MAJOR CHANGES TO EXISTING NMOCD ORDER R-333 (AS AMENDED) AS INDICATED IN PROPOSED NEW ORDER:

1. Deliverability Tests required for wells in prorated pools on biennial basis.

2. Shut-in pressures required for wells in non-prorated pools on biennial basis.

Page 2 — 3. The deliverability test year shall be the same as the calendar year.

Page 2 — 4. Wells on multiple well gas proration units (as Blanco Mesaverde Pool or Basin Dakota Pool) will be "exempt" from deliverability testing on a <u>Gas Proration Unit</u> basis only at 2000 MCF/Month.

Page 5 — 5. Wells shut-in for over production may be produced for deliverability test purposes after the operator notifies the Division District office.

Page 6 — 6. Restriction on flow interruptions during the conditioning period are eased slightly.

Page 7 — 7. The 7-day shut-in pressure may be measured at a time during the current testing season other than immediately following the test flow period.

Page 10 — 8. Deliverability pressure (P_d) assigned as a percentage of the 7-day shut-in pressure to be adjusted in each pool to more nearly approximate the pool average operating conditions.

Page 10 — 9. The table of friction factors has been modified from the manual entitled "Pressure Loss Due To Friction" for San Juan Basin only slightly.

Page 13 — 10. The 7-day shut-in pressure for wells in non-prorated gas pools to be filed with the Division on NMOCD Form C-125.

It is proposed that the entire testing order, necessary tables, formulas, examples of use of data, forms, examples of completed forms for any testing required in the San Juan Basin area of New Mexico be combined into a booklet for publication by the New Mexico Oil Conservation Division for use by the public.

EXHIBIT A

BEFORE EXAMINER QUINTANA
OIL CONSERVATION DIVISION
EXHIBIT NO. "A"
CASE NO. 859_

THE FOLLOWING PAGES ARE THE TEXT OF THE NEW VERSION OF NMOCD ORDER NO. R- 333. THIS IS THE PROPOSED NEW ORDER AS SUBMITTED BY THE NMOCD DELIVERABILITY TEST COMMITTEE:

MANUAL

GAS WELL TESTING RULES AND PROCEDURES SAN JUAN BASIN, NEW MEXICO

CHAPTER I TYPE OF TESTS REQUIRED FOR WELLS COMPLETED IN PRORATED GAS POOLS

SECTION 1: Initial Deliverability and Shut-In Pressure Tests for Newly Completed Well

A. Immediately upon completion of each gas well in the San Juan Basin, a shut-in pressure test of at least seven days duration shall be made. This initial shut-in pressure shall be filed with the Division's Aztec Office on either Form C-122 or C-104.

B. Within 90 days after a well first delivers gas to a gas transportation facility, the well shall have been tested in accordance with Section 1 of Chapter II of these rules, "Initial Deliverability and Shut-In Pressure Test Procedures", and the results of the test filed in triplicate with the Division's Aztec office and one copy filed with the gas transportation facility to which the well is connected. This test is to be filed on Form C-122-A. Failure to file said test within the above-prescribed 90-day period will subject the well to the loss of one day's allowable for each day the test is late.

1. If the newly first delivered well is an infill well on a proration unit, the old well on the unit is not required to be tested provided it has a valid test on file for the current proration year. Testing of the old well follows the regularly assigned test year for the pool in which the wells are located. The new well is required to be tested annually until at least three annual tests are on file and then the well is to be tested biennially with other wells in that pool.

2. If the newly first delivered well is an infill well on a proration unit and the old well on the unit is "exempt", the old well is to be tested along with the new well for the Initial and Annual Deliverability and Shut-In Pressure Test. The old well will lose its "exempt" classification and must be tested biennially along with other wells in that pool. The new infill well is required to be tested annually until at least three annual tests are on file and then the well is to be tested biennially with other wells in that pool.

C. The requirements for Initial Tests and Annual or Biennial Deliverability and Shut-In Pressure Tests and the notification

requirements and scheduling of such tests which apply to newly completed wells shall also apply to recompleted wells.

D. Any tests taken for informational purposes prior to pipeline connection shall not be recognized as official tests for the assignment of allowables.

SECTION 2. Annual and Biennial Deliverability and Shut-In Pressure Tests

A. Annual or Biennial Deliverability and Shut-In Pressure Tests shall be made on all gas wells during the period from January 1 through December 31 of that year except as follows:

1. A newly completed well or a recompleted well shall be tested on an annual basis until a minimum of three annual tests have been taken, after which the well shall be tested biennially as is required for other wells in the pool in which the well is located.

2. Wells classified as "exempt" shall not be subject to the requirements of annual or biennial deliverability tests.

   Classification of wells into or out of the "exempt" status shall be done once each year immediately following the reporting of June production and shall be effective for the succeeding annual test period.

   Gas wells completed in the Pictured Cliffs or any shallower formation shall be classified "exempt" if at least three months of production history is available and the well failed to produce, and is incapable of producing, an average of 250 MCF or more per month during the months produced within the preceding 12-month period, and the well is classified as marginal in the August Gas Proration Schedule.

   Gas wells completed in any formation deeper than the Pictured Cliffs formation shall be classified "exempt" if at least three months of production history is available and the well failed to produce, and is incapable of producing, an average of 2000 MCF or more per month during the months produced within the preceding 12-month period, and the well is classified as marginal in the August Gas Proration Schedule.

   Gas wells on multiple well Gas Proration Units will not be classified "exempt" unless the Gas Proration Unit is classified as marginal. Any or all wells on a marginal multiple well Gas Proration Unit may be classified as "exempt" provided each Gas Proration Unit so classified meets the qualification for "exempt" status. Gas Proration Units for wells producing from formations deeper than the Pictured Cliffs formation shall be classified "exempt" if at least three months of production history is available and the Gas Proration Unit failed to produce, and is incapable of producing, an average of 2000 MCF or more

per month during the months produced within the preceding 12-month period, and the Gas Proration Unit is classified as marginal in the August Gas Proration Schedule. Gas Proration Units are to be classified as "exempt" because of their low producing ability.

The District Supervisor of the Division's Aztec Office may classify a well or Gas Proration Unit as "exempt" at any time if the operator presents sufficient evidence to the District Supervisor indicating that the well or Gas Proration Unit is incapable of producing gas at a higher rate than that rate required for "exempt" classification for wells or Gas Proration Units in that pool.

Once a well or Gas Proration Unit has been declared "exempt" for the following test year, it shall remain classified "exempt" for that test year.

3. If a test is filed on any well on a gas proration unit, the test requirement for the gas proration unit has been met. The deliverability of the unit is taken only as the resulting sum of all wells tested.

4. If a test is not received for a proration unit then a shut-in pressure is also not received. Any test filed should have a shut-in pressure recorded on the Form C-122-A. "Exempt" wells do not require the filing of a shut-in pressure.

CHANGE THE WORDING - CLARIFY

ATTEMPTED DELIVERABILITY TEST, NO GAS, FILE C-122-A WITH WHAT DATA IS AVAILABLE

B. All Annual and Biennial Deliverability and Shut-In Pressure Tests required by these rules must be filed with the Division's Aztec office ~~and with the appropriate gas transportation facility~~ within 30 days following the completion of each test. Provided however, that any test completed between October 31 of the test year and January 31 of the following year are due no later than January 31. No extension of time for filing tests beyond January 31 will be granted except after notice and hearing.

Failure to file any test within the above-prescribed times will subject the well to the loss of one day's allowable for each day the test is late. A well classified as marginal shall be shut-in one day for each day the test is late.

SECTION 3: Scheduling of Tests

A. Notification of Pools to be Tested

By September 1 of each year, the District Supervisor of the Aztec District Office of the Division shall by memorandum notify each gas transportation facility and each operator of the pools which are to be scheduled for biennial testing during the following testing period from January 1 through the last day of December of that test year. The

District Supervisor will also provide a list of "exempt" wells and a list of wells that do not have a minimum of three Annual Deliverability and Shut-In Pressure Tests on file.

Any well scheduled for testing during its test year may have the conditioning period, test flow period, and some of the seven day shut-in period conducted in December of the previous year provided that if the 7 day shut-in period immediately follows the test flow period the 7 day shut-in pressure would be measured in January of the test year. The earliest date that a well could be scheduled for Annual or Biennial Deliverability and Shut-In Pressure Test would be such that the Test Flow Period would end on December 25 of the previous year.

Downhole commingled wells are to be scheduled for tests on dates for pool of lowermost prorated completion of well.

B. Annual and Biennial Deliverability Tests

By November 1 of each year, each gas transportation facility shall, in cooperation with the operators involved, prepare and submit a schedule of the wells to which it is connected which are to begin testing in December and January. Said schedule shall be entitled, "Annual and Biennial Deliverability and Shut-In Pressure Test Schedule", and one copy shall be submitted to the Division's Aztec office and to each operator concerned. The schedule shall indicate the date of tests, pool, operator, lease, well number, and location of each well.

At least 30 days prior to the beginning of each succeeding 2-month testing interval, a similar schedule shall be prepared and filed in accordance with the above.

The gas transportation facility and the Aztec District Office of the Division shall be notified immediately by any operator unable to conduct any test as scheduled.

In the event a well is not tested in accordance with the existing test schedule, the well shall be re-scheduled by the gas transportation facility, and the Division and the operator of the well so notified in writing. Every effort should be made to notify the Division of the new schedule prior to the conclusion of the newly assigned 14-day conditioning period.

Notice to the Division of Shut-In Pressure Tests which are scheduled at a time other than immediately following the flow test must be received prior to the time that the well is shut-in.

It shall be the responsibility of each operator to determine that all of its wells are properly scheduled for testing by the gas transportation facility to which they are connected, in order that all annual and biennial tests may be completed during the testing season.

In the event a well is shut-in by the state for over production, the operator may produce the well for a period of time to secure a test after notification to the Division. All gas produced during this testing period will be used in determining the over/under produced status of the well.

C. Deliverability Re-Tests

An operator may, in cooperation with the gas transportation facility, schedule a well for a deliverability re-test upon notification to the Division's Aztec office at least ten days before the test is to be commenced. Such re-test shall be for good and substantial reason and shall be subject to the approval of the Division. Re-tests shall in all ways be conducted in conformance with the Annual and Biennial Deliverability Test Procedures of these rules. The Division, at its discretion, may require the re-testing of any well by notification to the operator to schedule such re-test. These tests as filed on Form C-122-A should be identified as "RETEST" in the remarks column.

SECTION 4: Witnessing of Tests

Any Initial Annual or Biennial Deliverability and Shut-In Pressure Test may be witnessed by any or all of the following: an agent of the Division, an offset operator, a representative of the gas transportation facility connected to the well under test, or a representative of the gas transportation facility taking gas from an offset operator.

CHAPTER II PROCEDURE FOR TESTING

SECTION 1: Initial Deliverability and Shut-In Pressure Test Procedure

A. Within 90 days after a newly completed well is first delivered to a gas transportation facility, the operator shall complete a deliverability and shut-in pressure test of the well in conformance with the "Annual and Biennial Deliverability and Shut-In Pressure Test Procedures", prescribed in Section 2 of this chapter. Results of the test shall be filed as required by Section 1 of Chapter I of these rules.

B. In the event it is impractical to test a newly completed well in conformance with Paragraph A above, the operator may conduct the deliverability and shut-in pressure test in the following manner (provided, however, that any test so conducted will not be accepted as the first annual deliverability and shut-in pressure test as described in Paragraph A-3 of Section 2, Chapter I):

1. A 7-day or 8-day production chart may be used as the basis for determining the well's deliverability, providing the chart so used is

preceded by at least 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 ten (10) days of the conditioning period when maximum production would over-range the meter chart or location production equipment.

2. A shut-in pressure of at least seven days duration shall be taken. This shall be the shut-in test required in Paragraph A, Section 1 of Chapter I of these rules.

3. The average daily static meter pressure shall be determined in accordance with Section 2 of Chapter II of these rules. This pressure shall be used as P_t in calculating P_w for the Deliverability Calculation.

4. The daily average rate of flow shall be determined in accordance with Section 2 of Chapter II.

5. The static wellhead working pressure (P_w) shall be determined in accordance with Section 2 of Chapter II.

6. The deliverability of the well shall be determined by using the data determined in Paragraphs 1 through 5 above in the deliverability formula in accordance with Section 2 of Chapter II.

7. The data and calculations for Paragraphs 1 through 6 above shall be reported as required in Section 1 of Chapter I of these rules, upon the blue-colored Form C-122-A or on white Form C-122-A and write "INITIAL TEST ONLY" in remarks.

SECTION 2: Annual and Biennial Deliverability and Shut-In Pressure Test Procedure

This test shall begin by producing a well in the normal operating manner into the pipeline through either the casing or tubing, but not both, for a period of fourteen consecutive days. This shall be known as the conditioning period. The production valve and choke settings shall not be changed during either the conditioning or flow periods except during the first ten (10) days of the conditioning period when maximum production would over-range the meter chart or location production equipment. The first ten (10) days of said conditioning period shall not have more than forty-eight (48) hours of cumulative interruptions of flow. The eleventh to fourteenth days, inclusive, of said conditioning period shall have no interruptions of flow whatsoever. Any interruption of flow that occurs as normal operation of the well as stop-cock flow, intermittent flow, or well blow down will not be counted as shut-in time in either the conditioning or flow period.

The daily flowing rate shall be determined from an average of seven or eight consecutive producing days, following a minimum conditioning period of 14 consecutive days of production. This shall be known as the flow period.

Instantaneous pressures shall be measured by deadweight gauge or other method approved by the Division during the 7-day or 8-day flow period at the casinghead, tubinghead, and orifice meter, and shall be recorded along with 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, psia, to the upstream pressure, psia 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 Division on Form C-122-A in item (n) of the form. When critical flow conditions exist, the instantaneous flowing pressures required hereinabove shall be measured during the last 48 hours of the 7-day or 8-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 7-day or 8-day average static tubing pressure if the well is flowing through the casing; it shall be the calculated 7-day or 8-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 set out in this manual.

To obtain the shut-in pressure of a well under test, the well shall be shut in some time during the current testing season for a period of seven to fourteen consecutive days, which have been preceded by a minimum of seven days of uninterrupted production. Such shut-in pressure shall be measured with a deadweight gauge or other method approved by the Division on the seventh to fourteenth day of shut-in of the well. The 7-day shut-in pressure shall be measured on both the

tubing and the casing when communication exists between the two strings. The higher of such pressures shall be used as P_c in the deliverability calculation. When any such shut-in pressure is determined by the Division to be abnormally low, the shut-in pressure to be used as P_c shall be determined by one of the following methods:

1. A Division-designated value.

2. An average shut-in pressure of all offset wells completed in the same zone. Offset wells include the four side and four corner wells, if available.

3. A calculated surface pressure based on a measured bottom-hole pressure. Such calculation shall be made in accordance with the New Mexico Oil Conservation Division "Back Pressure Manual," Example No. 7. CHANGE TO AN EXHIBIT FOR A NEW INSTRUCTION PUBLICATION.

All Wellhead pressures as well as the flowing meter pressure tests which are to be taken during the 7-day or 8-day deliverability test period as required hereinabove shall be taken with a deadweight gauge or other method approved by the Division. The pressure readings and the date and time according to the chart shall be recorded and maintained in the operator'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 7-day or 8-day deliverability test period; however, 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, 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 average flowing meter pressure for the 7-day or 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.

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

15.025 psia pressure base, 60°F. temperature base and 0.60 specific gravity base.

The daily volume of flow as determined from the flow period chart readings shall be calculated by applying the Basic Orifice Meter Formula or other acceptable industry standard practices.

$$Q = C' \{h_w P_f\}^{1/2}$$

Where:

Q = Metered volume of flow Mcf/d @ 15.025 psia, 60° F., and 0.60 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 the New Mexico Oil Conservation Division "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 Division.

When supercompressibility correction is made for a gas containing either nitrogen or carbon dioxide in excess of two percent, the supercompressibility factors of such gas shall be determined by the use of Table V of the C.N.G.A. Bulletin TS-402 for pressures 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 the New Mexico Oil Conservation Division "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 7-day or 8-day flow period shall be corrected for meter error by multiplication by a correction factor. Said correction factor shall be determined by dividing the square root of the deadweight flowing meter pressure, psia, by the square root of the chart flowing meter pressure, psia.

NOTE Exhibit "B"

Deliverability pressure, as used herein, is a defined pressure applied to each well and used in the process of comparing the abilities of wells in a pool to produce at static wellhead working pressures equal to a percentage of the 7-day shut-in pressure of the respective individual wells. Such percentage shall be determined and announced periodically by the Division based on the relationship of the average static wellhead working pressures (P_w) divided by the average 7-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 Mcf/d at the deliverability pressure, (P_d), (at Standard Conditions of 15.025 psia, 60°F and 0.60 sp. gr.).

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 2 of Chapter II.

P_d = Deliverability pressure, psia, as defined above.

P_w = Average static wellhead working pressure, as determined from 7-day or 8-day flow period, psia, and calculated from tables in this manual entitled "Pressure Loss Due to Friction" Tables for San Juan Basin.

n = Average pool slope of back pressure curves as follows:

For Pictured Cliffs and shallower formations	0.85
For formations deeper than Pictured Cliffs	0.75

(Note: Special Rules for Any Specific Pool or Formation May Supersede The Above Values. Check Special Rules If In Doubt.)

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 and announced periodically by the Division. Such determination shall be made after a study of the test data of the pool obtained during the previous testing season.

Downhole commingled wells are to be tested in year for pool of lowermost prorated completion of well and shall use pool slope (n), and deliverability pressure of lowermost pool. The total flow rate from the downhole commingled well will be used to calculate a value of deliverability. For each prorated gas zone of a downhole commingled well, a Form C-122-A is required to be filed and in the Summary portion of that form, all zones will indicate the same data for line h, P_c, Q, P_w, and P_d. The value shown for Deliverability (D) will be that percentage of the total deliverability of the well that is applicable to this zone. A note shall be placed in the remarks column that indicates the percentage of deliverability to be allocated to this zone of the well.

Any test prescribed herein will be considered acceptable if the average flow rate for the final 7-day or 8-day deliverability test is not more than ten percent in excess of any consecutive 7-day or 8-day average of the preceding two weeks. A deliverability test not meeting this requirement may be declared invalid, requiring the well to be re-tested.

All charts relative to initial, annual, or biennial deliverability tests or copies thereof shall be made available to the Division upon its request.

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. The operator shall maintain the above data for a period of not less than two (2) years plus the current test year.

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

Initial and Annual or Biennial Deliverability and Shut-In Pressure Tests for gas wells in all formations shall be conducted and reported in accordance with these rules and procedures. Provided however, these rules shall be subject to any specific modification or change contained in Special Pool Rules adopted for any pool after notice and hearing.

CHAPTER III INFORMATIONAL TESTS

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 informational purposes at the option of the operator. When taken, this test must be taken and reported as prescribed below:

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 or other method approved by the Division.

2. The flow rate shall be that rate in Mcf/d measured at the end of a three hour test flow period. The flow from the well shall be for three 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 the New Mexico Oil Conservation Division "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 shall be considered to exist 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 Division's 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 2-inch nominal size tubing (1.995-inch ID) or larger shall be tested through the tubing.

B. Other tests for informational purposes may be conducted prior to obtaining a pipeline connection for a newly completed well upon receiving specific approval therefor from the Division's Aztec office. Approval of these tests shall be based primarily upon the volume of gas to be vented.

CHAPTER IV Type of Tests Required for Wells Completed in Non-Prorated Pools

SECTION 1: Initial Shut-in Pressure Tests for newly Completed Wells.

A. (Same as Chapter I, Section 1, A)

SECTION 2: Biennial Shut-in Pressure Tests

A. Non-prorated wells will be tested biennially as required by the District Office except as follows:

1. Wells which meet the "exempt" qualification as shown in Chapter I, Section 2, part 2 of these rules shall also be exempt from shut-in test requirements.

2. Wells classified as "hardship" wells during the test year shall also be exempt from shut-in test requirements.

B. All shut-in tests required by these rules must be filed with the Division's Aztec office by January 31 of the following year. Failure to file the test will subject the well to being shut-in one day for each day the test is late.

SECTION 3: Scheduling Tests

A. By September 1 of each year, the District Supervisor of the Aztec District Office of the Division shall by memorandum notify each gas transportation facility and each operator of the pools which are to be scheduled for biennial shut-in pressure testing during the following testing period from January 1 through the last day of December of that test year. The District Supervisor will also provide a list of "exempt" wells.

Any well scheduled for testing during its test year may have the test flow period, and some of the seven day shut-in period conducted in December of the previous year. The earliest date that a well could be scheduled for Biennial Shut-In Pressure Test would be such that the Test Flow Period would end on December 25 of the previous year.

Downhole commingled wells are to be scheduled for tests on dates for pool of lowermost completion of well.

SECTION 4: Test Procedure

A. To obtain the shut-in pressure of a well under test, the well shall be shut-in some time during the current testing season for a period of seven to fourteen consecutive days, which have been preceded by a minimum of seven days of uninterrupted production. Such shut-in pressure shall be measured by deadweight gauge or other method approved by the Division on the seventh to fourteenth day of shut-in of the well. The shut-in pressure shall be measured on both the tubing and the casing when communication exists between the two strings. The higher of such pressures shall be reported as the shut-in pressure of the well.

SECTION 5: Filing of shut-in Pressure Data

The results of this test will be filed in triplicate on Form C-125 showing the pressures in psia in column No.__ with the Aztec District Office.

Non-prorated pools

PSIA column added

C-125 A (Southeast) Same as current C-125

C-125 B (Northwest)

GAS WELL TESTING MANUAL FOR SAN JUAN BASIN, NEW MEXICO

CHAPTER I TYPE OF TESTS REQUIRED FOR WELLS COMPLETED IN PRORATED GAS POOLS

SECTION 1: Initial Deliverability and Shut-In Pressure Tests for Newly Completed Well

A. Immediately upon completion of each gas well in the San Juan Basin, a shut-in pressure test of at least seven days duration shall be made. This initial shut-in pressure shall be filed with the Division's Aztec Office on either Form C-122 or C-104.

B. Within 90 days after a well first delivers gas to a gas transportation facility, the well shall have been tested in accordance with Section 1 of Chapter II of these rules, "Initial Deliverability and Shut-In Pressure Test Procedures", and the results of the test filed in triplicate with the Division's Aztec office and one copy filed with the gas transportation facility to which the well is connected. This test is to be filed on Form C-122-A. Failure to file said test within the above-prescribed 90-day period will subject the well to the loss of one day's allowable for each day the test is late.

1. If the newly first delivered well is an infill well on a proration unit, the old well on the unit is not required to be tested provided it has a valid test on file for the current proration year. Testing of the old well follows the regularly assigned test year for the pool in which the wells are located. The new well is required to be tested annually until at least three annual tests are on file and then the well is to be tested biennially with other wells in that pool.

2. If the newly first delivered well is an infill well on a proration unit and the old well on the unit is "exempt", the old well is to be tested along with the new well for the Initial and Annual Deliverability and Shut-In Pressure Test. The old well will lose its "exempt" classification and must be tested biennially along with other wells in that pool. The new infill well is required to be tested annually until at least three annual tests are on file and then the well is to be tested biennially with other wells in that pool.

C. The requirements for Initial Tests and Annual or Biennial Deliverability and Shut-In Pressure Tests and the notification requirements and scheduling of such tests which apply to newly completed wells shall also apply to recompleted wells.

D. Any tests taken for informational purposes prior to pipeline connection shall not be recognized as official tests for the assignment of allowables.

SECTION 2. Annual and Biennial Deliverability and Shut-In Pressure Tests

A. Annual or Biennial Deliverability and Shut-In Pressure Tests shall be made on all gas wells during the period from January 1 through December 31 of that year except as follows:

1. A newly completed well or a recompleted well shall be tested on an annual basis until a minimum of three annual tests have been taken, after which the well shall be tested biennially as is required for other wells in the pool in which the well is located.

2. Wells classified as "exempt" shall not be subject to the requirements of annual or biennial deliverability tests.

   Classification of wells into or out of the "exempt" status shall be done once each year immediately following the reporting of June production and shall be effective for the succeeding annual test period.

   Gas wells completed in the Pictured Cliffs or any shallower formation shall be classified "exempt" if at least three months of production history is available and the well failed to produce, and is incapable of producing, an average of 250 MCF or more per month during the months produced within the preceding 12-month period, and the well is classified as marginal in the August Gas Proration Schedule.

   Gas wells completed in any formation deeper than the Pictured Cliffs formation shall be classified "exempt" if at least three months of production history is available and the well failed to produce, and is incapable of producing, an average of 2000 MCF or more per month during the months produced within the preceding 12-month period, and the well is classified as marginal in the August Gas Proration Schedule.

   Gas wells on multiple well Gas Proration Units will not be classified "exempt" unless the Gas Proration Unit is classified as marginal. Any or all wells on a marginal multiple well Gas Proration Unit may be classified as "exempt" provided each Gas Proration Unit so classified meets the qualification for "exempt" status. Gas Proration Units for wells producing from formations deeper than the Pictured Cliffs formation shall be classified "exempt" if at least three months of production history is available and the Gas Proration Unit failed to produce, and is incapable of producing, an average of 2000 MCF or more per month during the months produced within the preceding 12-month period, and the Gas Proration Unit is classified as marginal in the

August Gas Proration Schedule. Gas Proration Units are to be classified as "exempt" because of their low producing ability.

The District Supervisor of the Division's Aztec Office may classify a well or Gas Proration Unit as "exempt" at any time if the operator presents sufficient evidence to the District Supervisor indicating that the well or Gas Proration Unit is incapable of producing gas at a higher rate than that rate required for "exempt" classification for wells or Gas Proration Units in that pool.

Once a well or Gas Proration Unit has been declared "exempt" for the following test year, it shall remain classified "exempt" for that test year.

3. If a test is filed on any well on a gas proration unit, the test requirement for the gas proration unit has been met. The deliverability of the unit is taken only as the resulting sum of all wells tested.

4. A shut-in pressure must be filed on Form C-122-A even if no gas is measured during the production phase of the test. "Exempt" wells do not require the filing of a shut-in pressure.

B. All Annual and Biennial Deliverability and Shut-In Pressure Tests required by these rules must be filed with the Division's Aztec office and with the appropriate gas transportation facility within 90 days following the completion of each test. Provided however, that any test completed between October 31 of the test year and January 31 of the following year are due no later than January 31. No extension of time for filing tests beyond January 31 will be granted except after notice and hearing.

Failure to file any test within the above-prescribed times will subject the well to the loss of one day's allowable for each day the test is late. A well classified as marginal shall be shut-in one day for each day the test is late.

SECTION 3: Scheduling of Tests

A. Notification of Pools to be Tested

By September 1 of each year, the District Supervisor of the Aztec District Office of the Division shall by memorandum notify each gas transportation facility and each operator of the pools which are to be scheduled for biennial testing during the following testing period from January 1 through the last day of December of that test year. The District Supervisor will also provide a list of "exempt" wells and a list of wells that do not have a minimum of three Annual Deliverability and Shut-In Pressure Tests on file.

Any well scheduled for testing during its test year may have the conditioning period, test flow period, and some of the seven day shut-in period conducted in December of the previous year provided that if the 7 day shut-in period immediately follows the test flow period the 7 day shut-in pressure would be measured in January of the test year. The earliest date that a well could be scheduled for Annual or Biennial Deliverability and Shut-In Pressure Test would be such that the Test Flow Period would end on December 25 of the previous year.

Downhole commingled wells are to be scheduled for tests on dates for pool of lowermost prorated completion of well.

B. Annual and Biennial Deliverability Tests

By November 1 of each year, each gas transportation facility shall, in cooperation with the operators involved, prepare and submit a schedule of the wells to which it is connected which are to begin testing in December and January. Said schedule shall be entitled, "Annual and Biennial Deliverability and Shut-In Pressure Test Schedule", and one copy shall be submitted to the Division's Aztec office and to each operator concerned. The schedule shall indicate the date of tests, pool, operator, lease, well number, and location of each well.

At least 30 days prior to the beginning of each succeeding 2-month testing interval, a similar schedule shall be prepared and filed in accordance with the above.

The gas transportation facility and the Aztec District Office of the Division shall be notified immediately by any operator unable to conduct any test as scheduled.

In the event a well is not tested in accordance with the existing test schedule, the well shall be re-scheduled by the gas transportation facility, and the Division and the operator of the well so notified in writing. Every effort should be made to notify the Division of the new schedule prior to the conclusion of the newly assigned 14-day conditioning period.

Notice to the Division of Shut-In Pressure Tests which are scheduled at a time other than immediately following the flow test must be received prior to the time that the well is shut-in.

It shall be the responsibility of each operator to determine that all of its wells are properly scheduled for testing by the gas transportation facility to which they are connected, in order that all annual and biennial tests may be completed during the testing season.

In the event a well is shut-in by the state for over production, the operator may produce the well for a period of time to secure a test after notification to the Division. All gas produced during this

testing period will be used in determining the over/under produced status of the well.

C. Deliverability Re-Tests

An operator may, in cooperation with the gas transportation facility, schedule a well for a deliverability re-test upon notification to the Division's Aztec office at least ten days before the test is to be commenced. Such re-test shall be for good and substantial reason and shall be subject to the approval of the Division. Re-tests shall in all ways be conducted in conformance with the Annual and Biennial Deliverability Test Procedures of these rules. The Division, at its discretion, may require the re-testing of any well by notification to the operator to schedule such re-test. These tests as filed on Form C-122-A should be identified as "RETEST" in the remarks column.

SECTION 4: Witnessing of Tests

Any Initial Annual or Biennial Deliverability and Shut-In Pressure Test may be witnessed by any or all of the following: an agent of the Division, an offset operator, a representative of the gas transportation facility connected to the well under test, or a representative of the gas transportation facility taking gas from an offset operator.

CHAPTER II PROCEDURE FOR TESTING

SECTION 1: Initial Deliverability and Shut-In Pressure Test Procedure

A. Within 90 days after a newly completed well is first delivered to a gas transportation facility, the operator shall complete a deliverability and shut-in pressure test of the well in conformance with the "Annual and Biennial Deliverability and Shut-In Pressure Test Procedures", prescribed in Section 2 of this chapter. Results of the test shall be filed as required by Section 1 of Chapter I of these rules.

B. In the event it is impractical to test a newly completed well in conformance with Paragraph A above, the operator may conduct the deliverability and shut-in pressure test in the following manner (provided, however, that any test so conducted will not be accepted as the first annual deliverability and shut-in pressure test as described in Paragraph A-1 of Section 2, Chapter I):

1. A 7-day or 8-day production chart may be used as the basis for determining the well's deliverability, providing the chart so used is preceded by at least 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 ten (10) days of the conditioning period when maximum production would over-range the meter chart or location production equipment.

2. A shut-in pressure of at least seven days duration shall be taken. This shall be the shut-in test required in Paragraph A, Section 1 of Chapter I of these rules.

3. The average daily static meter pressure shall be determined in accordance with Section 2 of Chapter II of these rules. This pressure shall be used as P_t in calculating P_w for the Deliverability Calculation.

4. The daily average rate of flow shall be determined in accordance with Section 2 of Chapter II.

5. The static wellhead working pressure (P_w) shall be determined in accordance with Section 2 of Chapter II.

6. The deliverability of the well shall be determined by using the data determined in Paragraphs 1 through 5 above in the deliverability formula in accordance with Section 2 of Chapter II.

7. The data and calculations for Paragraphs 1 through 6 above shall be reported as required in Section 1 of Chapter I of these rules, upon the blue-colored Form C-122-A or on white Form C-122-A and write "INITIAL TEST ONLY" in remarks.

SECTION 2: Annual and Biennial Deliverability and Shut-In Pressure Test Procedure

This test shall begin by producing a well in the normal operating manner into the pipeline through either the casing or tubing, but not both, for a period of fourteen consecutive days. This shall be known as the conditioning period. The production valve and choke settings shall not be changed during either the conditioning or flow periods except during the first ten (10) days of the conditioning period when maximum production would over-range the meter chart or location production equipment. The first ten (10) days of said conditioning period shall not have more than forty eight (48) hours of cumulative interruptions of flow. The eleventh to fourteenth days, inclusive, of said conditioning period shall have no interruptions of flow whatsoever. Any interruption of flow that occurs as normal operation of the well as stop-cock flow, intermittent flow, or well blow down will not be counted as shut-in time in either the conditioning or flow period.

The daily flowing rate shall be determined from an average of seven or eight consecutive producing days, following a minimum conditioning period of 14 consecutive days of production. This shall be known as the flow period.

Instantaneous pressures shall be measured by deadweight gauge or other method approved by the Division during the 7-day or 8-day flow period at the casinghead, tubinghead, and orifice meter, and shall be recorded along with instantaneous meter-chart static pressure reading.

If a well is producing through a compressor that is located between the wellhead and the meter run, the meter run pressure and the wellhead casing pressure and the wellhead tubing pressure are to be reported on Form C-122-A. (Neither the suction pressure nor the discharge pressure of the compressor is considered wellhead pressure.) A note shall be entered in the remarks portion on Form C-122-A stating "This well produces through a compressor".

When it is necessary to restrict the flow of gas between the wellhead and orifice meter, the ratio of the downstream pressure, psia, to the upstream pressure, psia 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 Division on Form C-122-A in item (n) of the form. When critical flow conditions exist, the instantaneous flowing pressures required hereinabove shall be measured during the last 48 hours of the 7-day or 8-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 7-day or 8-day average static tubing pressure if the well is flowing through the casing; it shall be the calculated 7-day or 8-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 set out in this manual.

To obtain the shut-in pressure of a well under test, the well shall be shut in some time during the current testing season for a period of seven to fourteen consecutive days, which have been preceded by a minimum of seven days of uninterrupted production. Such shut-in

pressure shall be measured with a deadweight gauge or other method approved by the Division on the seventh to fourteenth day of shut-in of the well. The 7-day shut-in pressure shall be measured on both the tubing and the casing when communication exists between the two strings. The higher of such pressures shall be used as P_c in the deliverability calculation. When any such shut-in pressure is determined by the Division to be abnormally low or the well can not be shut-in due to "HARDSHIP" classification, the shut-in pressure to be used as P_c shall be determined by one of the following methods:

1. A Division-designated value.

2. An average shut-in pressure of all offset wells completed in the same zone. Offset wells include the four side and four corner wells, if available.

3. A calculated surface pressure based on a calculated bottom-hole pressure. Such calculation shall be made in accordance with the examples in this manual.

All Wellhead pressures as well as the flowing meter pressure tests which are to be taken during the 7-day or 8-day deliverability test period as required hereinabove shall be taken with a deadweight gauge or other method approved by the Division. The pressure readings and the date and time according to the chart shall be recorded and maintained in the operator'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 7-day or 8-day deliverability test period; however, 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, 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 average flowing meter pressure for the 7-day or 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.

The 7-day or 8-day flow period volume shall be calculated from the integrated readings as determined from the flow period orifice meter chart. The volume so calculated shall be divided by the number of testing days on the chart to determine the average daily rate of flow during said flow period. The flow period shall have a minimum of seven

and a maximum of eight legibly recorded flowing days to be acceptable for test purposes. The volume used in this calculation shall be corrected to New Mexico Oil Conservation Division standard conditions of 15.025 psia pressure base, 60°F. temperature base and 0.60 specific gravity base.

The daily volume of flow as determined from the flow period chart readings shall be calculated by applying the Basic Orifice Meter Formula or other acceptable industry standard practices.

$$Q = C' \{h_w P_f\}^{1/2}$$

Where:

Q = Metered volume of flow Mcf/d @ 15.025 psia, 60° F., and 0.60 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 the tables in this 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 Division.

When supercompressibility correction is made for a gas containing either nitrogen or carbon dioxide in excess of two percent, the supercompressibility factors of such gas shall be determined by the use of Table V of the C.N.G.A. Bulletin TS-402 for pressures 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 the New Mexico Oil Conservation Division "Back Pressure Test Manual", or this 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 7-day or 8-day flow period shall be corrected for meter error by multiplication by a

correction factor. Said correction factor shall be determined by dividing the square root of the deadweight flowing meter pressure, psia, by the square root of the chart flowing meter pressure, psia.

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

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

Where:

D = Deliverability Mcf/d at the deliverability pressure, (P_d), (at Standard Conditions of 15.025 psia, 60°F and 0.60 sp. gr.).

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 2 of Chapter II.

P_d = Deliverability pressure, psia, as defined above.

P_w = Average static wellhead working pressure, as determined from 7-day or 8-day flow period, psia, and calculated from tables in this manual entitled "Pressure Loss Due to Friction" Tables for San Juan Basin.

n = Average pool slope of back pressure curves as follows:

For Pictured Cliffs and shallower formations	0.85
For formations deeper than Pictured Cliffs	0.75

(Note: Special Rules for Any Specific Pool or Formation May Supersede The Above Values. Check Special Rules If In Doubt.)

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 and announced periodically by the Division. Such determination shall be made after a study of the test data of the pool obtained during the previous testing season.

Downhole commingled wells are to be tested in year for pool of lowermost prorated completion of well and shall use pool slope (n), and deliverability pressure of lowermost pool. The total flow rate from the downhole commingled well will be used to calculate a value of deliverability. For each prorated gas zone of a downhole commingled well, a Form C-122-A is required to be filed and in the Summary portion of that form, all zones will indicate the same data for line h, P_c, Q, P_w, and P_d. The value shown for Deliverability (D) will be that percentage of the total deliverability of the well that is applicable to this zone. A note shall be placed in the remarks column that indicates the percentage of deliverability to be allocated to this zone of the well.

Any test prescribed herein will be considered acceptable if the average flow rate for the final 7-day or 8-day deliverability test is not more than ten percent in excess of any consecutive 7-day or 8-day average of the preceding two weeks. A deliverability test not meeting this requirement may be declared invalid, requiring the well to be re-tested.

All charts relative to initial, annual, or biennial deliverability tests or copies thereof shall be made available to the Division upon its request.

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. The operator shall maintain the above data for a period of not less than two (2) years plus the current test year.

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

Initial and Annual or Biennial Deliverability and Shut-In Pressure Tests for gas wells in all formations shall be conducted and reported in accordance with these rules and procedures. Provided however, these rules shall be subject to any specific modification or change contained in Special Pool Rules adopted for any pool after notice and hearing.

CHAPTER III INFORMATIONAL TESTS

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 informational purposes at the option of the operator. When taken, this test must be taken and reported as prescribed below:

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 or other method approved by the Division.

2. The flow rate shall be that rate in Mcf/d measured at the end of a three hour test flow period. The flow from the well shall be for three 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 this manual or the New Mexico Oil Conservation Division "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 shall be considered to exist 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 this manual or in the Division's 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 2-inch nominal size tubing (1.995-inch ID) or larger shall be tested through the tubing.

B. Other tests for informational purposes may be conducted prior to obtaining a pipeline connection for a newly completed well upon receiving specific approval therefor from the Division's Aztec office. Approval of these tests shall be based primarily upon the volume of gas to be vented.

CHAPTER IV Type of Tests Required for Wells Completed in Non-Prorated Pools

SECTION 1: Initial Shut-in Pressure Tests for newly Completed Wells.

A. (Same as Chapter I, Section 1, A)

SECTION 2: Biennial Shut-in Pressure Tests

A. Non-prorated wells will be tested biennially as required by the District Office except as follows:

1. Wells which meet the "exempt" qualification as shown in Chapter I, Section 2, paragraph A-2 of these rules shall also be exempt from shut-in test requirements.

2. Wells classified as "hardship" wells during the test year shall also be exempt from shut-in test requirements.

B. All shut-in tests required by these rules must be filed with the Division's Aztec office by January 31 of the following year. Failure to file the test will subject the well to being shut-in one day for each day the test is late.

SECTION 3: Scheduling Tests

A. By September 1 of each year, the District Supervisor of the Aztec District Office of the Division shall by memorandum notify each gas transportation facility and each operator of the pools which are to be scheduled for biennial shut-in pressure testing during the following testing period from January 1 through the last day of December of that test year. The District Supervisor will also provide a list of "exempt" wells.

Any well scheduled for testing during its test year may have the test flow period, and some of the seven day shut-in period conducted in December of the previous year. The earliest date that a well could be scheduled for Biennial Shut-In Pressure Test would be such that the Test Flow Period would end on December 25 of the previous year.

Downhole commingled wells are to be scheduled for tests on dates for pool of lowermost completion of well.

SECTION 4: Test Procedure

A. To obtain the shut-in pressure of a well under test, the well shall be shut-in some time during the current testing season for a period of seven to fourteen consecutive days, which have been preceded by a minimum of seven days of uninterrupted production. Such shut-in pressure shall be measured by deadweight gauge or other method approved by the Division on the seventh to fourteenth day of shut-in of the well. The shut-in pressure shall be measured on both the tubing and the casing when communication exists between the two strings. The higher of such pressures shall be reported as the shut-in pressure of the well.

SECTION 5: Filing of shut-in Pressure Data

The results of this test will be filed in triplicate on Form C-125-B showing the pressures in psia in column labeled "S. I. PRESSURE PSIA (DWT)" with the Aztec District Office.

END OF THIS PROPOSED MANUAL FOR TESTING IN SJB 11/10/86

YEAR	NO. WELLS	LINE h	Pc	Q	Pw	Pd	D	Pw/Pc %	Pd/Pc %	D/Q %
1978	2,155	490,960	1,550,728	447,212	557,853	775,146	423,603	35.97	49.99	94.72
1979	2,262	570,789	1,643,270	415,998	620,139	821,793	400,289	37.74	50.01	96.22
1980	2,441	621,940	1,825,604	466,006	678,268	912,891	447,387	37.15	50.00	96.00
1981	2,750	743,866	2,091,191	488,192	806,734	1,046,088	473,945	38.67	50.02	97.08
1982	3,296	900,882	2,541,860	614,764	1,010,056	1,270,427	612,460	39.74	49.98	99.63
1983	3,460	982,746	2,674,138	640,847	1,113,180	1,339,297	630,081	41.63	50.08	98.32
TOTALS	16,364	4,311,183	12,326,791	3,073,019	4,788,230	6,165,642	2,987,765	38.84	50.02	97.23
AVERAGE	2,727	718,530	2,054,465	512,170	798,038	1,027,607	497,961	38.84	50.02	97.23
1984	607	183,651	554,991	174,006	203,791	278,458	162,388	36.72	50.17	93.32

BEFORE EXAMINER QUINTANA
OIL CONSERVATION DIVISION
EXHIBIT NO. "B"
CASE NO. 8586

EXHIBIT "B"

YEAR	NO. WELLS	LINE h	Pc	Q	Pw	Pd	D	Pw/Pc %	Pd/Pc %	D/Q %
1978	2,476	683,031	1,234,025	987,467	748,565	985,680	763,520	60.66	79.88	77.32
1979	2,769	764,062	1,365,331	1,048,668	838,123	1,088,011	830,633	61.39	79.69	79.21
1980	2,985	827,266	1,422,375	912,834	926,559	1,133,351	750,350	65.14	79.68	82.20
1981	3,223	898,717	1,542,031	928,197	1,000,375	1,229,115	769,560	64.87	79.71	82.91
1982	3,504	1,078,307	1,719,075	803,100	1,142,885	1,370,429	721,655	66.48	79.72	89.86
1983	3,673	1,130,436	1,806,657	793,419	1,196,383	1,437,787	710,416	66.22	79.58	89.54
TOTALS	18,630	5,381,819	9,089,494	5,473,685	5,852,890	7,244,373	4,546,134	64.39	79.70	79.70
AVERAGE	3,105	896,970	1,514,916	912,281	975,482	1,207,396	757,689	64.39	79.70	83.05
CORRECTED	4/8/85									
1984	3,071	990,322	1,549,230	819,460	1,067,244	1,235,897	752,410	68.89	79.77	91.82
NEW TOT	21,701	6,372,141	10,638,724	6,293,145	6,920,134	8,480,270	5,298,544	65.05	79.71	84.20
NEW AVG	3,100	910,306	1,519,818	899,021	988,591	1,211,467	756,935	65.05	79.71	84.20

YEAR	NO. WELLS	LINE h	Pc	Q	Pw	Pd	D	Pw/Pc %	Pd/Pc %	D/Q %
1978	1,320	195,580	380,943	87,792	202,877	304,867	56,598	53.26	80.03	64.47
1979	1,343	197,406	386,765	87,487	203,957	309,540	55,087	52.73	80.03	62.97
1980	1,368	216,857	394,573	77,815	223,850	315,712	55,027	56.73	80.01	70.72
1981	1,424	227,176	418,567	82,487	235,083	334,904	57,491	56.16	80.01	69.70
1982	1,493	257,066	442,986	76,379	265,669	354,459	58,570	59.97	80.02	76.68
1983	1,563	271,186	461,176	76,188	280,967	368,961	59,620	60.92	80.00	78.25
TOTALS	8,511	1,365,271	2,485,010	488,148	1,412,403	1,988,443	342,393	56.84	80.02	70.14
AVERAGE	1,418	227,545	414,168	81,358	235,400	331,407	57,066	56.84	80.02	70.14

NOTE: Pc IN 1983 IN ERROR CORRECTED BY SUBTRACTING 58056 AND ADDING 580 = 461,176
Q IN 1983 IN ERROR CORRECTED BY ADDING 56= 76,188
FOR THE ABOVE, AN ERROR WAS FOUND IN THE POSTING IN THE BOOK
11/16/84

1984	1,431	246,510	428,579	75,207	255,852	342,751	55,250	59.70	79.97	73.46
NEW TOT	9,942	1,611,781	2,913,589	563,355	1,668,255	2,331,194	397,643	57.26	80.01	70.58
NEW AVG	1,420	230,254	416,227	80,479	238,322	333,028	56,806	57.26	80.01	70.58

YEAR	NO. WELLS	LINE h	Pc	Q	Pw	Pd	D	Pw/Pc %	Pd/Pc %	D/Q %
1978	283	72,298	114,337	27,822	73,420	91,852	23,784	64.21	80.33	85.49
1979	297	74,560	116,509	24,668	75,537	93,593	22,321	64.83	80.33	90.49
1980	304	69,181	114,159	22,333	71,634	91,319	19,877	62.75	79.99	89.00
1981	314	72,023	120,143	25,427	75,101	96,108	28,688	62.51	79.99	112.82
1982	320	84,211	126,330	19,174	88,859	100,954	22,584	70.34	79.91	117.78
1983	314	82,503	126,712	19,202	88,532	100,414	21,022	69.87	79.25	109.48
TOTALS	1,832	454,776	718,190	138,626	473,083	574,240	138,276	65.87	79.96	99.75
AVERAGE	305	75,796	119,698	23,104	78,847	95,707	23,046	65.87	79.96	99.75
1984	270	75,822	115,599	17,539	80,433	91,211	14,582	69.58	78.90	83.14

Ex. 2 B-1
Case 8586

GAS WELL TESTING MANUAL FOR SAN JUAN BASIN, NEW MEXICO

CHAPTER I TYPE OF TESTS REQUIRED FOR WELLS COMPLETED IN PRORATED GAS POOLS

SECTION 1: Initial Deliverability and Shut-In Pressure Tests for Newly Completed Well

A. Immediately upon completion of each gas well in the San Juan Basin, a shut-in pressure test of at least seven days duration shall be made. This initial shut-in pressure shall be filed with the Division's Aztec Office on either Form C-122 or C-104.

B. Within 90 days ater a well first delivers gas to a gas transportation facility, the well shall have been tested in accordance with Section 1 of Chapter II of these rules, "Initial Deliverability and Shut-In Pressure Test Procedures", and the results of the test filed in triplicate with the Division's Aztec office and one copy filed with the gas transportation facility to which the well is connected. This test is to be filed on Form C-122-A. Failure to file said test within the above-prescribed 90-day period will subject the well to the loss of one day's allowable for each day the test is late.

1. If the newly first delivered well is an infill well on a proration unit, the old well on the unit is not required to be tested provided it has a valid test on file for the current proration year. Testing of the old well follows the regularly assigned test year for the pool in which the wells are located. The new well is required to be tested annually until at least three annual tests are on file and then the well is to be tested biennially with other wells in that pool.

2. If the newly first delivered well is an infill well on a proration unit and the old well on the unit is "exempt", the old well is to be tested along with the new well for the Initial and Annual Deliverability and Shut-In Pressure Test. The old well will lose its "exempt" classification and must be tested biennially along with other wells in that pool. The new infill well is required to be tested annually until at least three annual tests are on file and then the well is to be tested biennially with other wells in that pool.

C. The requirements for Initial Tests and Annual or Biennial Deliverability and Shut-In Pressure Tests and the notification

requirements and scheduling of such tests which apply to newly completed wells shall also apply to recompleted wells.

D. Any tests taken for informational purposes prior to pipeline connection shall not be recognized as official tests for the assignment of allowables.

SECTION 2. Annual and Biennial Deliverability and Shut-In Pressure Tests

A. Annual or Biennial Deliverability and Shut-In Pressure Tests shall be made on all gas wells during the period from January 1 through December 31 of that year except as follows:

1. A newly completed well or a recompleted well shall be tested on an annual basis until a minimum of three annual tests have been taken, after which the well shall be tested biennially as is required for other wells in the pool in which the well is located.

2. Wells classified as "exempt" shall not be subject to the requirements of annual or biennial deliverability tests.

   Classification of wells into or out of the "exempt" status shall be done once each year immediately following the reporting of June production and shall be effective for the succeeding annual test period.

   Gas wells completed in the Pictured Cliffs or any shallower formation shall be classified "exempt" if at least three months of production history is available and the well failed to produce, and is incapable of producing, an average of 250 MCF or more per month during the months produced within the preceding 12-month period, and the well is classified as marginal in the August Gas Proration Schedule.

   Gas wells completed in any formation deeper than the Pictured Cliffs formation shall be classified "exempt" if at least three months of production history is available and the well failed to produce, and is incapable of producing, an average of 2000 MCF or more per month during the months produced within the preceding 12-month period, and the well is classified as marginal in the August Gas Proration Schedule.

   Gas wells on multiple well Gas Proration Units will not be classified "exempt" unless the Gas Proration Unit is classified as marginal. Any or all wells on a marginal multiple well Gas Proration Unit may be classified as "exempt" provided each Gas Proration Unit so classified meets the qualification for "exempt" status. Gas Proration Units for wells producing from formations deeper than the Pictured Cliffs formation shall be classified "exempt" if at least three months of production history is

available and the Gas Proration Unit failed to produce, and is incapable of producing, an average of 2000 MCF or more per month during the months produced within the preceding 12-month period, and the Gas Proration Unit is classified as marginal in the August Gas Proration Schedule. Gas Proration Units are to be classified as "exempt" because of their low producing ability.

The District Supervisor of the Division's Aztec Office may classify a well or Gas Proration Unit as "exempt" at any time if the operator presents sufficient evidence to the District Supervisor indicating that the well or Gas Proration Unit is incapable of producing gas at a higher rate than that rate required for "exempt" classification for wells or Gas Proration Units in that pool.

Once a well or Gas Proration Unit has been declared "exempt" for the following test year, it shall remain classified "exempt" for that test year.

3. If a test is filed on any well on a gas proration unit, the test requirement for the gas proration unit has been met. The deliverability of the unit is taken only as the resulting sum of all wells tested.

4. A shut-in pressure must be filed on Form C-122-A even if no gas is measured during the production phase of the test. "Exempt" wells do not require the filing of a shut-in pressure.

B. All Annual and Biennial Deliverability and Shut-In Pressure Tests required by these rules must be filed with the Division's Aztec office and with the appropriate gas transportation facility within 90 days following the completion of each test. Provided however, that any test completed between October 31 of the test year and January 31 of the following year are due no later than January 31. No extension of time for filing tests beyond January 31 will be granted except after notice and hearing.

Failure to file any test within the above-prescribed times will subject the well to the loss of one day's allowable for each day the test is late. A well classified as marginal shall be shut-in one day for each day the test is late.

SECTION 3: Scheduling of Tests

A. Notification of Pools to be Tested

By September 1 of each year, the District Supervisor of the Aztec District Office of the Division shall by memorandum notify each gas transportation facility and each operator of the pools which are to

be scheduled for biennial testing during the following testing period from January 1 through the last day of December of that test year. The District Supervisor will also provide a list of "exempt" wells and a list of wells that do not have a minimum of three Annual Deliverability and Shut-In Pressure Tests on file.

Any well scheduled for testing during its test year may have the conditioning period, test flow period, and some of the seven day shut-in period conducted in December of the previous year provided that if the 7 day shut-in period immediately follows the test flow period the 7 day shut-in pressure would be measured in January of the test year. The earliest date that a well could be scheduled for Annual or Biennial Deliverability and Shut-In Pressure Test would be such that the Test Flow Period would end on December 25 of the previous year.

Downhole commingled wells are to be scheduled for tests on dates for pool of lowermost prorated completion of well.

B. Annual and Biennial Deliverability Tests

By November 1 of each year, each gas transportation facility shall, in cooperation with the operators involved, prepare and submit a schedule of the wells to which it is connected which are to begin testing in December and January. Said schedule shall be entitled, "Annual and Biennial Deliverability and Shut-In Pressure Test Schedule", and one copy shall be submitted to the Division's Aztec office and to each operator concerned. The schedule shall indicate the date of tests, pool, operator, lease, well number, and location of each well.

At least 30 days prior to the beginning of each succeeding 2-month testing interval, a similar schedule shall be prepared and filed in accordance with the above.

The gas transportation facility and the Aztec District Office of the Division shall be notified immediately by any operator unable to conduct any test as scheduled.

In the event a well is not tested in accordance with the existing test schedule, the well shall be re-scheduled by the gas transportation facility, and the Division and the operator of the well so notified in writing. Every effort should be made to notify the Division of the new schedule prior to the conclusion of the newly assigned 14-day conditioning period.

Notice to the Division of Shut-In Pressure Tests which are scheduled at a time other than immediately following the flow test must be received prior to the time that the well is shut-in.

It shall be the responsibility of each operator to determine that all of its wells are properly scheduled for testing by the gas transportation facility to which they are connected, in order that all annual and biennial tests may be completed during the testing season.

In the event a well is shut-in by the state for over production, the operator may produce the well for a period of time to secure a test after notification to the Division. All gas produced during this testing period will be used in determining the over/under produced status of the well.

C. Deliverability Re-Tests

An operator may, in cooperation with the gas transportation facility, schedule a well for a deliverability re-test upon notification to the Division's Aztec office at least ten days before the test is to be commenced. Such re-test shall be for good and substantial reason and shall be subject to the approval of the Division. Re-tests shall in all ways be conducted in conformance with the Annual and Biennial Deliverability Test Procedures of these rules. The Division, at its discretion, may require the re-testing of any well by notification to the operator to schedule such re-test. These tests as filed on Form C-122-A should be identified as "RETEST" in the remarks column.

SECTION 4: Witnessing of Tests

Any Initial Annual or Biennial Deliverability and Shut-In Pressure Test may be witnessed by any or all of the following: an agent of the Division, an offset operator, a representative of the gas transportation facility connected to the well under test, or a representative of the gas transportation facility taking gas from an offset operator.

CHAPTER II PROCEDURE FOR TESTING

SECTION 1: Initial Deliverability and Shut-In Pressure Test Procedure

A. Within 90 days after a newly completed well is first delivered to a gas transportation facility, the operator shall complete a deliverability and shut-in pressure test of the well in conformance with the "Annual and Biennial Deliverability and Shut-In Pressure Test Procedures", prescribed in Section 2 of this chapter. Results of the test shall be filed as required by Section 1 of Chapter I of these rules.

B. In the event it is impractical to test a newly completed well in conformance with Paragraph A above, the operator may conduct the deliverability and shut-in pressure test in the following manner (provided, however, that any test so conducted will not be accepted as the first annual deliverability and shut-in pressure test as described in Paragraph A-1 of Section 2, Chapter I):

1. A 7-day or 8-day production chart may be used as the basis for determining the well's deliverability, providing the chart so used is preceded by at least 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 ten (10) days of the conditioning period when maximum production would over-range the meter chart or location production equipment.

2. A shut-in pressure of at least seven days duration shall be taken. This shall be the shut-in test required in Paragraph A, Section 1 of Chapter I of these rules.

3. The average daily static meter pressure shall be determined in accordance with Section 2 of Chapter II of these rules. This pressure shall be used as P_t in calculating P_w for the Deliverability Calculation.

4. The daily average rate of flow shall be determined in accordance with Section 2 of Chapter II.

5. The static wellhead working pressure (P_w) shall be determined in accordance with Section 2 of Chapter II.

6. The deliverability of the well shall be determined by using the data determined in Paragraphs 1 through 5 above in the deliverability formula in accordance with Section 2 of Chapter II.

7. The data and calculations for Paragraphs 1 through 6 above shall be reported as required in Section 1 of Chapter I of these rules, upon the blue-colored Form C-122-A or on white Form C-122-A and write "INITIAL TEST ONLY" in remarks.

SECTION 2: Annual and Biennial Deliverability and Shut-In Pressure Test Procedure

This test shall begin by producing a well in the normal operating manner into the pipeline through either the casing or tubing, but not both, for a period of fourteen consecutive days. This shall be known as the conditioning period. The production valve and choke settings shall not be changed during either the conditioning or flow

periods except during the first ten (10) days of the conditioning period when maximum production would over-range the meter chart or location production equipment. The first ten (10) days of said conditioning period shall not have more than forty eight (48) hours of cumulative interruptions of flow. The eleventh to fourteenth days, inclusive, of said conditioning period shall have no interruptions of flow whatsoever. Any interruption of flow that occurs as normal operation of the well as stop-cock flow, intermittent flow, or well blow down will not be counted as shut-in time in either the conditioning or flow period.

The daily flowing rate shall be determined from an average of seven or eight consecutive producing days, following a minimum conditioning period of 14 consecutive days of production. This shall be known as the flow period.

Instantaneous pressures shall be measured by deadweight gauge or other method approved by the Division during the 7-day or 8-day flow period at the casinghead, tubinghead, and orifice meter, and shall be recorded along with instantaneous meter-chart static pressure reading.

If a well is producing through a compressor that is located between the wellhead and the meter run, the meter run pressure and the wellhead casing pressure and the wellhead tubing pressure are to be reported on Form C-122-A. (Neither the suction pressure nor the discharge pressure of the compressor is considered wellhead pressure.) A note shall be entered in the remarks portion on Form C-122-A stating "This well produces through a compressor".

When it is necessary to restrict the flow of gas between the wellhead and orifice meter, the ratio of the downstream pressure, psia, to the upstream pressure, psia 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 Division on Form C-122-A in item (n) of the form. When critical flow conditions exist, the instantaneous flowing pressures required hereinabove shall be measured during the last 48 hours of the 7-day or 8-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 7-day or 8-day average static tubing pressure if the well is flowing through the casing; it shall be the calculated 7-day or 8-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 set out in this manual.

To obtain the shut-in pressure of a well under test, the well shall be shut in some time during the current testing season for a period of seven to fourteen consecutive days, which have been preceded by a minimum of seven days of uninterrupted production. Such shut-in pressure shall be measured with a deadweight gauge or other method approved by the Division on the seventh to fourteenth day of shut-in of the well. The 7-day shut-in pressure shall be measured on both the tubing and the casing when communication exists between the two strings. The higher of such pressures shall be used as P_c in the deliverability calculation. When any such shut-in pressure is determined by the Division to be abnormally low or the well can not be shut-in due to "HARDSHIP" classification, the shut-in pressure to be used as P_c shall be determined by one of the following methods:

1. A Division-designated value.

2. An average shut-in pressure of all offset wells completed in the same zone. Offset wells include the four side and four corner wells, if available.

3. A calculated surface pressure based on a calculated bottom-hole pressure. Such calculation shall be made in accordance with the examples in this manual.

All Wellhead pressures as well as the flowing meter pressure tests which are to be taken during the 7-day or 8-day deliverability test period as required hereinabove shall be taken with a deadweight gauge or other method approved by the Division. The pressure readings and the date and time according to the chart shall be recorded and maintained in the operator'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 7-day or 8-day deliverability test period; however, 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, 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 average flowing meter pressure for the 7-day or 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.

The 7-day or 8-day flow period volume shall be calculated from the integrated readings as determined from the flow period orifice meter chart. The volume so calculated shall be divided by the number of testing days on the chart to determine the average daily rate of flow during said flow period. The flow period shall have a minimum of seven and a maximum of eight legibly recorded flowing days to be acceptable for test purposes. The volume used in this calculation shall be corrected to New Mexico Oil Conservation Division standard conditions of 15.025 psia pressure base, 60°F. temperature base and 0.60 specific gravity base.

The daily volume of flow as determined from the flow period chart readings shall be calculated by applying the Basic Orifice Meter Formula or other acceptable industry standard practices.

$$Q = C' \{h_w P_f\}^{1/2}$$

Where:

Q = Metered volume of flow Mcf/d @ 15.025 psia, 60° F., and 0.60 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 the tables in this 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 Division.

When supercompressibility correction is made for a gas containing either nitrogen or carbon dioxide in excess of two percent, the supercompressibility factors of such gas shall be determined by the use of Table V of the C.N.G.A. Bulletin TS-402 for pressures 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 the New Mexico Oil Conservation Division "Back Pressure Test Manual", or this 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 7-day or 8-day flow period shall be corrected for meter error by multiplication by a correction factor. Said correction factor shall be determined by dividing the square root of the deadweight flowing meter pressure, psia, by the square root of the chart flowing meter pressure, psia.

Deliverability pressure, as used herein, is a defined pressure applied to each well and used in the process of comparing the abilities of wells in a pool to produce at static wellhead working pressures equal to a percentage of the 7-day shut-in pressure of the respective individual wells. Such percentage shall be determined and announced periodically by the Division based on the relationship of the average static wellhead working pressures (P_w) divided by the average 7-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 Mcf/d at the deliverability pressure, (P_d), (at Standard Conditions of 15.025 psia, 60°F and 0.60 sp. gr.).

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 2 of Chapter II.

P_d = Deliverability pressure, psia, as defined above.

P_w = Average static wellhead working pressure, as determined from 7-day or 8-day flow period, psia, and calculated from tables in this manual entitled "Pressure Loss Due to Friction" Tables for San Juan Basin.

n = Average pool slope of back pressure curves as follows:

For Pictured Cliffs and shallower formations	0.85
For formations deeper than Pictured Cliffs	0.75

(Note: Special Rules for Any Specific Pool or Formation May Supersede The Above Values. Check Special Rules If In Doubt.)

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 and announced periodically by the Division. Such determination shall be made after a study of the test data of the pool obtained during the previous testing season.

Downhole commingled wells are to be tested in year for pool of lowermost prorated completion of well and shall use pool slope (n), and deliverability pressure of lowermost pool. The total flow rate from the downhole commingled well will be used to calculate a value of deliverability. For each prorated gas zone of a downhole commingled well, a Form C-122-A is required to be filed and in the Summary portion of that form, all zones will indicate the same data for line h, P_c, Q, P_w, and P_d. The value shown for Deliverability (D) will be that percentage of the total deliverability of the well that is applicable to this zone. A note shall be placed in the remarks column that indicates the percentage of deliverability to be allocated to this zone of the well.

Any test prescribed herein will be considered acceptable if the average flow rate for the final 7-day or 8-day deliverability test is not more than ten percent in excess of any consecutive 7-day or 8-day average of the preceding two weeks. A deliverability test not meeting this requirement may be declared invalid, requiring the well to be re-tested.

All charts relative to initial, annual, or biennial deliverability tests or copies thereof shall be made available to the Division upon its request.

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. The operator shall maintain the above data for a period of not less than two (2) years plus the current test year.

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

Initial and Annual or Biennial Deliverability and Shut-In Pressure Tests for gas wells in all formations shall be conducted and reported in accordance with these rules and procedures. Provided however, these rules shall be subject to any specific modification or change contained in Special Pool Rules adopted for any pool after notice and hearing.

CHAPTER III INFORMATIONAL TESTS

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 informational purposes at the option of the operator. When taken, this test must be taken and reported as prescribed below:

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 or other method approved by the Division.

2. The flow rate shall be that rate in Mcf/d measured at the end of a three hour test flow period. The flow from the well shall be for three 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 this manual or the New Mexico Oil Conservation Division "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 shall be considered to exist 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 this manual or in the Division's 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 2-inch nominal size tubing (1.995-inch ID) or larger shall be tested through the tubing.

B. Other tests for informational purposes may be conducted prior to obtaining a pipeline connection for a newly completed well upon receiving specific approval therefor from the Division's Aztec office. Approval of these tests shall be based primarily upon the volume of gas to be vented.

CHAPTER IV Type of Tests Required for Wells Completed in Non-Prorated Pools

SECTION 1: Initial Shut-in Pressure Tests for newly Completed Wells.

A. (Same as Chapter I, Section 1, A)

SECTION 2: Biennial Shut-in Pressure Tests

A. Non-prorated wells will be tested biennially as required by the District Office except as follows:

1. Wells which meet the "exempt" qualification as shown in Chapter I, Section 2, paragraph A-2 of these rules shall also be exempt from shut-in test requirements.

2. Wells classified as "hardship" wells during the test year shall also be exempt from shut-in test requirements.

B. All shut-in tests required by these rules must be filed with the Division's Aztec office by January 31 of the following year. Failure to file the test will subject the well to being shut-in one day for each day the test is late.

SECTION 3: Scheduling Tests

A. By September 1 of each year, the District Supervisor of the Aztec District Office of the Division shall by memorandum notify each gas transportation facility and each operator of the pools which

are to be scheduled for biennial shut-in pressure testing during the following testing period from January 1 through the last day of December of that test year. The District Supervisor will also provide a list of "exempt" wells.

Any well scheduled for testing during its test year may have the test flow period, and some of the seven day shut-in period conducted in December of the previous year. The earliest date that a well could be scheduled for Biennial Shut-In Pressure Test would be such that the Test Flow Period would end on December 25 of the previous year.

Downhole commingled wells are to be scheduled for tests on dates for pool of lowermost completion of well.

SECTION 4: Test Procedure

A. To obtain the shut-in pressure of a well under test, the well shall be shut-in some time during the current testing season for a period of seven to fourteen consecutive days, which have been preceded by a minimum of seven days of uninterrupted production. Such shut-in pressure shall be measured by deadweight gauge or other method approved by the Division on the seventh to fourteenth day of shut-in of the well. The shut-in pressure shall be measured on both the tubing and the casing when communication exists between the two strings. The higher of such pressures shall be reported as the shut-in pressure of the well.

SECTION 5: Filing of shut-in Pressure Data

The results of this test will be filed in triplicate on Form C-125-B showing the pressures in psia in column labeled "S. I. PRESSURE PSIA (DWT)" with the Aztec District Office.

name	company	address	city/state	zip code
BOB ADKINS	AMOCO PRODUCTION COMPANY	501 AIRPORT DRIVE	FARMINGTON, NM	87401
GARY NUNSON	AMOCO PRODUCTION COMPANY	501 AIRPORT DRIVE	FARMINGTON, NM	87401
RALPH MONTOYA	AMOCO PRODUCTION COMPANY	501 AIRPORT DRIVE	FARMINGTON, NM	87401
RANDY RICKFORD	AMOCO PRODUCTION COMPANY	501 AIRPORT DRIVE	FARMINGTON, NM	87401
ROBERT COVLIN	AMOCO PRODUCTION COMPANY	1670 BROADWAY	DENVER, CO	80202
STU McFARLAND	AMOCO PRODUCTION COMPANY	1670 BROADWAY	DENVER, CO	80202
AL GREER	BENSON-MONTIN-GREER	221 PETR. CENTER BLDG.	FARMINGTON, NM	87401
HUGH INGRAM	CONOCO	P.O. BOX 460	HOBBS, NM	88240
VICTOR T. LYON	CONOCO	P.O. BOX 2197	HOUSTON, TX	77252
BARBARA REX	CONSOLIDATED OIL AND GAS	P.O. BOX 2038	FARMINGTON, NM	87499
ED MARCUM	EL PASO EXPLORATION CO	P.O. BOX 4289	FARMINGTON, NM	87499-4289
L. E. MABE	EL PASO EXPLORATION CO	P.O. BOX 4289	FARMINGTON, NM	87499-4289
H. L. BABE KENDRICK	EL PASO NATURAL GAS CO	P.O. BOX 1492	EL PASO, TX	79978
MAX WEBB	ENGINEERING & PRODUCTION SERVICE	P.O. BOX 190	FARMINGTON, NM	87401
A. R. KENDRICK	FOUR CORNERS GAS PRODUCERS ASSOC.	P.O. BOX 516	AZTEC, NM	87410
STELLA WHITTAKER	GAS COMPANY OF NEW MEXICO	P.O. BOX 1899	BLOOMFIELD, NM	87413
ALAN BOHLING	GULF	P.O. BOX 1150	MIDLAND, TX	79702
RAEANNE LAMBERT	GULF	P.O. BOX 670	HOBBS, NM	88240
BARBARA WILLIAMS	INDEPENDENT	P.O. BOX 2038	FARMINGTON, NM	87401
MIKE MASER	MESA PETROLEUM COMPANY	P.O. BOX 579	FLORA VISTA, NM	87415
RANDY NORDSVEN	MESA PETROLEUM COMPANY	P.O. BOX 2009	AMARILLO, TX	79189
ERNIE BUSCH	NEW MEXICO OIL CONSERVATION DIV	1000 RIO BRAZOS ROAD	AZTEC, NM	87410
FRANK CHAVEZ	NEW MEXICO OIL CONSERVATION DIV	1000 RIO BRAZOS ROAD	AZTEC, NM	87410
HAROLD GARCIA	NEW MEXICO OIL CONSERVATION DIV	P.O. BOX 2088	SANTA FE, NM	87501
R. L. STAMETS	NEW MEXICO OIL CONSERVATION DIV	P.O. BOX 2088	SANTA FE, NM	88501
MIKE TURNBAUGH	NORTHWEST PIPELINE CORP	P.O. BOX 90	FARMINGTON, NM	87401
SANDY LIESE	NORTHWEST PIPELINE CORP	P.O. BOX 90	FARMINGTON, NM	87401
JACK EVANS	SCHALK DEVELOPMENT COMPANY	P.O. BOX 2078	FARMINGTON, NM	87401
MICHAEL L. DAVIES	SOUTHERN UNION EXPLORATION	P.O. BOX 2179	FARMINGTON, NM	87499
GARY HUDGINS	SOUTHERN UNION EXPLORATION	P.O. BOX 2179	FARMINGTON, NM	87401
TOM OLLE	SOUTHLAND ROYALTY COMPANY	P.O. DRAWER 570	FARMINGTON, NM	87401
JOHN COOK	TENNECO	P.O. BOX 3249	ENGLEWOOD, CO	80155
KEN RODDY	UNION TEXAS PETROLEUM	P.O. BOX 1290	FARMINGTON, NM	87499
RUDY MOTTO	UNION TEXAS PETROLEUM	P.O. BOX 1290	FARMINGTON, NM	87401
STERGIE KATIRGIS	UNION TEXAS PETROLEUM	P.O. BOX 1290	FARMINGTON, NM	87401

BEFORE EXAMINER QUINTANA
OIL CONSERVATION DIVISION
EXHIBIT NO. "C"
CASE NO. 8556

PITOT	TUBE	IMPACT	PRESSURE	FLOW	NIPPLE	INSIDE	DIAMETER
INCHES WATER	OUNCES/ SQ. IN.	INCHES MERCURY	LBS. PER SQ. IN.	1" nominal actual dia.	2" nominal actual dia.	3" nominal actual dia.	4" nominal actual dia.
				1.049	2.067	3.068	4.026
.1				11	41	91	156
.2				15	58	128	221
.3				18	71	157	271
.4				21	82	181	312
.5				24	92	203	349
.6				26	101	222	383
.7				28	109	240	413
.8				30	116	257	442
.9	.52			32	124	272	469
1.0				34	130	287	494
1.1				35	137	301	518
1.2				37	143	314	541
1.3				38	148	327	563
1.4				40	154	339	584
1.5				41	159	351	605
1.6				42	165	363	625
1.7	.98			44	170	374	644
1.8				45	175	385	663
1.9				46	179	395	681
2.0				47	184	406	698
2.1				49	189	416	716
2.2				50	193	425	733
2.3				51	197	435	749
2.4				52	202	444	765
2.5				53	206	453	781
2.6	1.50			54	210	462	796
2.7		.20		55	214	471	812
2.8				56	218	480	826
2.9				57	222	488	841
3.0				58	225	497	855
3.1				59	229	505	870
3.2				60	233	513	883
3.3				61	236	521	897
3.4				62	240	529	911
3.5	2.02			63	244	537	924
3.6				64	247	544	937
3.7				64	250	552	950
3.8				65	254	559	963
3.9				66	257	566	975
4.0				67	260	574	988
4.1		.30		68	264	581	1,000
4.2				69	267	588	1,012
4.3	2.49			70	270	595	1,024
4.4				70	273	602	1,036
4.5				71	276	608	1,048
4.6				72	279	615	1,059

PITOT	TURF	IMPACT	PRESSURE	FLOW	NIPPLE	INSIDE	DIAMETER
INCHES	OUNCES/	INCHES	LBS. PER	1" nominal	2" nominal	3" nominal	4" nominal
WATER	SQ. IN.	MERCURY	SQ. IN.	actual dia.	actual dia.	actual dia.	actual dia.
				1.049	2.067	3.068	4.026
4.7				73	282	622	1,071
4.8				73	285	628	1,082
4.9				74	288	635	1,093
5.0				75	291	641	1,104
5.1				76	294	648	1,115
5.2	3.01			76	297	654	1,126
5.3				77	300	660	1,137
5.4		.40		78	303	666	1,148
5.5				79	305	673	1,158
5.6				79	308	679	1,169
5.7				80	311	685	1,179
5.8				81	314	691	1,189
5.9				81	316	697	1,200
6.0				82	319	703	1,210
6.1	3.53			83	322	708	1,220
6.2				83	324	714	1,230
6.3				84	327	720	1,240
6.4				85	329	726	1,249
6.5				85	332	731	1,259
6.6				86	334	737	1,269
6.7				87	337	742	1,278
6.8		.50		87	339	748	1,288
6.9	3.99		.25	88	342	753	1,297
7.0				89	344	759	1,307
7.1				89	347	764	1,316
7.2				90	349	770	1,325
7.3				91	352	775	1,334
7.4				91	354	780	1,343
7.5				92	357	785	1,353
7.6				92	359	791	1,362
7.7				93	361	796	1,370
7.8	4.51			94	364	801	1,379
7.9				94	366	806	1,388
8.0				95	368	811	1,397
8.1				95	371	816	1,406
8.2		.60		96	373	821	1,414
8.3				97	375	826	1,423
8.4				97	377	831	1,431
8.5				98	380	836	1,440
8.6				98	382	841	1,448
8.7	5.03			99	384	846	1,457
8.8				99	386	851	1,465
8.9				100	388	856	1,473
9.0				101	391	860	1,482
9.1				101	393	865	1,490
9.2				102	395	870	1,498

PITOT	TUBE	IMPACT	PRESSURE	FLOW	NIPPLE	INSIDE	DIAMETER
INCHES	OUNCES/	INCHES	LBS. PER	1" nominal	2" nominal	3" nominal	4" nominal
WATER	SQ. IN.	MERCURY	SQ. IN.	actual dia.	actual dia.	actual dia.	actual dia.
				1.049	2.067	3.068	4.026
9.3				102	397	875	1,506
9.4				103	399	879	1,514
9.5	5.49	.70		103	401	884	1,522
9.6				104	403	889	1,530
9.7				104	405	893	1,538
9.8				105	408	898	1,546
9.9				105	410	902	1,554
10.0				106	412	907	1,562
10.1				107	414	911	1,570
10.2		.75		107	416	916	1,577
10.3				108	418	920	1,585
10.4	6.01			108	420	925	1,593
10.5				109	422	929	1,600
10.6				109	424	934	1,608
10.7				110	426	938	1,616
10.8		.79		110	428	943	1,623
10.9		.80		111	430	947	1,631
11.0				111	432	951	1,638
11.1				112	434	956	1,645
11.2				112	436	960	1,653
11.3	6.53			113	438	964	1,660
11.4				113	440	968	1,668
11.5				114	441	973	1,675
11.6				114	443	977	1,682
11.7				115	445	981	1,689
11.8				115	447	985	1,697
11.9				116	449	989	1,704
12.0				116	451	994	1,711
12.1	6.99			117	453	998	1,718
12.2				117	455	1,002	1,725
12.3				118	457	1,006	1,732
12.4				118	458	1,010	1,739
12.5				119	460	1,014	1,746
*13.0	7.50			121	469	1,033	1,779
	7.75	.99		123	477	1,050	1,808
	8.00		.50	125	484	1,067	1,837
	8.25			127	492	1,084	1,866
	8.50			129	499	1,100	1,894
	8.75			130	507	1,116	1,922
	9.00			132	514	1,132	1,949
	9.25			134	521	1,147	1,976
	9.50			136	528	1,163	2,002
	9.75	1.24		138	535	1,178	2,028
	10.00			139	541	1,193	2,054
	10.25			141	548	1,208	2,080
18.2	10.50	1.34	.66	143	555	1,222	2,105

PITOT	TUBE	IMPACT	PRESSURE	FLOW	NIPPLE	INSIDE	DIAMETER
INCHES WATER	OUNCES/ SQ. IN.	INCHES MERCURY	LBS. PER SQ. IN.	1" nominal actual dia.	2" nominal actual dia.	3" nominal actual dia.	4" nominal actual dia.
				1.049	2.067	3.068	4.026
19.0	11.00	1.40	.69	146	568	1,251	2,154
19.9	11.50			150	581	1,279	2,203
	12.00	1.53	.75	153	593	1,307	2,250
	12.50			156	605	1,334	2,297
	13.00			159	617	1,360	2,342
	13.50			162	629	1,386	2,387
	14.00			165	641	1,411	2,431
25.1	14.50			168	652	1,436	2,474
	15.00			171	663	1,461	2,516
	15.50	1.97		174	674	1,485	2,557
	16.00		1.00	176	685	1,509	2,598
	16.50			179	696	1,532	2,639
	17.00			182	706	1,555	2,678
30.3	17.50			184	716	1,578	2,717
	18.00			187	726	1,600	2,756
	18.50			190	736	1,623	2,794
	19.00			192	746	1,644	2,832
	19.50	2.48		195	756	1,666	2,869
	20.00		1.25	197	766	1,687	2,905
35.5	20.50			200	775	1,708	2,941
	21.00			202	785	1,729	2,977
	21.50			204	794	1,749	3,012
	22.00			207	803	1,769	3,047
	22.50			209	812	1,789	3,081
39.8	23.00			211	821	1,809	3,115
	23.50	2.99		214	830	1,829	3,149
	24.00		1.50	216	839	1,848	3,182
	24.50			218	848	1,867	3,215
	25.00			221	856	1,886	3,248
	25.50			223	865	1,905	3,280
45.0	26.00			225	873	1,924	3,312
	26.50			227	881	1,942	3,344
	27.00			229	890	1,960	3,375
	27.50	3.50		231	898	1,978	3,407
	28.00		1.75	233	906	1,996	3,437
	28.50			235	914	2,014	3,468
50.2	29.00			237	922	2,031	3,498
	29.50			240	930	2,049	3,528
	30.00			242	938	2,066	3,558
	30.50			244	946	2,083	3,588
	31.00			246	953	2,100	3,617
54.5	*31.50	4.00	1.96	247	960	2,115	3,641
		4.20		253	984	2,167	3,731
		4.40		259	1,007	2,218	3,819
		4.60		265	1,029	2,268	3,905
65.2	37.71	4.80	2.35	271	1,051	2,316	3,989

PITOT	TUBE	IMPACT	PRESSURE	FLOW	NIPPLE	INSIDE	DIAMETER
INCHES WATER	OUNCES/ SQ. IN.	INCHES MERCURY	LBS. PER SQ. IN.	1" nominal actual dia.	2" nominal actual dia.	3" nominal actual dia.	4" nominal actual dia.
				1.049	2.067	3.068	4.026
68.0	39.28	5.00	2.45	276	1,073	2,864	4,071
	40.85	5.20	2.55	282	1,094	2,411	4,152
		5.40		287	1,115	2,457	4,231
		5.60		293	1,136	2,502	4,308
		5.80		298	1,156	2,546	4,385
		6.00		303	1,176	2,590	4,460
		6.20	3.04	308	1,195	2,633	4,533
	50.28	6.40		313	1,214	2,675	4,606
		6.60		318	1,233	2,716	4,677
		6.80		322	1,251	2,757	4,748
		7.00		327	1,270	2,797	4,817
		7.20	3.53	332	1,288	2,837	4,885
		7.40		336	1,306	2,876	4,953
	59.70	7.60		341	1,323	2,915	5,019
		7.80		345	1,340	2,953	5,085
		8.00		350	1,357	2,990	5,150
		8.20	4.02	354	1,374	3,028	5,214
		8.40		358	1,391	3,064	5,277
		8.60		362	1,407	3,101	5,339
		8.80		367	1,424	3,136	5,401
	70.70	9.00		371	1,440	3,172	5,462
		9.20	4.51	375	1,456	3,207	5,522
		9.40		379	1,471	3,242	5,582
	75.41	9.60		383	1,487	3,276	5,641
		9.80		387	1,502	3,310	5,700
		10.00		391	1,518	3,343	5,757
	80.13	10.20	5.00	395	1,533	3,377	5,815
		10.40		399	1,548	3,410	5,871
		10.60		402	1,562	3,442	5,928
	84.84	10.80		406	1,577	3,475	5,983
		11.00		410	1,592	3,507	6,038
		11.20	5.49	414	1,606	3,538	6,093
	89.55	11.40		417	1,620	3,570	6,147
		11.60		421	1,635	3,601	6,201
		11.80		425	1,649	3,632	6,254
	94.27	12.00		428	1,662	3,663	6,307
	95.84	12.20	5.98	432	1,676	3,693	6,359
		12.40		435	1,690	3,723	6,411
		12.60		439	1,704	3,753	6,463
	100.55	12.80		442	1,717	3,783	6,514
		13.00		446	1,730	3,812	6,565
		13.20	6.47	449	1,744	3,841	6,615
	105.26	13.40		452	1,757	3,870	6,665
		13.60		456	1,770	3,899	6,714
		13.80		459	1,783	3,928	6,763
190.3	109.98	14.00	6.87	462	1,796	3,956	6,812

PITOT	TUBE	IMPACT	PRESSURE	FLOW	NIPPLE	INSIDE	DIAMETER
INCHES	OUNCES/	INCHES	LBS. PER	1" nominal	2" nominal	3" nominal	4" nominal
WATER	SQ. IN.	MERCURY	SQ. IN.	actual dia.	actual dia.	actual dia.	actual dia.
				1.049	2.067	3.068	4.026
197.1	113.91	14.50	7.11	471	1,827	4,026	6,933
		15.00		479	1,859	4,095	7,051
		15.50		487	1,889	4,163	7,168
	125.69	16.00		494	1,920	4,229	7,283
		16.50	8.09	502	1,949	4,295	7,396
		17.00		510	1,979	4,359	7,507
		17.50		517	2,008	4,423	7,616
		18.00		524	2,036	4,486	7,724
		18.50	9.07	532	2,064	4,548	7,831
	149.25	19.00		539	2,092	4,609	7,936
		19.50		546	2,119	4,669	8,040
		20.00		553	2,146	4,728	8,142
		20.50	10.06	560	2,173	4,787	8,243
		21.00		566	2,199	4,845	8,343
		21.50		573	2,225	4,902	8,442
		22.00		580	2,251	4,959	8,540
	176.75	22.50	11.04	586	2,276	5,015	8,636
		23.00		593	2,302	5,071	8,732
		23.50		599	2,326	5,125	8,826
		24.00		606	2,351	5,180	8,919
		24.50	12.02	612	2,375	5,233	9,012
		25.00		618	2,400	5,286	9,103
	200.32	25.50		624	2,423	5,339	9,194
		26.00		630	2,447	5,391	9,284
		26.50	13.00	636	2,471	5,443	9,372
		27.00		642	2,494	5,494	9,460
		27.50		648	2,517	5,544	9,548
		28.00		654	2,539	5,595	9,634
	223.88	28.50	13.98	660	2,562	5,644	9,720
		29.00		666	2,584	5,694	9,805
		29.50		671	2,607	5,743	9,889
		30.00		677	2,629	5,791	9,972
	240.22	*30.58	15.00	683	2,653	5,844	10,063
	256.24	32.62	16.00	706	2,740	6,036	10,394
		34.66	17.00	727	2,824	6,221	10,713
		36.70	18.00	748	2,906	6,402	11,024
	304.29	38.74	19.00	769	2,985	6,577	11,326
		40.77	20.00	789	3,063	6,748	11,620
		42.81	21.00	808	3,139	6,915	11,907
		44.85	22.00	827	3,213	7,077	12,187
		46.89	23.00	846	3,285	7,237	12,461
		48.93	24.00	864	3,355	7,392	12,729
692.6	400.38	50.97	25.00	882	3,425	7,545	12,992
		53.01	26.00	899	3,492	7,694	13,249
		55.04	27.00	917	3,559	7,841	13,502
775.6	448.42	57.08	28.00	933	3,624	7,984	13,749

Specific Gravity	0.0	.001	.002	.003	.004	.005	.006	.007	.008	.009
.510	1.085	1.084	1.083	1.081	1.080	1.079	1.078	1.077	1.076	1.075
.520	1.074	1.073	1.072	1.071	1.070	1.069	1.068	1.067	1.066	1.065
.530	1.064	1.063	1.062	1.061	1.060	1.059	1.058	1.057	1.056	1.055
.540	1.054	1.053	1.052	1.051	1.050	1.049	1.048	1.047	1.046	1.045
.550	1.044	1.044	1.043	1.042	1.041	1.040	1.039	1.038	1.037	1.036
.560	1.035	1.034	1.033	1.032	1.031	1.031	1.030	1.029	1.028	1.027
.570	1.026	1.025	1.024	1.023	1.022	1.022	1.021	1.020	1.019	1.018
.580	1.017	1.016	1.015	1.014	1.014	1.013	1.012	1.011	1.010	1.009
.590	1.008	1.008	1.007	1.006	1.005	1.004	1.003	1.003	1.002	1.001
.600	1.000	.9992	.9983	.9975	.9967	.9959	.9950	.9942	.9934	.9926
.610	.9918	.9910	.9901	.9893	.9885	.9877	.9869	.9861	.9853	.9845
.620	.9837	.9829	.9822	.9814	.9806	.9798	.9790	.9782	.9775	.9767
.630	.9759	.9751	.9744	.9736	.9728	.9721	.9713	.9705	.9698	.9690
.640	.9682	.9675	.9667	.9660	.9652	.9645	.9637	.9630	.9623	.9615
.650	.9608	.9600	.9593	.9586	.9578	.9571	.9564	.9556	.9549	.9542
.660	.9535	.9527	.9520	.9513	.9506	.9499	.9492	.9484	.9477	.9470
.670	.9463	.9456	.9449	.9442	.9435	.9428	.9421	.9414	.9407	.9400
.680	.9393	.9386	.9380	.9373	.9366	.9359	.9352	.9345	.9339	.9332
.690	.9325	.9318	.9312	.9305	.9298	.9291	.9285	.9278	.9271	.9265
.700	.9258	.9252	.9245	.9238	.9232	.9225	.9219	.9212	.9206	.9199
.710	.9193	.9186	.9180	.9173	.9167	.9161	.9154	.9148	.9141	.9135
.720	.9129	.9122	.9116	.9110	.9103	.9097	.9091	.9085	.9078	.9072
.730	.9066	.9060	.9054	.9047	.9041	.9035	.9029	.9023	.9017	.9011
.740	.9005	.8998	.8992	.8986	.8980	.8974	.8968	.8962	.8956	.8950
.750	.8944	.8938	.8932	.8926	.8921	.8915	.8909	.8903	.8897	.8891
.760	.8885	.8879	.8874	.8868	.8862	.8856	.8850	.8845	.8839	.8833
.770	.8827	.8822	.8816	.8810	.8805	.8799	.8793	.8787	.8782	.8776
.780	.8771	.8765	.8759	.8754	.8748	.8743	.8737	.8731	.8726	.8720
.790	.8715	.8709	.8704	.8698	.8693	.8687	.8682	.8677	.8671	.8666
.800	.8660	.8655	.8649	.8644	.8639	.8633	.8628	.8623	.8617	.8612
.810	.8607	.8601	.8596	.8591	.8585	.8580	.8575	.8570	.8564	.8559
.820	.8554	.8549	.8544	.8538	.8533	.8528	.8523	.8518	.8513	.8507
.830	.8502	.8497	.8492	.8487	.8482	.8477	.8472	.8467	.8462	.8457
.840	.8452	.8447	.8441	.8436	.8431	.8427	.8422	.8417	.8412	.8407
.850	.8402	.8397	.8392	.8387	.8382	.8377	.8372	.8367	.8362	.8358
.860	.8353	.8348	.8343	.8338	.8333	.8329	.8324	.8319	.8314	.8309
.870	.8305	.8300	.8295	.8290	.8286	.8281	.8276	.8271	.8267	.8262
.880	.8257	.8253	.8248	.8243	.8239	.8234	.8229	.8225	.8220	.8215
.890	.8211	.8206	.8201	.8197	.8192	.8188	.8183	.8179	.8174	.8170
.900	.8165	.8160	.8156	.8151	.8147	.8142	.8138	.8133	.8129	.8124
.910	.8120	.8116	.8111	.8107	.8102	.8098	.8093	.8089	.8085	.8080
.920	.8076	.8071	.8067	.8063	.8058	.8054	.8050	.8045	.8041	.8037
.930	.8032	.8028	.8024	.8019	.8015	.8011	.8006	.8002	.7998	.7994
.940	.7989	.7985	.7981	.7977	.7972	.7968	.7964	.7960	.7956	.7951
.950	.7947	.7943	.7939	.7935	.7931	.7926	.7922	.7918	.7914	.7910
.960	.7906	.7902	.7897	.7893	.7889	.7885	.7881	.7877	.7873	.7869
.970	.7865	.7861	.7857	.7853	.7849	.7845	.7841	.7837	.7833	.7829
.980	.7825	.7821	.7817	.7813	.7809	.7805	.7801	.7797	.7793	.7789
.990	.7785	.7781	.7777	.7773	.7769	.7765	.7762	.7758	.7754	.7750

Observed Temp. °F	0	1	2	3	4	5	6	7	8	9
0	1.063	1.062	1.061	1.060	1.059	1.057	1.056	1.055	1.054	1.053
10	1.052	1.051	1.050	1.049	1.047	1.046	1.045	1.044	1.043	1.042
20	1.041	1.040	1.039	1.038	1.037	1.035	1.034	1.033	1.032	1.031
30	1.030	1.029	1.028	1.027	1.026	1.025	1.024	1.023	1.022	1.021
40	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012	1.011
50	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001
60	1.000	.9990	.9981	.9971	.9962	.9952	.9943	.9933	.9924	.9915
70	.9905	.9896	.9887	.9877	.9868	.9859	.9850	.9840	.9831	.9822
80	.9813	.9804	.9795	.9786	.9777	.9768	.9759	.9750	.9741	.9732
90	.9723	.9715	.9706	.9697	.9688	.9680	.9671	.9662	.9653	.9645
100	.9636	.9628	.9619	.9611	.9602	.9594	.9585	.9577	.9568	.9560
110	.9551	.9543	.9535	.9526	.9518	.9510	.9501	.9493	.9485	.9477
120	.9469	.9460	.9452	.9444	.9436	.9428	.9420	.9412	.9404	.9396
130	.9388	.9380	.9372	.9364	.9356	.9349	.9341	.9333	.9325	.9317
140	.9309	.9302	.9294	.9286	.9279	.9271	.9263	.9256	.9248	.9240
150	.9233	.9225	.9218	.9210	.9203	.9195	.9188	.9180	.9173	.9166
160	.9158	.9151	.9143	.9136	.9129	.9121	.9114	.9107	.9100	.9092
170	.9085	.9078	.9071	.9064	.9056	.9049	.9042	.9035	.9028	.9021
180	.9014	.9007	.9000	.8993	.8986	.8979	.8972	.8965	.8958	.8951
190	.8944	.8937	.8931	.8924	.8917	.8910	.8903	.8896	.8890	.8883
200	.8876	.8870	.8863	.8856	.8849	.8843	.8836	.8830	.8823	.8816
210	.8810	.8803	.8797	.8790	.8784	.8777	.8771	.8764	.8758	.8751
220	.8745	.8738	.8732	.8726	.8719	.8713	.8706	.8700	.8694	.8687
230	.8681	.8675	.8669	.8662	.8656	.8650	.8644	.8637	.8631	.8625
240	.8619	.8613	.8607	.8601	.8594	.8588	.8582	.8576	.8570	.8564
250	.8558	.8552	.8546	.8540	.8534	.8528	.8522	.8516	.8510	.8504