Phillips

Exhibit 1

EXHIBIT (CASE No. 529)

# GAS WELL TESTING PROCEDURE FOR SAN JUAN, RIO ARRIBA AND McKINLEY COUNTIES

The following pages constitutes a recommended procedure for testing gas wells in San Juan Basin of Northwestern, New Mexico. Due to the reservoir conditions peculiar to this area, a lengthy study by the commission and the operators in the area was necessitated. The commission believes these recommendations are workable and will entail the minimum of time on the part of the operators in order to comply with Commission Rules 401, 402 and 1121 in this area.

Copies of this proposal have been mailed to all parties listed on the mailing list of the San Juan Basin Engineering subcommittee of the New Mexico Oil and Gas Engineering Committee.

The following type of tests and procedure are recommended for testing natural gas wells in the San Juan Basin:

A. TYPE OF TESTS REQUIRED BY THE NEW MEXICO OIL CONSERVATION COMMISSION:

The deliverability test required in paragraph 2 and 3 of this section shall determine the ~~theoretical~~ deliverability of each gas well, which shall be reported to the commission, by converting actual deliverability against existing line pressures to the theoretical deliverability at a pressure equal to 50% of each wells shut in pressure in the manner specified below. The theoretical deliverability so determined hereinafter referred to as deliverability shall not be considered the actual deliverability of any well into a gas transportation facility.

1. THE INITIAL POTENTIAL TEST: An "open flow" and shut in pressure test to be taken upon completion of the well.

2. ORIGINAL DELIVERABILITY AND SHUT IN PRESSURE TEST: A deliverability and shut in pressure test will be completed on each well within 90 days after first delivery into the pipe line and following a minimum of twenty days continuous production. This test shall be filed during month following completion of test.

3. THE ANNUAL DELIVERABILITY AND SHUT IN PRESSURE TEST: To be taken during the period from April 1 through October 31, and will be required for all producing wells except those placed on production that year, in which case the original deliverability and shut in pressure test shall serve as the annual test for the current year. This test shall be filed during month following completion of test.

B. TESTING PROCEDURE: (Dependent upon the formation the well is completed in).

I. MESA VERDE FORMATION:

1. Initial Potential Test: The initial potential test will be taken after a minimum shut in time of seven days. The shut in pressure will be measured with a dead weight gauge. The open flow will be determined by a pitot tube measurement after flowing the well unrestricted to the air for a period of three hours. The flow nipple shall be at least eight diameters long. The pitot tube shall be constructed of either ¼" or 1/8" pipe (nominal diameter). Standard tables (Reid's) will be furnished by the New Mexico Oil Conservation Commission. This test will be reported on NMOCC form number 105 or USGS form number 9-330, whichever applies. The following data will be reported:

(a) The open flow in MCF per day (using Reid's tables).
(b) The shut in wellhead casing and tubing pressure in pounds per square inch gauge.
(c) The actual length of the shut in period.

2. Original Deliverability and Shut in Pressure Test: The procedure for this test will be the same as described below for the annual deliverability test.

3. The Annual Deliverability and Shut in Pressure Test:
(a) This test will be taken by producing the well unrestricted into the pipe line. The daily flow rate will be determined from an average of seven consecutive producing days, following a minimum of twenty days continuous production. All production during the 27 days must be at working wellhead pressures not in excess of 75% of the previous seven-day shut in pressure of the well, ~~existing pipe line Pressures permitting~~. The working wellhead pressure ($P_w$) will be determined as the seven day average tubing pressure if the well is flowing through the casing, or the seven day average casing pressure if the well is flowing through the tubing. The well will then be shut in for a period of seven days to obtain the shut in pressure.

This pressure will be measured within a period of 24 hours following the seven day shut in period. All wellhead pressures will be taken with a dead weight gauge. The volume calculation will be made using the meter charts. Basic orifice coefficient will be determined from American Gas Association Committee Report No. 2. Corrections shall be made for the measured flowing temperature, gravity and super-compressibility. Super-compressibility factors will be determined from California Natural Gasoline Association's Bulletin No. TS-461. The well's deliverability at the deliverability pressure will be calculated from the above test data by using the back pressure formula, $Q = C (P_c^2 - P_w^2)^n$, and using a value of .75 for the exponent, n, by the following formula:

$$D = Q \frac{(P_c^2 - P_d^2)}{(P_c^2 - P_w^2)}$$

WHERE:

D = Deliverability at the deliverability pressure, $P_d$, MCF/day (at standard conditions of 15.025 psia and 60° F)

C = Orfice coefficient as determined from C.N.G.A. Committee Report No. 2

Q = Daily flow rate in MCF/day at working wellhead pressure, $P_w$

$P_c$ = Shut in casing wellhead pressure, psia

$P_d$ = Deliverability pressure; half of the individual well 7-day shut in pressure, $P_c$, psia, not to exceed 500 psia.

$P_w$ = Average Wellhead working pressure, as determined from 7 day flow period, psia (casing pressure if flowing through the tubing, or tubing pressure if flowing through the casing).

n = Slope of back pressure curve (0.75 for Mesa Verde wells).

(b) In the event it is impossible to measure accurately the pressure of the static column of gas due to packers or bridges, then the working wellhead pressure, $P_w$, shall be determined by adding the calculated pressure drop due to friction in the flowing column of gas to the actual flowing wellhead pressure. The method of determining the friction shall be specified on the test data sheet. C-122-A.

(c) Any test will be considered not acceptable if the average flow rate for the final 7 days is 25% in excess of any consecutive 7-day average in the preceding three weeks.

(d) This test will be reported on NMOCC form number C-122-A, copy of which is attached. All charts relative to tests shall be made available to the Oil Conservation Commission upon its request.

II. PICTURED CLIFFS FORMATION:

1. Initial Potential Test: Same as described for Mesa Verde formation.

2. Original Deliverability and Shut in Pressure Test: Same as described below for annual deliverability test.

3. Annual Deliverability and Shut in Pressure Test: This test will be the same as for the Mesa Verde formation, except the exponent, in the back pressure formula will have a value of .85 and the deliverability pressure, $P_d$ will be one half of the individual well pressure, $P_c$, psia, not to exceed 250 psia.

III. FRUITLAND FORMATION: All tests same as for Pictured Cliffs formation.

IV. DAKOTA FORMATION: All tests same as for Mesa Verde formation with the exception of Barker Dome Dakota storage area.

1. Barker Dome Dakota.

(A) Initial Potential test:
An average Pool slope based on bottom hole conditions shall be established by the convention, all back pressure method and applied to each well. A seven day shut in pressure shall be used, but if shut in time exceeds seven days it shall be indicated on form C-122-A.

(B) Annual Potential test:
A minimum seven day shut in pressure is obtained and converted to bottom hole pressure.
$P_f$, $P_f^2$ is computed and applied to the original average slope and an adjusted open flow is obtained. If shut in exceeds seven days it shall be so indicated.

# GENERAL INSTRUCTIONS FOR TAKING DELIVERABILITY TESTS OF GAS WELLS IN THE SAN JUAN BASIN

1. CONDITIONING PERIOD:

A twenty day conditioning period is required on all deliverability tests. During this period the well must produce every day unrestricted into the pipe line. Working well head pressures during this period must be less than 75% of the previous year's seven-day shut in pressure. For a new well which has just commenced delivering gas, this pressure will be the shut in pressure taken in connection with the potential test. If the well has had a previous deliverability test made, this shut in pressure will be the pressure measured in connection with the deliverability test taken the preceeding year.

2. FLOW TEST PERIOD AND DATA REQUIRED:

The flow test period will consist of 7 days immediately following the conditioning period. At some time during this 7 day period, measurements of the flowing tubing pressure, flowing casing pressure, and pressure on the flow meter will be measured with a dead weight gauge. At the same time these measurements are taken, the meter pressure as shown by the static reading of the flow meter will be observed and compared (as provided on the test data sheet) to determine the meter error in recorded static pressure on the meter chart.

At the end of the 7 day flow test period the well will be shut in. Flow rate characteristics will be determined as seven day averages. The flow rate will be calculated from the "corrected seven-day average static meter pressure" (obtained from the average static pressure reading on the meter chart plus the meter error) and the seven day average differential reading on the chart. Corrections shall be made for flowing temperature, gravity, and super-compressibility, as specified in sec. B, Part I, paragraph 3. This flow rate for the test period must not be more than 25% in excess of any consecutive seven day average during the conditioning period, or the test will not be acceptable.

The seven day average working well-head pressure, $P_w$, will be obtained from the corrected seven day average static meter pressure, psia by adding the friction loss from the meter to the wellhead, as provided on the test data sheet. This friction loss is determined from the measurements taken with a dead weight gauge the day the meter is checked. It is assumed that this friction loss will be constant throughout the flow test.

3. SHUT IN PRESSURE TEST:

After the well has been shut in seven days, its shut in pressure will be measured with a dead weight gauge. This measurement is to be taken within a 24-hour period following the end of the 7-day shut in period, and, when expressed in pounds per square inch absolute, is the shut in pressure, $P_c$.

4. THE WELL'S DELIVERABILITY can then be calculated from the above data and the formula set out on the test data sheet which is the general flow equation as set out in A.G.A. Committee report #2. $Q = C\sqrt{h_w P_f}$ where:

$Q$ = Quantity of Gas at base conditions MCF/day
$C'$ = Orfice flow constant.
$h_w$ = Meter differential in inches water.
$P_f$ = Absolute static meter pressure lbs./sq. in.

in which:

$$C' = \frac{24}{1000} \times F_b \times F_{pb} \times F_{tf} \times F_g \times F_{pv} \text{ and}$$

$\frac{24}{1000}$ or .024 = correction from cu.ft. 1 hr. to MCF/day

$F_b$ = Basic orfice flow factor (table 4 or 5)
$F_{pb}$ = Pressure base factor (15.025, table 13)
$F_{tf}$ = Flowing temp. factor (Table 15)
$F_g$ = Specific gravity factor (Table 16)
$F_{pv}$ = Super-compressibility factor (C.N.G.A. TS-461 or equivalent)

Where test chart is integrated average differential and flowing meter pressures need not be shown on form C-122-A but if chart is integrated it should be stated in the space provided for $\sqrt{(h)(i)}$.

If so desired an adjusted open flow may be computed from the following equation:

$$O_{f_2} = O_{f_1} \left[ \frac{\left(P_{f_2}\right)^2}{\left(P_{f_1}\right)^2} \right]^N$$

WHERE:

$O_{f_2}$ = adjusted absolute open flow.
$O_{f_1}$ = Original absolute open flow.
$P_{f_2}$ = New bottom hole shut in (psia)
$P_{f_1}$ = Old bottom hole shut in (psia)
N = Slope of back pressure curve.

All tests shall be taken during period from April 1 to Oct. 31, and reported during month following completion of test.

V. PENNSYLVANIAN FORMATION

1. Initial Potential Test

An absolute open flow will be determined on new wells by the conventional back pressure method. Seven-day shut-in pressures will be used, but if the shut-in time exceeds this amount, it will be so indicated.

2. Annual Potential Test

This test will be conducted as described in the initial potential test above; or as an alternate method, an adjusted absolute open flow may be derived in the following manner:
A minimum seven-day shut-in pressure is obtained and converted to bottom hole pressure ($P_f$). $P_f{}^2$ is computed and applied to the original back pressure curve and an adjusted absolute open flow is obtained. If shut-in time exceeds seven days it will be so specified on the test sheet.

If so desired, an adjusted absolute open flow may be calculated from the equation as shown under Dakota formation Part IV, Paragraph 1, Sub. Paragraph (B)

All tests shall be taken during period from April 1 to Oct. 31,and filed during month following completion of test.

VI. OTHER FORMATIONS: Tests will be specified by the New Mexico Oil Conservation Commission.

NEW MEXICO OIL CONSERVATION COMMISSION
GAS WELL TEST DATA SHEET
SAN JUAN BASIN

NMOCC C-122-A

POOL _____ ☐ Original Deliverability Test

FORMATION _____ ☐ Annual Deliverability Test

COUNTY _____ Date Test Filed _____

OPERATOR: _____ LEASE: _____ WELL NO. _____

1/4 SECTION: _____ TWP. _____ RGE. _____

CASING: OD _____ WT. _____ SET AT _____ TUBING: OD _____ WT. _____ SET AT _____

PAY ZONE FROM _____ TO _____. GAS GRAVITY: MEASURED _____ ESTIMATED _____

PRODUCED THROUGH: CASING _____ TUBING _____

DATE OF FLOW TEST: FROM _____ TO _____

COMPLETION DATE OF TEST: _____ (DATE SHUT IN PRESSURE MEASURED)

METER RUN SIZE _____ ORIFICE SIZE _____ TYPE CHART _____ TYPE TAPS _____

## OBSERVED DATA

| | | | | | |
|---|---|---|---|---|---|
| Flowing casing pressure (Dwt.) See B-I-1-(A) | _____ | psig + 12 | = | _____ | psia (a) |
| Flowing tubing pressure (Dwt.) | _____ | psig + 12 | = | _____ | psia (b) |
| Flowing meter pressure (Dwt.) | _____ | psig + 12 | = | _____ | psia (c) |
| Flowing meter pressure (meter reading at time dead weight measurement taken): | | | | | |
| Normal chart reading | _____ | psig + 12 | = | _____ | psia (d) |
| Square root chart reading (_____)$^2$ x spring constant | _____ | | = | _____ | psia (d) |
| Meter error c - d or d - c | | ± | = | _____ | psi (e) |
| Friction loss, static column to meter: | | | | | |
| a - c if well is flowing through tubing | | | | _____ | psi (f) |
| b - c if well is flowing through casing | | | | _____ | psi (f) |
| Seven day average static meter pressure (from meter chart): | | | | | |
| Normal chart average reading | _____ | psig + 12 | = | _____ | psia (g) |
| Square root chart average reading (_____)$^2$ x spring constant | _____ | | = | _____ | psia (g) |
| Corrected seven day average meter pressure ($P_f$) g ± e | | | = | _____ | psia (h) |
| Seven day average differential reading: (hw) | | | | | |
| Normal chart average reading | | | = | _____ | in.Wtr. (i) |
| Square root average reading (_____)$^2$ | | | = | _____ | in.Wtr. (i) |
| Pw = h + f | | | = | _____ | psia (j) |
| Wellhead casing shut in pressure (dead weight) | _____ | psig + 12 | = | _____ | psia (k) |
| Wellhead tubing shut in pressure (dead weight) | _____ | psig + 12 | = | _____ | psia (l) |
| $P_c$ = k or l, whichever is higher | | | = | _____ | psia (m) |
| Meter run line diameter | | | = | _____ | inches (n) |
| Orifice diameter | | | = | _____ | inches (o) |
| Flowing Temp. (Meter Run) | _____ | °F + 460 | = | _____ | °Abs. |
| $P_d = \frac{1}{2} P_c = \frac{1}{2}$(m) | | | = | _____ | psia (p) |

(not to exceed 500 for Mesa Verde formation and not to exceed 250 for Pictured Cliffs formation)

## FLOW RATE CALCULATION

| $F_b$ | $F_{pb}$ | $F_{tf}$ | $F_g$ | $F_{pv}$ | (h) | (i) |
|---|---|---|---|---|---|---|
| | | | | | | |

$$Q = \left(\frac{24}{1000}\right) \times F_b \times F_{pb} \times F_{tf} \times F_g \times F_{pv} \sqrt{(h)\,(i)} = \_\_\_\_\_ \text{ MCF/day}$$

## DELIVERABILITY CALCULATION

| $P_c^2$ | $P_d^2$ | $P_w^2$ | Exponent n |
|---|---|---|---|
| | | | |

$$D = Q\left(\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right)^n = \_\_\_\_\_ \text{ MCF/day}$$

## SUMMARY

$P_c$ = _____ psia

Q = _____ MCF/day

$P_w$ = _____ psia

$P_d$ = _____ psia

D = _____ MCF/day

COMPANY: _____

BY: _____

TITLE: _____