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 test 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 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 the operator.

2. An Initial Deliverability Test accomplished in accordance with Annual testing procedures set out in this order shall be used as an Annual Test for that 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 wells are connected within thirty (30) days after the end of the month during which the tests are 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 1 days 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 test, 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 prior to or 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 prior to or during the fourteen days 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 to be tested within the testing season.

(B) DELIVERABILITY RETESTS

An operator may in cooperation with the transportation facility, schedule a well for deliverability retest for substantial reason 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 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. MESA VERDE FORMATION:

(A) INITIAL DELIVERABILITY AND SHUT-IN PRESSURE TEST.

1. Within sixty (60) days 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 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 ~~unrestrictedly~~ through either the casing or tubing, but not both, into a pipeline during these periods. The production valve and choke settings shall not be changed during the conditioning or flow periods. except during the first week of the conditioning period when ~~maximum production~~ would over-range the meter chart.

(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.

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

This test a well
~~The test~~ shall be taken by producing ~~the 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 week of the conditioning period when maximum production would over-range the meter chart. The daily flowing rate shall be determined from an average 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 hours continuous 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) days deliverability test period shall be at static wellhead working pressures not in excess

of seventy-five (75) per cent 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 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.

Insert No. 1

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 a 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 shut-in pressure shall be measured on both tubing and casing provided communication exists. The higher 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.

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 dead-weight gauge. The dead-weight reading, the date and time according to the chart shall be recorded and maintained in the company's 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 therefore, 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 No. 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 No. 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 No. 3) integrator readings shall be calculated by applying the Basic Orifice meter formula.

$$Q = C' \sqrt{h_w \times P_f} \quad \text{~~Pm (to be in accord with IOGC Manual)~~}$$

Where:

Q = Metered volume of flow MCFD at 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_m~~ $\rightarrow P_f$ = Daily average flowing meter pressure form 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 per cent, the supercompressibility factors of such gas shall be determined by the use of Table V of the ~~above-mentioned~~ C.M.S.A. 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 dead-weight flowing meter pressure psia.

Deliverability pressure, as used herein for the Mesa Verde ~~production~~ 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 pressure (P_w) divided by the average seven-day shut-in pressure (P_c) 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:

$$D = Q \left[\frac{(P_c^2 - P_d^2)}{(P_c^2 - P_w^2)} \right]^n$$

WHERE:

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

Q = Daily flow rate in MCF/D, 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 for San Juan Basin.

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

The value of the multiplier (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 the 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% in excess of any consecutive 7-day average of the preceding two weeks.

~~reduction in pipeline pressure;~~ "A deliverability test" not meeting this requirement shall be ~~retested~~ invalid and the well shall be retested.

All charts relative to initial or 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 MESA VERDE

(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 Mesa Verde formation, provided however, that the exponent "n" for the Pictured Cliffs, Fruitland and Farmington formations shall be zero 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 dead weight guage.
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.

5. The observed data and flow calculations shall be reported in duplicate on Form C-122, "Multi-Point Back Pressure Test for Gas Wells."

6. Non-critical flow exists when the choke pressure is 13 psig or less. When this condition exists the flow rate shall be measured with a pitot tube and nipple as specified in the Commissions manual of "Tables and Procedure for Pitot Tests." The pitot test nipple shall be installed immediately downstream from the 3/4 inch positive choke.

7. Any well completed with two-inch nominal size (1.995 inside diameter) or larger shall be tested through the tubing. ~~Any well completed with tubing smaller than two-inch nominal shall be tested through the casing.~~

IT IS FURTHER ORDERED:

All forms heretofore mentioned, are hereby adopted for the use in the San Juan Basin Area in open form subject to such modification as experience may indicate.

All testing agencies whether individuals, companies, pipeline companies or operators shall maintain a log of all tests accomplished by them including all field test data.

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

STATE OF NEW MEXICO

OIL CONSERVATION COMMISSION