

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

Type Test:

- Open Flow  
 Deliverability

(See Instructions on Reverse Side)

Test Date:  
09/09/2003

API No. 15  
023-20501-00-00

|                                      |                         |                                      |                        |  |                             |  |
|--------------------------------------|-------------------------|--------------------------------------|------------------------|--|-----------------------------|--|
| Company<br><b>NOBLE ENERGY, INC</b>  |                         | Lease<br><b>ZWEYGARDT</b>            |                        |  | Well Number<br><b>24-32</b> |  |
| County<br><b>CHEYENNE</b>            | Location<br><b>SESW</b> | Section<br><b>32</b>                 | TWP<br><b>3S</b>       | RNG (E/W)<br><b>41</b>                                   | Acres Attributed            |  |
| Field<br><b>CHERR CREEK</b>          |                         | Reservoir<br><b>NIORARA</b>          |                        | Gas Gathering Connection<br><b>BITTER CREEK PIPELINE</b> |                             |  |
| Completion Date<br><b>09/09/2003</b> |                         | Plug Back Total Depth<br><b>1524</b> |                        | Packer Set at  |                             |  |
| Casing Size<br><b>4 1/2"</b>         | Weight<br><b>10.5#</b>  | Internal Diameter<br><b>4.052</b>    | Set at<br><b>1566'</b> | Perforations<br><b>1400</b>                              | To<br><b>1436</b>           |  |
| Tubing Size                          | Weight                  | Internal Diameter                    | Set at                 | Perforations   | To                          |  |

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|   |                                      |   |  |
|---|--------------------------------------|---|--|
| Type Completion (Describe)<br><b>SINGLE (GAS)</b>   | Type Fluid Production<br><b>NONE</b> | Pump Unit or Traveling Plunger? Yes / No<br><b>NO</b> |  |
| Producing Thru (Annulus / Tubing)<br><b>CASING</b>  | % Carbon Dioxide                     | % Nitrogen  | Gas Gravity - G <sub>s</sub><br><b>0.6</b> |
| Vertical Depth(H)<br><b>1604</b>  | Pressure Taps                        |   | (Meter Run) (Prover) Size<br><b>2"</b>     |
| Pressure Buildup: Shut in <b>8/30</b> <b>20 03</b> at _____ (AM) (PM) Taken <b>9/03</b> <b>20 03</b> at _____ (AM) (PM) |                                      |   |  |
| Well on Line: Started <b>9/09</b> <b>20 03</b> at <b>3:10</b> (AM) (PM) Taken _____ <b>20</b> at _____ (AM) (PM)        |                                      |   |  |

**OBSERVED SURFACE DATA**

Duration of Shut-in \_\_\_\_\_ Hours

| Static / Dynamic Property | Orifice Size (inches) | Circle one:<br>Meter<br>Prover Pressure<br>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>i</sub> ) or (P <sub>c</sub> ) |      | Tubing Wellhead Pressure (P <sub>w</sub> ) or (P <sub>i</sub> ) or (P <sub>c</sub> ) |      | Duration (Hours) | Liquid Produced (Barrels) |
|---------------------------|-----------------------|--|--|-----------------------|-------------------------|--|------|--|------|------------------|---------------------------|
|                           |                       |  |  |                       |                         | psig   | psia | psig   | psia |                  |                           |
| Shut-in                   |                       |  |  |                       |                         | 257  |      | NA   |      |                  |                           |
| Flow                      | 3/8                   | 115  |  | 60                    |                         | 280  |      | NA   |      | 24               | 0                         |

**FLOW STREAM ATTRIBUTES**

| Plate Coefficient (F <sub>p</sub> ) (F <sub>p</sub> ) Mcfd | Circle one:<br>Meter or<br>Prover Pressure<br>psia | Press Extension $\sqrt{P_m \times h}$ | Gravity Factor F <sub>g</sub> | Flowing Temperature Factor F <sub>t</sub> | Deviation Factor F <sub>pv</sub> | Metered Flow R (Mcfd) | GOR (Cubic Feet/ Barrel) | Flowing Fluid Gravity G <sub>m</sub> |
|--|--|---------------------------------------|-------------------------------|---|----------------------------------|-----------------------|--------------------------|--------------------------------------|
|  |  |                                       |                               |   |                                  |                       |                          |                                      |

**(OPEN FLOW) (DELIVERABILITY) CALCULATIONS**

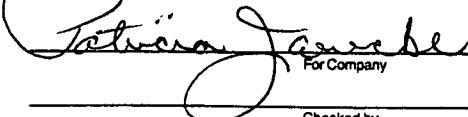
(P<sub>c</sub>)<sup>2</sup> = \_\_\_\_\_ : (P<sub>w</sub>)<sup>2</sup> = \_\_\_\_\_ : P<sub>g</sub> = \_\_\_\_\_ % (P<sub>c</sub> - 14.4) + 14.4 = \_\_\_\_\_ : (P<sub>a</sub>)<sup>2</sup> = 0.207  
(P<sub>d</sub>)<sup>2</sup> = \_\_\_\_\_

| (P <sub>c</sub> ) <sup>2</sup> - (P <sub>a</sub> ) <sup>2</sup><br>or<br>(P <sub>c</sub> ) <sup>2</sup> - (P <sub>d</sub> ) <sup>2</sup> | (P <sub>c</sub> ) <sup>2</sup> - (P <sub>w</sub> ) <sup>2</sup> | Choose formula 1 or 2:<br>1. P <sub>c</sub> <sup>2</sup> - P <sub>a</sub> <sup>2</sup><br>2. P <sub>c</sub> <sup>2</sup> - P <sub>d</sub> <sup>2</sup><br>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: $\frac{P_c^2 - P_a^2}{P_c^2 - P_w^2}$ | Backpressure Curve Slope = "n"<br>----- or -----<br>Assigned Standard Slope | n x LOG [ ] | Antilog | Open Flow Deliverability Equals R x Antilog (Mcfd) |
|--|---|---|--|---|-------------|---------|--|
|  |   |   |  |   |             |         |  |

Open Flow Mcfd @ 14.65 psia      Deliverability **113**      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 26th day of September, 20 03.

\_\_\_\_\_  
Witness (if any)

  
For Company

\_\_\_\_\_  
For Commission

\_\_\_\_\_  
Checked by

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 24-32 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: 09/26/03

Signature:   
Title: REGULATORY SPECIALIST III

**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.

## MULTIPOINT BACK PRESSURE TEST

|                                  |                                   |                      |
|----------------------------------|-----------------------------------|----------------------|
| Test Type ; INITIAL              | State: Kansas                     | Test Date: 09/03/03  |
| Company ; Nobel Energy           | Lease ; Zweggardt                 | Well No. ; 24 32     |
| County ; Cheyenne                | Location ; SESW/4,Sec.32-T3S-R41W | Acres ;              |
| Field ; Cherry Creek             | Reservoir ; Niobrara              | Pipeline Conn. None  |
| Completion Date ;                | PBTD ; 1524'                      | Packer Set ;         |
| Casing Size ; 4 1/2" Wt. ; 10.5# | Set @ ; 1566'                     | Perfs. ; N/A         |
| Tubing Size ; None Wt. ;         | Set @ ;                           | Perfs. ;             |
| 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 ; 1436'           | Type Meter Conn. ; None           | Prover Size ; 2"     |

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

| Rate No. | OBSERVED DATA |               |               |                          |      | Shut-in Hrs.: |              |
|----------|---------------|---------------|---------------|--------------------------|------|---------------|--------------|
|          | Orifice Size  | Prover Press. | Flowing Temp. | Casing Wellhead Pressure |      | Duration      | Liquid Prod. |
|          | in.           | psig          | deg. F        | psig                     | psia | hrs.          | bbls.        |
| Shut-in  | blank         | 257           | --            | 257                      | 270  | 0             | 0            |
| 1        | 3/16          | 248           | 68            | 248                      | 261  | 1             | 0            |
| 2        | 17/64         | 239           | 67            | 239                      | 252  | 1             | 0            |
| 3        | 11/32         | 228           | 67            | 228                      | 241  | 1             | 0            |
| 4        | 7/16          | 213           | 67            | 213                      | 226  | 1             | 0            |
| 5        | 13/32         | 148           | 68            | 148                      | 161  | 24            | 0            |

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| RATE OF FLOW CALCULATIONS |             |               |                |              |                  |                |
|---------------------------|-------------|---------------|----------------|--------------|------------------|----------------|
| Rate No.                  | Coefficient | Prover Press. | Gravity Factor | Temp. Factor | Deviation Factor | Rate of Flow Q |
|                           | mcfd        | psia          | Fg             | Ft           | Fpv              | mcfd           |
| 1                         | 0.6237      | 261           | 1.291          | 0.9924       | 1.0188           | 212            |
| 2                         | 1.2640      | 252           | 1.291          | 0.9933       | 1.0181           | 416            |
| 3                         | 2.0350      | 241           | 1.291          | 0.9933       | 1.0173           | 640            |
| 4                         | 3.4950      | 226           | 1.291          | 0.9933       | 1.0162           | 1029           |
| 5                         | 2.9066      | 161           | 1.291          | 0.9924       | 1.0115           | 606            |

| PRESSURE CALCULATIONS |      |      |       |       |           |      |           |
|-----------------------|------|------|-------|-------|-----------|------|-----------|
| Rate No.              | Pc   | Pw   | Pc^2  | Pw^2  | Pc^2-Pw^2 | Q    | Shut-in % |
|                       | psia | psia | /1000 | /1000 | /1000     | mcfd |           |
| 1                     | 270  | 261  | 72.9  | 68.1  | 4.8       | 212  | 96.50     |
| 2                     | 270  | 252  | 72.9  | 63.5  | 9.4       | 416  | 93.00     |
| 3                     | 270  | 241  | 72.9  | 58.1  | 14.8      | 640  | 88.72     |
| 4                     | 270  | 226  | 72.9  | 51.1  | 21.8      | 1029 | 82.88     |
| 5                     | 270  | 161  | 72.9  | 25.9  | 47.0      | 606  | 57.59     |

INDICATED WELLHEAD OPEN FLOW = 950.42 Mcfd "n" = 1.03

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 \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

Wayne Mahon For Excell Drilling Co.

Signed: \_\_\_\_\_ Title: Field Technician