PROPOSED REVISION OF ORDERS R-333-C&D AND R-333-E

The following is a copy of the proposed Special Rules and Regulations governing gas well testing in the San Juan Basin which will be considered at a hearing to be held in the Oil Conservation Commission Conference Room, State Land Office Building, Santa Fe, New Mexico, at 9:00 a.m., November 8, 1962.

These rules would supersede Commission Orders R-333-C and D and R-333-E and would govern gas well testing in the Counties of San Juan, Rio Arriba, McKinley, and Sandoval.

GAS WELL TESTING RULES AND PROCEDURES FOR SAN JUAN BASIN AREA

SECTION A. TYPE OF GAS WELL TESTS REQUIRED:

I. THE INITIAL DELIVERABILITY AND SHUT-IN PRESSURE TESTS FOR NEWLY COMPLETED GAS WELLS.

(A) Immediately upon completion of each gas well in San Juan Basin, a shut-in pressure test of at least 7 days duration shall be made.

(B) Within 60 days after a well is connected to a gas transportation facility the well shall be tested in accordance with Section B, Subsection I, Paragraph (A) of this order, and the results of the test reported to the Commission, and to the gas transportation facility to which the well is connected. Failure to file the required test within the time prescribed above will subject the delinquent well to the loss of one day's allowable for each day the test is late.

(C) Any tests accomplished for information purposes prior to pipeline connection shall not be recognized as an official test for the establishment of allowables.

II. ANNUAL DELIVERABILITY AND SHUT-IN PRESSURE TESTS:

Annual Deliverability and Shut-In Pressure Tests of all producing

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
OCC EXHIBIT NO. 1
CASE NO. 2685

gas wells are required to be made during the period from January 1, through December 31, of each year.

1. Annual Deliverability and Shut-In Pressure tests shall not be required during the current annual test period for wells connected after October 31 to a gas transportation facility but such tests may be taken at the option of operator.

2. An initial deliverability test accomplished in accordance with annual testing procedures set out in this order shall be used as the annual test of the well for the year in which the test was accomplished.

All Annual Deliverability and Shut-In Pressure Tests required by this order shall be filed with the Commission and with the gas transportation facility to which the wells are connected within thirty (30) days after the end of the month during which the test is completed; provided however, that all tests completed during the period from December 1 through December 31, shall be reported not later than January 10 of the following year. Failure to file the required tests within the time prescribed above may subject the delinquent wells to the loss of one day's allowable for each day the test is late. No extension of time will be allowed after January 10, except after notice and hearing.

III. SCHEDULE OF TESTS:

(A) ANNUAL DELIVERABILITY TESTS

At least 30 days prior to the beginning of the tests the gas transportation facilities receiving gas from wells to be tested shall, in cooperation with respective operators, submit to the Commission's Aztec office a testing schedule for the Annual Deliverability and Shut-in Pressure Tests. Three copies of the schedule shall be furnished to the Commission and one copy shall be furnished to each operator concerned. Such schedule shall indicate the dates of tests, pool, operator, lease, well number and location of each well. The gas transportation facility making the schedule of tests shall be notified immediately by any operator unable to take such tests as scheduled.

When an Initial Deliverability Test accomplished in accordance with annual testing procedures is to be used as an annual test the operator shall notify the Commission, and the gas transportation facility to which the well is connected, in writing during the fourteen day conditioning period for said test.

of this order and results reported as required in Section A, Subsection I, or:

2. In the event that it is impractical to test a newly completed well in accordance with paragraph 1 above, the operator may accomplish a deliverability and shut-in pressure test in the following manner:

(a) "A seven or eight day production chart may be used as a basis for determining the well's deliverability, providing the chart so used is preceded by at least fourteen (14) days continuous production. The well shall produce through either the casing or tubing, but not both, into a pipeline during these periods. The production valve and the choke settings shall not be changed during either the conditioning or flow period with the exception of the first week of the conditioning period when maximum production would over-range the meter chart and/or location production equipment."

(b) A shut-in pressure of at least seven days duration shall be taken. This shall be the shut-in test required in Section A, Subsection I, Paragraph (A).

(c) The average daily static meter pressure shall be determined in accordance with Section B, subsection I, Paragraph (B). This pressure shall be used as P_t in calculating P_w for the Deliverability Calculation.

(d) The daily average rate of flow shall be determined in accordance with Section B, Subsection I, Paragraph (B) of this order.

(e) The static wellhead working pressure (P_w) shall be determined in accordance with Section B, Subsection I, Paragraph (B) of this order.

(f) The deliverability of the well shall be determined by using the data determined in Paragraphs (a) through (e) above, in the deliverability formula in accordance with Section B, Subsection I, Paragraph (B) of this order.

(g) The data and calculations for the above Paragraphs (a) through (f) shall be reported as required in Section A, Subsection I, upon the blue colored Form C-122-A.

In the event a well is not tested in accordance with the test schedule, the well shall be re-scheduled for testing, and the Commission shall be notified of such fact in writing not later than the fourteen day conditioning period for said test.

It shall be the responsibility of each operator to determine that its wells are properly scheduled by the transportation facility to which its wells are connected, in order that said wells can be tested within the testing season.

(B) DELIVERABILITY RETESTS

An operator may, in cooperation with the transportation facility, schedule a well for a deliverability retest by notification to the Commission ten (10) days before the retest is to commence. Such notification shall consist of scheduling the well as required for the annual deliverability test in subsection III, Paragraph A, above. Such retest shall be for good and substantial reason and shall be subject to the approval of the Commission, and conducted in conformance with the Annual Deliverability Test procedures of this order. The Commission may at its discretion require the retesting of any well by notification to the operator to schedule such retest.

The requirements for Initial and Annual Deliverability Tests and the notification and scheduling of such tests which apply to newly completed wells shall also apply to reworked or recompleted wells.

IV. WHO MAY WITNESS TESTS:

Any initial or annual deliverability and shut-in pressure test may be witnessed by any or all of the following: an agent of the Commission, an offset operator, a representative of the pipeline company taking gas from an offset operator, or a representative of a pipeline company taking gas from the well under test.

SECTION B. PROCEDURE FOR TESTS:

I. MESAVERDE FORMATION:

(A) INITIAL DELIVERABILITY AND SHUT-IN PRESSURE TEST

1. Within sixty days (60) after a newly completed well is connected to a gas transportation facility the operator shall accomplish a deliverability and shut-in pressure test in conformance with annual test procedures

(B) THE ANNUAL DELIVERABILITY AND SHUT-IN PRESSURE TESTS

This test shall be taken by producing a well into the pipeline through either the casing or tubing, but not both. The production valve and choke settings shall not be changed during either the conditioning or flow periods except during the first seven (7) days of the conditioning period when maximum production would overrange the meter chart and/or the location production equipment. The daily flowing rate shall be determined from an average of seven (7) consecutive producing days, following a minimum conditioning period of fourteen (14) consecutive days production. The first seven (7) days of said conditioning period shall have not more than one (1) interruption, which interruption shall be no longer than 36 continuous hours in duration. The eighth to fourteenth days, inclusive, of said conditioning period shall have no interruptions whatsoever. All such production during the fourteen (14) days conditioning period plus the seven (7) day deliverability test period shall be at static wellhead working pressures not in excess of seventy-five (75) percent of the previous annual seven (7) day shut-in pressure of such well if such previous annual shut-in pressure information is available; otherwise, the seven (7) day initial deliverability shut-in pressure of such well shall be used.

In the event that the existing line pressure does not permit a drawdown as specified above, with the well producing unrestrictedly into the pipeline, the operator shall request an exception to this requirement on the Form C-122-A. The request shall state the reasons for the necessity for the exception.

Instantaneous pressures shall be measured by deadweight gauge during the seven day flow period at the casinghead, tubinghead, and orifice meter and recorded along with the instantaneous meter chart static pressure reading.

When it is necessary to restrict the flow of gas between the wellhead and orifice meter the ratio of the downstream pressure to the upstream pressure shall be determined. When this ratio is 0.57, or less, critical flow conditions shall be considered to exist across the restriction.

When more than one restriction between the wellhead and orifice meter causes the pressures to reflect critical flow between the wellhead and orifice meter the pressures across each of these restrictions shall be measured to determine whether critical flow exists at any restriction. When critical flow does not exist at any restriction the pressures taken to disprove critical flow shall be reported to the Commission on Form C-122-A in the "remarks" section of the form. When critical flow conditions exist, the instantaneous flowing pressures required hereinabove shall be

measured during the last forty-eight (48) hours of the seven (7) day flow period.

When critical flow exists between the wellhead and orifice meter, the measured wellhead flowing pressure of the string through which the well flowed during test shall be used as P_t when calculating the static wellhead working pressure (P_w) using the method established below.

When critical flow does not exist at any restriction, P_t shall be the corrected average static pressure from the meter chart plus friction loss from the wellhead to the orifice meter.

The static wellhead working pressure (P_w) of any well under test shall be the calculated seven (7) day average static tubing pressure if the well is flowing through the casing; or the calculated seven (7) day average static casing pressure if the well is flowing through the tubing. The static wellhead working pressure (P_w) shall be calculated by applying the tables and procedures as set out in New Mexico Oil Conservation Commission Manual entitled "Method of Calculating Pressure Loss Due to Friction in Gas Well Flow Strings" for San Juan Basin.

To obtain the shut-in pressure of a well under test the well shall be shut-in immediately after the seven (7) day deliverability test for the full period of seven (7) consecutive days. Such shut-in pressure shall be measured within the next succeeding twenty-four (24) hours following the seven (7) day shut-in period aforesaid. The seven-day (7) shut-in pressure shall be measured on both the tubing and the casing when communication exists between the two strings. The high of such pressures shall be used as P_c in the deliverability calculation. When any such shut-in pressure has been determined by the Commission to be abnormally low, or when only one pressure is available, the shut-in pressure to be used shall be determined by one of the following methods:

1. A Commission designated value.

2. An average shut-in pressure of all offset wells completed in the same zone.

3. A calculated surface pressure based on a measured bottom hole pressure. Such calculation shall be made in accordance with New Mexico Oil Conservation Commission Back Pressure Manual, Example No. 7.

All wellhead pressures as well as the flowing meter pressure tests which are to be taken during the seven (7) day deliverability test period, as required hereinabove, shall be taken with a deadweight gauge. The

Insert (1)

Instantaneous pressures shall be measured by deadweight gauge during the seven day flow period at the casing head, tubing head, and orifice meter and recorded along with the instantaneous meter chart static pressure reading.

When it is necessary to restrict the flow of gas between the wellhead and orifice meter the ratio of the downstream pressure to the upstream pressure shall be determined. When this ratio is o.57, or less, critical flow conditions shall be considered to exist accross the restriction. When this condition exists the flowing separator and/or dehydrator pressure is to be measured and recorded on Form C-122-A immediately above line (a) and identified as "flowing separator pressure_____psia." When critical flow conditions exist, the instantaneous flowing pressures required hereinabove shall be measured during the last forty-eight (48) hours of the seven (7) day flow period.

When critical flow exists between the wellhead and orifice meter, the measured wellhead flowing pressure of the string thru which the well flowed during test shall be used as P_t when calculating the static wellhead working pressure (P_w) using the method established below.

deadweight reading, the date and time according to the chart shall be recorded and maintained in the companies records with the test information.

Orifice meter charts shall be changed and so arranged as to reflect upon a single chart the flow data for the gas from each well for the full seven-day deliverability test period; except that no tests shall be voided if satisfactory explanation is made as to the necessity for using test volumes through two chart periods. Corrections shall be made for pressure base, measured flowing temperature, specific gravity, and supercompressibility provided however, that if the specific gravity of the gas from any well under test is not available, an estimated specific gravity may be assumed therefor, based upon that of gas from near-by wells, the specific gravity of which has been actually determined by measurement.

The seven (7) day average flowing meter pressure shall be calculated by taking the average of all consecutive 2-hour flowing meter pressure readings as recorded on the seven (7) day flow period chart (test chart #3). The pressure so calculated shall be used in calculating the wellhead working pressure, determining supercompressibility factors and calculating flow volumes.

The seven (7) day flow period volume shall be calculated from the integrated readings as determined from the flow period orifice meter chart, (chart #3). The volume so calculated shall be divided by the number of testing days on the chart to determine the average daily flow period rate of flow. The flow chart shall have legibly recorded a minimum of seven (7) days and a maximum of eight (8) flowing days to be acceptable for test purposes. The volume used in this calculation shall be corrected to New Mexico Oil Conservation Commission standard conditions.

The average flowing meter pressure for the seven (7) day or eight (8) day flow period and the corrected integrated volume shall be determined by the purchasing company that integrates the flow charts and furnished to the operator or testing agency when such operator or testing agency requests such information.

The daily volume of flow as determined from the flow period chart (Test Chart #3) integrator readings shall be calculated by applying the Basic Orifice meter formula.

$$Q = C' \sqrt{h_w \quad p_f}$$

Where:

Q = Metered volume of flow MCFD @ 15.025, 60° F. and .60 specific gravity.

C' = The 24-hour basic orifice meter flow factor corrected for flowing temperature, gravity and supercompressibility.

h_w = Daily average differential meter pressure from flow period chart.

P_f = Daily average flowing meter pressure from flow period chart.

The basic orifice meter flow factors, flowing temperature factor and specific gravity factor shall be determined from New Mexico Oil Conservation Commission Back Pressure Test Manual.

The daily flow period average corrected flowing meter pressure, psig, shall be used to determine the supercompressibility factor. Supercompressibility Tables may be obtained from the New Mexico Oil Conservation Commission.

When supercompressibility correction is made for a gas containing either nitrogen or carbon dioxide in excess of 2 percent, the supercompressibility factors of such gas shall be determined by the use of Table V of the C.N.G.A. Bulletins TS-402 for pressure 100-500 psig or Table II, TS-461 for pressures in excess of 500 psig.

The use of tables for calculating rates of flow from integrator readings, which do not specifically conform to New Mexico Oil Conservation Commission Back Pressure Test Manual may be approved for determining the daily flow period rates of flow upon a showing that such tables are appropriate and necessary.

The daily average integrated rate of flow for the seven-day flow period shall be corrected for meter error by the multiplication by a correction factor determined by dividing the square root of the chart flowing meter pressure psia into the square root of the deadweight flowing meter pressure psia.

Deliverability pressure, as used herein for the Mesaverde formation, is a defined pressure applied to each well and used in the process of comparing the abilities of wells in this formation to produce at static wellhead working pressures equal to a percentage of the seven (7) day shut-in pressure of the respective individual wells. Such percentage shall be determined periodically by the Commission based on the relationship of the average static wellhead working pressures (P_w) divided by the average (P_c) seven-day shut-in pressure of the pool.

The deliverability of gas at the "deliverability pressure" of any well under test shall be calculated from the test data derived from the tests hereinabove required by use of the following deliverability formula:

$$D = Q \left[\frac{\left(P^2_c - P^2_d \right)}{\left(P^2_c - P^2_w \right)} \right]^n$$

WHERE:

D = Deliverability at the deliverability pressure, (P_d) Mcfd, (at Standard Condition of 15.025 psia and 60° F).

Q = Daily flow rate in Mcfd, at wellhead pressure (P_w).

P_c = 7-day shut-in wellhead pressure, psia, determined in accordance with Section B, Subsection I, Paragraph (B).

P_d = Deliverability pressure; psia, as defined above.

P_w = Average static wellhead working pressure, as determined from 7-day flow period, psia, and calculated from New Mexico Oil Conservation Commission "Pressure Loss Due to Friction" Tables.

n = Average pool slope of back pressure curve (.75) for Mesaverde wells).

The value of the multiplier in the above formula (ratio factor after the application of the pool slope) by which Q is multiplied shall not exceed a limiting value to be determined periodically by the Commission. Such determination shall be made after a study of the test data of the pool obtained during the previous testing season. The limiting value of multiplier may be exceeded only after the operator has conclusively shown to the Commission that the shut-in pressure (P_c) is accurate or that the static wellhead pressure (P_w) cannot be lowered due to existing producing conditions.

Any test hereinabove provided for will be considered unacceptable if the average flow rate for the final 7-day deliverability test is more than 10 percent in excess of any consecutive 7-day average of the preceding two weeks. A deliverability test not meeting this requirement shall be invalid and the well shall be retested.

All charts relative to annual deliverability tests shall be identified by the words "Test Chart No. 1" (2, 3, 4, etc.), and any or all charts or photostats thereof shall be made available to the Commission upon its request.

II. ALL FORMATIONS OTHER THAN MESAVERDE

(A) Initial and/or annual deliverability and shut-in Pressure Tests:

Except as provided in Special Pool Rules these tests shall be made and reported in accordance with the procedure set out in this order for the Mesaverde formation, provided however, that the exponent "n" for the Pictured Cliffs and Fruitland formations shall be point eight five (0.85).

SECTION C. INFORMATION TEST FOR ALL FORMATIONS

I. TYPE OF TEST:

(A) A one-point back pressure test may be taken on newly completed wells before their connection or reconnection to a gas transportation facility. This test shall not be a required official test but may be taken for information purposes at the option of the operator. When taken, this test must be taken and reported as prescribed below:

(B) ONE-POINT BACK PRESSURE POTENTIAL TEST PROCEDURE

1. This test shall be accomplished after a minimum shut-in of seven days. The shut-in pressure shall be measured with a deadweight gauge.

2. The flow rate shall be measured by flowing the well 3 hours through a positive choke, which has a 3/4 inch orifice.

3. A 2-inch nipple which provides a mechanical means of accurately measuring the pressure and temperature of the flowing gas shall be installed immediately upstream from the positive choke.

4. The absolute open flow shall be calculated using the conventional back pressure formula as shown in New Mexico Oil Conservation Commission Back Pressure Test Manual.

II. ANNUAL DELIVERABILITY AND SHUT-IN PRESSURE TESTS:

Annual Deliverability and Shut-In Pressure Tests of all producing gas wells are required to be made during the period from February 1 through December 15 of each year.

All wells making connection to a gas transportation facility between October 31 and December 31 of any calendar year shall be tested during the following annual testing period. All wells making connection to a gas transportation facility between January 1 and February 1 of any calendar year shall be tested during the testing period of that year.

An Initial Deliverability Test accomplished in accordance with Section B, Sub-paragraph 1, Paragraph (A), Subparagraph 1, may be used as an annual test when the initial connection to a gas transportation facility is made between February 1 and October 31 of the test year.

All Annual Deliverability and Shut-in Pressure Tests required by this order shall be filed with the Commission and with the gas transportation facility to which the well is connected within thirty (30) days after the end of the month during which the test is completed; provided however, that all tests completed during the period from December 1 through December 15 shall be reported not later than January 10 of the following year. Failure to file the required tests within the time prescribed above will subject the delinquent wells to cancellation of allowable.

III. SCHEDULE OF TESTS:

(A) ANNUAL DELIVERABILITY TESTS

At least thirty days (30) days prior to the beginning of the test period each gas transportation facility shall to the Commission's Aztec Office (1000 Rio Brazos Road) submit a complete list of wells connected to its system, said wells to be grouped according to the pools in which they are located. All undesignated wells shall be listed separately.

At least 30 days prior to the beginning of the test period the gas transportation facilities receiving gas from wells to be tested shall, in cooperation with respective operators, submit to the Commission's Aztec office a testing schedule for the Annual Deliverability and Shut-in Pressure Tests for all wells connected to their respective pipeline systems which are to be tested during the succeeding two months. Five copies of the schedule shall be furnished to the Commission and one copy shall be furnished to each operator concerned. A similar schedule shall be submitted at least 30 days prior to the beginning of each two-month testing interval. Such schedule shall indicate the pool, operator, lease, well number and location of each well. The gas transportation facility making the schedule of tests shall be notified immediately by any operator unable to take such tests as scheduled.

When an Initial Deliverability Test accomplished in accordance with Section B, Sub-section 1, Paragraph (A), Sub-paragraph 1 is to be used as an annual test for wells connected to a gas transportation facility

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO FOR THE PURPOSE OF CONSIDERING:

CASE NO. 1378
Order No. R-333-E
Amends R-333-C & D

APPLICATION OF EL PASO NATURAL GAS COMPANY FOR AN ORDER REVISING, AMENDING OR DELETING CERTAIN PORTIONS OF ORDER R-333-C & D PERTAINING TO GAS WELL TESTING PROCEDURE APPLICABLE TO GAS WELLS COMPLETED IN SAN JUAN, RIO ARRIBA AND McKINLEY COUNTIES, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on February 13, 1958, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 28th. day of February, 1958, the Commission, a quorum being present, having considered the evidence adduced and being fully advised in the premises,

FINDS:

(1) That due notice of the time and place of hearing and the purpose thereof having been given as required by law, the Commission has jurisdiction of this case and the subject matter thereof.

(2) That there is need for a number of amendments to Order R-333-C & D, heretofore entered by the Commission, said order outlining the gas testing procedure of gas wells completed in San Juan, McKinley and Rio Arriba Counties, New Mexico.

(3) That the following amendments should be adopted, in the interests of conservation.

IT IS THEREFORE ORDERED:

(1) That the gas well testing period of April 1 through October 31 as established by Order No. R-333-C & D be and the same is hereby amended to read "February 1 through December 15."

(2) That Sub-Sections II and III of Section A of Order R-333-C & D be and the same are hereby amended to read as follows:

during the period between February 1, and October 31, then the operator shall notify the Commission in writing during the fourteen day conditioning period for said test.

In the event a well is not tested in accordance with the test schedule, the well shall be re-scheduled for testing, and the Commission shall be notified of such fact in writing during the fourteen day conditioning period for said test.

(3) That the sixth sub-paragraph of Paragraph (B) of Sub-Section I of Section B of Order No. R-333-C & D be and the same is hereby amended to read as follows:

Orifice meter charts shall be changed and so arranged as to reflect upon a single chart the flow data for the gas from each well for the full seven-day deliverability test period; except that no tests shall be voided if satisfactory explanation is made as to the necessity for using test volumes through two chart periods. Corrections shall be made for pressure base, measured flowing temperature, specific gravity, and supercompressibility, provided however, that if the specific gravity of the gas from any well under test is not available, then and in that event an estimated specific gravity may be assumed therefor, based upon that of gas from nearby wells, the specific gravity of which has been actually determined by measurement.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

EDWIN L. MECHEM, Chairman

MURRAY E. MORGAN, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

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