimate of what the well will first produce for plate sizing and pipeline nominations. We do not believe the initial four-point test is indicative of the long term performance of the Niobrara reservoir. The well is producing in linear flow from the hydraulic fracture during the four-point test. The true reservoir performance is not observed until the well begins flowing in radial flow and that does not occur until the well has produced for more than 2-3 days.

We believe a 30-day average rate of production provides the best value to use in the potential test and we have attached those values for these wells. We use the shut-in casing pressure prior to the well being turned on, the average flowing pressure and the slope of the 4-point test above to determine the value of "C". We then calculate the AOF using a flowing pressure of 14.65 psia. Those calculations are attached, also.

We are also enclosing production graphs of offset wells in the area. The graphs show that no well has ever produced over 250 MCFPD. Thus, we feel that Niobrara gas wells in Cheyenne County, KS should be considered exempt from testing.

Should you have any questions, please contact the undersigned at 281-874-6773.

Sincerely,
Noble Energy, Inc.

A handwritten signature in black ink that reads 'Scott Steinke'.

Scott Steinke
Petroleum Engineer

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CONSERVATION DIVISION
WICHITA, KS

ZWEY GARDT 31-5

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 Noble Energy, Inc. 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 Zweygardt 31-5 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: 8/13/04

Signature: Scott A. Slomko
Title: Engineer

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WICHITA, KS

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.

ZWEYGARDT 31-5

JULY 2004

Date	Time	Total Flow	Units	Flow Time	Units	Flow Rate	Units	DP Avg	Units	SP Avg	Units	PT Avg	Units	Sequence	
04/07/01	07:00:02	55,801.80	SCF	24:00:00	hrs	55,801.80	SCFD	7.20	InH2O	156.59	psi	65.69	DegF	26	
04/07/02	07:00:02	55,999.10	SCF	24:00:00	hrs	55,999.10	SCFD	7.17	InH2O	156.67	psi	60.16	DegF	27	
04/07/03	07:00:02	53,365.40	SCF	24:00:00	hrs	53,365.40	SCFD	6.58	InH2O	157.21	psi	67.57	DegF	28	
04/07/04	07:00:02	51,958.30	SCF	24:00:00	hrs	51,958.30	SCFD	6.27	InH2O	157.22	psi	70.47	DegF	29	
04/07/05	07:00:02	52,993.80	SCF	23:59:57	hrs	52,995.70	SCFD	6.49	InH2O	156.94	psi	67.00	DegF	30	
04/07/06	07:00:02	53,245.20	SCF	24:00:00	hrs	53,245.20	SCFD	6.55	InH2O	156.78	psi	66.30	DegF	31	
04/07/07	07:00:02	52,729.00	SCF	24:00:03	hrs	52,727.20	SCFD	6.44	InH2O	156.85	psi	68.10	DegF	32	
04/07/08	07:00:02	49,068.40	SCF	24:00:00	hrs	49,068.40	SCFD	5.65	InH2O	157.36	psi	76.61	DegF	33	
04/07/09	07:00:02	49,880.90	SCF	23:59:57	hrs	49,882.70	SCFD	5.84	InH2O	157.10	psi	75.65	DegF	34	
04/07/10	07:00:02	52,051.10	SCF	24:00:03	hrs	52,049.30	SCFD	6.39	InH2O	156.33	psi	75.48	DegF	35	
04/07/11	07:00:02	53,192.10	SCF	24:00:00	hrs	53,192.10	SCFD	6.67	InH2O	155.95	psi	74.18	DegF	36	
04/07/12	07:00:02	52,883.30	SCF	23:59:57	hrs	52,885.20	SCFD	6.59	InH2O	156.16	psi	74.14	DegF	37	
04/07/13	07:00:01	50,718.00	SCF	23:49:49	hrs	51,079.20	SCFD	6.19	InH2O	156.50	psi	79.18	DegF	38	
04/07/14	07:00:02	54,331.30	SCF	23:58:11	hrs	54,399.90	SCFD	7.03	InH2O	156.66	psi	79.54	DegF	39	
04/07/15	07:00:02	55,595.60	SCF	24:00:00	hrs	55,595.60	SCFD	7.32	InH2O	156.06	psi	76.15	DegF	40	
04/07/16	07:00:02	53,994.40	SCF	23:59:57	hrs	53,996.20	SCFD	6.84	InH2O	156.70	psi	73.49	DegF	41	
04/07/17	07:00:02	54,495.70	SCF	24:00:03	hrs	54,493.90	SCFD	6.88	InH2O	156.72	psi	67.28	DegF	42	
04/07/18	07:00:02	53,076.10	SCF	23:59:57	hrs	53,077.90	SCFD	6.56	InH2O	157.01	psi	71.17	DegF	43	
04/07/19	07:00:02	52,512.40	SCF	24:00:03	hrs	52,510.60	SCFD	6.49	InH2O	156.77	psi	75.36	DegF	44	
04/07/20	07:00:02	51,799.00	SCF	24:00:00	hrs	51,799.00	SCFD	6.34	InH2O	156.90	psi	77.93	DegF	45	
04/07/21	07:00:02	49,995.30	SCF	24:00:00	hrs	49,995.30	SCFD	5.92	InH2O	157.34	psi	80.72	DegF	46	
04/07/22	07:00:02	51,086.00	SCF	24:00:00	hrs	51,086.00	SCFD	6.13	InH2O	157.16	psi	75.46	DegF	47	
04/07/23	07:00:02	56,177.20	SCF	23:59:58	hrs	56,178.50	SCFD	7.36	InH2O	155.58	psi	67.08	DegF	48	
04/07/24	07:00:02	58,282.90	SCF	24:00:02	hrs	58,281.50	SCFD	7.77	InH2O	155.14	psi	56.10	DegF	49	
04/07/25	07:00:01	58,166.60	SCF	23:59:59	hrs	58,167.30	SCFD	7.74	InH2O	155.15	psi	56.42	DegF	50	
04/07/26	07:00:02	57,648.10	SCF	24:00:01	hrs	57,647.40	SCFD	7.68	InH2O	155.05	psi	60.81	DegF	51	
04/07/27	07:00:03	57,118.40	SCF	24:00:00	hrs	57,118.40	SCFD	7.64	InH2O	154.74	psi	66.32	DegF	52	
04/07/28	07:00:02	56,645.10	SCF	23:59:57	hrs	56,647.00	SCFD	7.58	InH2O	154.60	psi	70.43	DegF	53	
04/07/29	07:00:02	57,412.60	SCF	24:00:00	hrs	57,412.60	SCFD	7.73	InH2O	154.36	psi	66.16	DegF	54	
04/07/30	07:00:02	53,262.10	SCF	24:00:03	hrs	53,260.20	SCFD	6.62	InH2O	155.81	psi	68.28	DegF	55	
04/07/31	07:00:02	50,218.40	SCF	24:00:00	hrs	50,218.40	SCFD	5.87	InH2O	156.85	psi	70.58	DegF	56	
Flow Grand Total:		1,665.70	MCF												

53.7

$$P_c (W/H) = 265 \text{ psig}$$

$$= 278 \text{ psia}$$

$$P_w = 156 \text{ psia}$$

$$Q = C(P_c^2 - P_w^2)^{0.93}$$

$$53.7 = C(278^2 - 156^2)^{0.93}$$

$$C = 0.0022$$

$$P_c^2 - P_w^2 = 53,000$$

$$AOF = 0.0022(278^2 - 14.65^2)^{0.93}$$

$$AOF = 76.14 \text{ MCF/D}$$

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 WICHITA, KS

ZWEYGARDT 31-5

JUNE 2004

Date	Time	Total Flow	Units	Flow Time	Units	Flow Rate	Units	DP Avg	Units	SP Avg	Units	PT Avg	Units	Sequence
04/06/07	10:27:25	0.00	SCF	00:00:00	hrs	0.00	SCFD	0.15	InH2O	12.85	psi	92.45	DegF	1
04/06/07	11:29:03	0.00	SCF	00:00:00	hrs	0.00	SCFD	0.15	InH2O	12.85	psi	92.45	DegF	2
04/06/08	07:00:02	31,762.60	SCF	12:25:45	hrs	61,331.80	SCFD	9.77	InH2O	140.82	psi	72.75	DegF	3
04/06/09	07:00:02	56,347.70	SCF	24:00:02	hrs	56,346.40	SCFD	8.01	InH2O	144.94	psi	73.11	DegF	4
04/06/10	07:00:02	55,204.60	SCF	24:00:01	hrs	55,204.00	SCFD	7.55	InH2O	145.66	psi	65.80	DegF	5
04/06/11	07:00:01	46,392.10	SCF	24:00:00	hrs	46,392.10	SCFD	5.18	InH2O	151.82	psi	70.29	DegF	6
04/06/12	07:00:02	40,601.60	SCF	24:00:00	hrs	40,601.60	SCFD	3.86	InH2O	155.75	psi	71.08	DegF	7
04/06/13	07:00:02	39,783.10	SCF	24:00:00	hrs	39,783.10	SCFD	3.71	InH2O	156.02	psi	72.64	DegF	8
04/06/14	07:00:02	38,904.30	SCF	24:00:00	hrs	38,904.30	SCFD	3.57	InH2O	156.23	psi	75.97	DegF	9
04/06/15	07:00:02	38,272.00	SCF	24:00:00	hrs	38,272.00	SCFD	3.43	InH2O	156.62	psi	73.26	DegF	10
04/06/16	07:00:02	41,089.00	SCF	23:59:57	hrs	41,090.40	SCFD	3.98	InH2O	154.82	psi	71.59	DegF	11
04/06/17	07:00:01	47,429.70	SCF	24:00:03	hrs	47,428.00	SCFD	5.29	InH2O	151.13	psi	58.17	DegF	12
04/06/18	07:00:02	48,504.40	SCF	24:00:00	hrs	48,504.40	SCFD	5.54	InH2O	150.49	psi	56.38	DegF	13
04/06/19	07:00:02	46,365.50	SCF	23:59:57	hrs	46,367.20	SCFD	4.91	InH2O	152.64	psi	48.86	DegF	14
04/06/20	07:00:02	45,665.50	SCF	24:00:03	hrs	45,663.90	SCFD	4.81	InH2O	152.84	psi	54.28	DegF	15
04/06/21	07:00:02	43,639.30	SCF	23:59:57	hrs	43,640.80	SCFD	4.45	InH2O	153.49	psi	62.76	DegF	16
04/06/22	07:00:02	44,466.30	SCF	24:00:03	hrs	44,464.70	SCFD	4.56	InH2O	153.29	psi	54.98	DegF	17
04/06/23	07:00:01	44,581.40	SCF	23:59:59	hrs	44,581.90	SCFD	4.70	InH2O	152.49	psi	65.48	DegF	18
04/06/24	07:00:02	43,461.90	SCF	24:00:01	hrs	43,461.40	SCFD	4.52	InH2O	152.62	psi	71.80	DegF	19
04/06/25	07:00:02	44,399.90	SCF	24:00:00	hrs	44,399.90	SCFD	4.67	InH2O	152.05	psi	64.59	DegF	20
04/06/26	07:00:02	42,669.20	SCF	24:00:00	hrs	42,669.20	SCFD	4.29	InH2O	153.28	psi	65.61	DegF	21
04/06/27	07:00:02	41,956.70	SCF	24:00:00	hrs	41,956.70	SCFD	4.13	InH2O	153.59	psi	64.85	DegF	22
04/06/28	07:00:01	42,222.50	SCF	24:00:00	hrs	42,222.50	SCFD	4.14	InH2O	153.75	psi	60.22	DegF	23
04/06/29	07:00:02	41,792.60	SCF	24:00:00	hrs	41,792.60	SCFD	4.13	InH2O	153.55	psi	68.01	DegF	24
04/06/30	07:00:02	56,900.30	SCF	24:00:00	hrs	56,900.30	SCFD	7.57	InH2O	156.05	psi	69.71	DegF	25
Flow Grand Total:		1,022.41	MCF											

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NOBLE ENERGY, INC.

ZWEYGARDT #31-5 TEST 6/1/04

" λ " = 0.93 " θ " = 47-1°

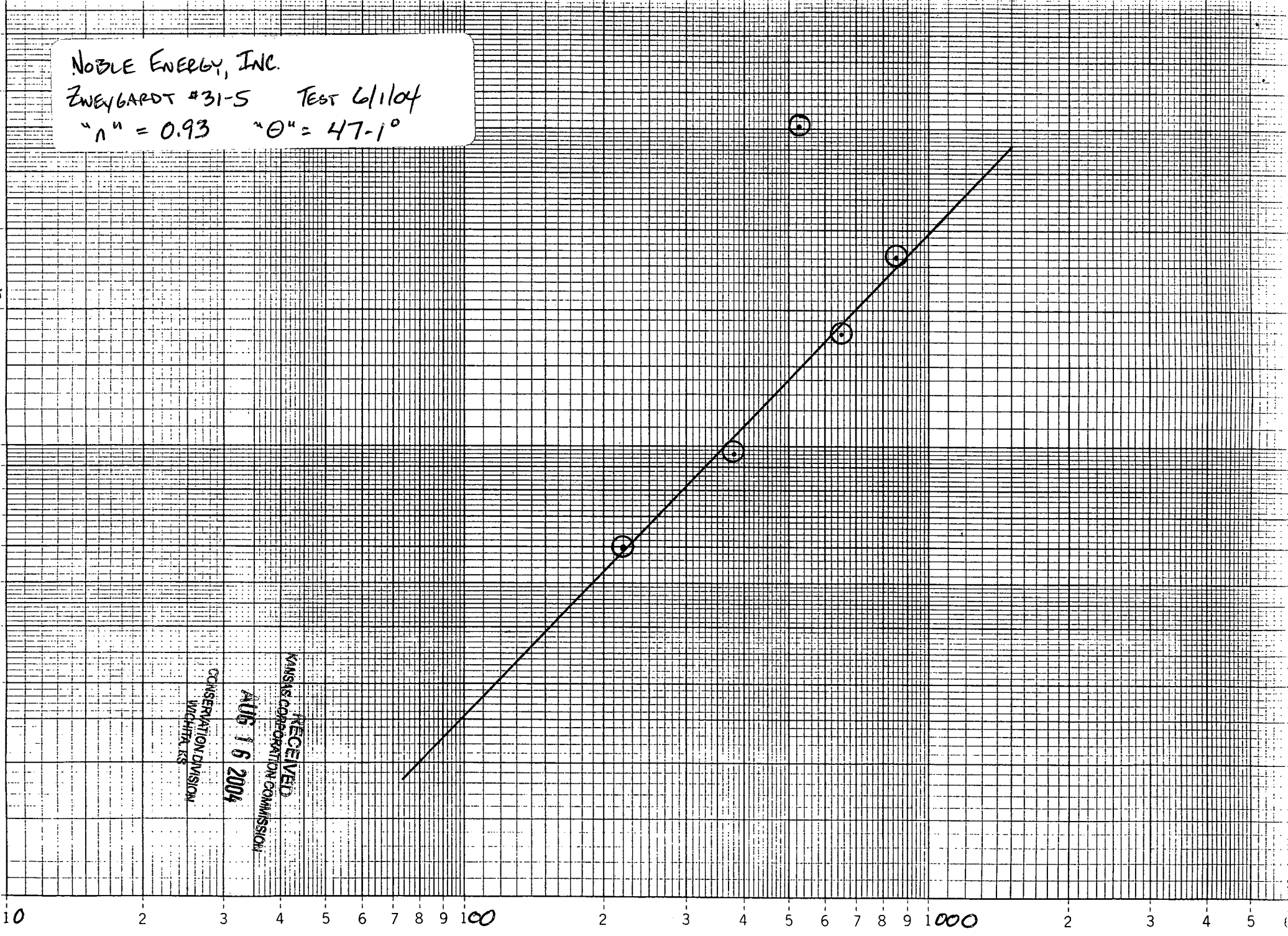
$(P_c^2 - P_w^2) / 1000$

9
8
7
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10 2 3 4 5 6 7 8 9 100 2 3 4 5 1000 2 3 4 5

Q, MCF/D



MULTIPOINT BACK PRESSURE TEST

Test Type ;	INITIAL	State;	Kansas	Test Date;	08/01/04
Company ;	Noble Energy Inc.	Lease ;	Zweggart	Well No. ;	31 5
County ;	Cheyenne	Location ;	NWNE/4SEC.5-T4S-R41W	Acres ;	
Field;	Cherry Creek	Reservoir ;	Niobrara	Pipeline Conn.	None
Completion Date ;		PBDT ;	1556	Packer Set ;	
Casing Size ;	4 1/2" Wt. ; 10.6#	Set @ ;	1598	Perfs. ;	N/A
Tubing Size ;	None Wt. ;	Set @ ;		Perfs. ;	N/A
Type of Completion ;	Single Gas	Type Fluid Prod ;	None		
Producing Thru ;	Casing	Reservoir Temp. F ;	-	Bar. Press. ;	13 PSI
Gas Gravity ;	.6 (est)	% CO2 ;	- % N2 ; -	Liquid API Grav	N/A
Vertical Depth ;	1448	Type Meter Conn. ;	None	Prover Size ;	2"

Remarks: Used 2" critical flow prover & dead weight tester.

Rate No.	Orifice Size In.	Prover Press. psig	Flowing Temp. deg. F	Casing Wellhead Pressure		Shut-in Hrs. hrs.	Liquid Prod. bbls.
				psig	psia		
Shut-in	blank	286	--	266	279	0	0
1	3/16	255	64	255	268	1	0
2	1/4	248	64	248	261	1	0
3	11/32	232	64	232	245	1	0
4	13/32	214	65	214	227	1	0
5	3/8	152	87	152	165	24	0

RATE OF FLOW CALCULATIONS

Rate No.	Coefficient mcf/d	Prover Press. psia	Gravity Factor Fg	Temp. Factor Ft	Deviation Factor Fpv	Rate of Flow Q mcf/d
1	0.6237	268	1.291	0.9962	1.0198	219
2	1.1150	261	1.291	0.9962	1.0193	381
3	2.0350	245	1.291	0.9962	1.0181	653
4	2.8066	227	1.291	0.9952	1.0187	862
5	2.4380	165	1.291	0.9933	1.0121	522

PRESSURE CALCULATIONS

Rate No.	Pc psia	Pw psia	Pc^2 /1000	Pw^2 /1000	Pc^2-Pw^2 /1000	Q mcf/d	Shut-in %
1	279	268	77.8	71.8	6.0	219	95.86
2	279	261	77.8	68.1	9.7	381	93.23
3	279	245	77.8	60.0	17.8	653	87.22
4	279	227	77.8	51.5	26.3	862	80.45
5	279	165	77.8	27.2	50.6	522	57.14

INDICATED WELLHEAD OPEN FLOW = 779.00 Mcfd "n" = 0.93

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 3rd day of June, 2004

Wayne Mahon For Excell Drilling Co.

Signed: Wayne Mahon Title: Field Technician

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WICHITA, KS



David Ledet

08/12/2004 04:05 PM

To: Scott Steinke/Production/Houston_Onshore/Samedan@Samedan
cc:
Subject: one-pt test for KS wells

Scott,

Here is the pressure info on the 4 KS wells in question:

Zweygardt 13-33 SIFBU on 6-2-04 SICP on 6-9-04 at 242 psi Turned on to sales 6-10-04 , -
.500 orifice plate -

Production for 6-11-04 = 52 mcf
" 6-12-04 = 52 mcf
" 6-13-04 = 39 mcf

Zweygardt 22-5 SIFBU on 6-3-04 SICP on 6-7-04 at 272 psi Turned on to sales 6-7-04 -
.500 orifice plate

Production for 6-8-04 = 29 mcf
" 6-9-04 = 57 mcf
" 6-10-04 = 57 mcf
" 6-11-04 = 57 mcf

Zweygardt 31-5 SIFBU on 6-1-04 SICP on 6-7-04 at 265 psi Turned on to sales 6-7-04 -
.500 orifice plate

Production for 6-8-04 = 31 mcf
" 6-9-04 = 31 mcf
" 6-10-04 = 55 mcf
" 6-11-04 = 46 mcf

Zweygardt 13-32 SIFBU on 6-4-04 SICP on 6-9-04 at 262 psi Turned on to sales on 6-9-04 -
.500 orifice plate

Production for 6-10-04 = 35 mcf
" 6-11-04 = 54 mcf
" 6-12-04 = 54 mcf
" 6-13-04 = 54 mcf

If you need anything else, please call

David

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