1. NSL-5250

Finding Paragraph No. (8)

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

CASE No. 3044
Order No. R-2707

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION ON ITS OWN MOTION TO CONSIDER THE AMENDMENT OF CERTAIN RULES.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on May 13, 1964, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 25th day of May, 1964, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That in Lea, Chaves, Eddy, and Roosevelt Counties, New Mexico, a gas well completed in a formation no deeper than the top of the Pennsylvanian formation will efficiently and economically drain and develop a 160-acre tract.

(3) That in Lea, Chaves, Eddy, and Roosevelt Counties, New Mexico, a gas well completed in the Pennsylvanian formation or a deeper formation will efficiently and economically drain and develop a 320-acre tract.

(4) That Rule 104 of the Commission Rules and Regulations should be amended to permit the dedication of 160 acres to a gas well in Lea, Chaves, Eddy, and Roosevelt Counties, New Mexico, projected to or completed in a formation no deeper than the top of the Pennsylvanian formation.

(5) That Rule 104 of the Commission Rules and Regulations should also be amended to permit the dedication of 320 acres to

a gas well in Lea, Chaves, Eddy, and Roosevelt Counties, New Mexico, projected to or completed in the Pennsylvanian formation or a deeper formation.

(6) That Rule 104 of the Commission Rules and Regulations should also be amended to establish a testing procedure to determine whether a well in Lea, Chaves, Eddy, and Roosevelt Counties should properly be classified as a gas well upon completion.

(7) That amendment of Rule 104 as set out above will prevent the economic loss caused by the drilling of unnecessary wells, will avoid the augmentation of risks arising from the drilling of an excessive number of wells, will prevent reduced recovery which might result from the drilling of too few wells, and will otherwise prevent waste and protect correlative rights.

(8) That Rule 301 of the Commission Rules and Regulations should be amended to require a gas-oil ratio test to be taken within 20 to 30 days following completion or recompletion of an oil well and to be filed with the Commission within 10 days following completion of the test.

(9) That Rule 401 of the Commission Rules and Regulations should be amended to require gas wells which are not connected to a gas gathering facility to be tested within 30 days following the installation of a christmas tree and to require the test to be filed with the Commission within 10 days following completion of the test.

(10) That amendment of Rules 301 and 401 as set out above will enable the Oil Conservation Commission to more efficiently and effectively administer the laws of the State of New Mexico concerning the conservation of oil and gas, the prevention of waste, and the protection of correlative rights.

IT IS THEREFORE ORDERED:

(1) That Rule 104 of the Commission Statewide Rules and Regulations is hereby amended to read in its entirety as follows:

RULE 104. WELL SPACING: ACREAGE REQUIREMENTS FOR DRILLING TRACTS

A. CLASSIFICATION OF WELLS: WILDCAT WELLS AND DEVELOPMENT WELLS

Any well which is to be drilled a distance of one mile or more from (1) the outer boundary of any defined pool which has

produced oil or gas from the formation to which the well is projected, and (2) any other well which has produced oil or gas from the formation to which the proposed well is projected, shall be classified as a wildcat well.

Any well which is not a wildcat well as defined above shall be classified as a development well for the nearest pool which has produced oil or gas from the formation to which the well is projected. Any such development well shall be spaced, drilled, operated, and produced in accordance with the rules and regulations in effect in such nearest pool, provided the well is completed in the formation to which it was projected.

Any well classified as a development well for a given pool but which is completed in a producing horizon not included in the vertical limits of said pool shall be operated and produced in accordance with the rules and regulations in effect in the nearest pool within one mile which is producing from that horizon. If there is no designated pool for said producing horizon within one mile, the well shall be re-classified as a wildcat well.

B. ACREAGE AND WELL LOCATION REQUIREMENTS FOR WILDCATS

I. Lea, Chaves, Eddy, and Roosevelt Counties

(a) Wildcat Gas Wells

In Lea, Chaves, Eddy, and Roosevelt Counties, a wildcat well which is projected as a gas well to a formation and in an area which, in the opinion of the engineer or supervisor approving the application to drill, may reasonably be presumed to be productive of gas rather than oil shall be located on a drilling tract consisting of 160 surface contiguous acres, more or less, substantially in the form of a square which is a quarter section, being a legal subdivision of the U. S. Public Land Surveys, and shall be located not closer than 660 feet to any outer boundary of such tract nor closer than 330 feet to any quarter-quarter section or subdivision inner boundary.

Provided however, that any such wildcat gas well which is projected to a formation of Pennsylvanian age or older shall be located on a drilling tract consisting of 320 surface contiguous acres, more or less, comprising any two contiguous quarter sections of a single governmental section, being a legal subdivision of the U. S. Public Land Surveys. Any such

"deep" wildcat gas well to which is dedicated more than 160 acres shall be located not closer than 660 feet to the nearest side boundary of the dedicated tract nor closer than 1980 feet to the nearest end boundary nor closer than 330 feet to any quarter-quarter section or subdivision inner boundary. (For the purpose of this rule, "side" boundary is defined as one of the outer boundaries running lengthwise to the tract's greatest overall dimension; "end" boundary is defined as one of the outer boundaries perpendicular to a side boundary and closing the tract across its least overall dimension.)

(b) Wildcat Oil Wells

In Lea, Chaves, Eddy, and Roosevelt Counties, a wildcat well which is not a wildcat gas well as defined above shall be located on a tract consisting of approximately 40 surface contiguous acres substantially in the form of a square which is a legal subdivision of the U. S. Public Land Surveys, or on a governmental quarter-quarter section or lot, and shall be located not closer than 330 feet to any boundary of such tract.

In the event gas production is encountered in a well which was projected as an oil well and which is located accordingly but does not conform to the above gas well location rule, it shall be necessary for the operator to bring the matter to a hearing before approval for the production of gas can be given.

II. <u>San Juan, Rio Arriba, and Sandoval Counties</u>

(a) Wildcat Gas Wells

In San Juan, Rio Arriba, and Sandoval Counties, a wildcat well which is projected to a gas-producing horizon shall be located on a designated drilling tract consisting of 160 surface contiguous acres, more or less, substantially in the form of a square which is a quarter section, being a legal subdivision of the U. S. Public Land Surveys, and shall be located not closer than 790 feet to any outer boundary of the tract nor closer than 130 feet to any quarter-quarter section or subdivision inner boundary.

In the event oil production is encountered in a well which was projected to a gas-producing horizon and which is located accordingly but does not conform to the oil well location rule below, it shall be necessary for the operator to bring the matter to a hearing before approval for the production of oil can be given.

(b) Wildcat Oil Wells

A wildcat well which is projected to an oil-producing horizon as recognised by the Commission shall be located on a tract consisting of approximately 40 surface contiguous acres substantially in the form of a square which is a legal subdivision of the U. S. Public Land Surveys, or on a governmental quarter-quarter section or lot, and shall be located not closer than 330 feet to any boundary of such tract.

In the event gas production is encountered in a well which was projected to an oil-producing horizon and which is located accordingly but does not conform to the above gas well location rule, it shall be necessary for the operator to bring the matter to a hearing before approval for the production of gas can be given.

III. All counties except Lea, Chaves, Eddy, Roosevelt, San Juan, Rio Arriba, and Sandoval

Any wildcat well in any county other than Lea, Chaves, Eddy, Roosevelt, San Juan, Rio Arriba, and Sandoval shall be located on a tract consisting of approximately 40 surface contiguous acres substantially in the form of a square which is a legal subdivision of the U. S. Public Land Surveys, or on a governmental quarter-quarter section or lot and shall be located not closer than 330 feet to any boundary of such tract.

C. ACREAGE AND WELL LOCATION REQUIREMENTS FOR DEVELOPMENT WELLS

I. Oil Wells, All Counties

Unless otherwise provided in special pool rules, each development well for a defined oil pool shall be located on a tract consisting of approximately 40 surface contiguous acres substantially in the form of a square which is a legal subdivision of the U. S. Public Land Surveys, or on a governmental quarter-quarter section or lot, and shall be located not closer than 330 feet to any boundary of such tract nor closer than 660 feet to the nearest well drilling to or capable of producing from the same pool.

II. Gas Wells

(a) Lea, Chaves, Eddy, and Roosevelt Counties

Unless otherwise provided in special pool rules, each development well for a defined gas pool of less than Pennsylvanian age or for a defined gas pool of Pennsylvanian age or older which was created and defined by the Commission prior to June 1, 1964, shall be located on a designated drilling tract consisting of 160 surface contiguous acres, more or less, substantially in the form of a square which is a quarter section being a legal subdivision of the U. S. Public Land Surveys, and shall be located not closer than 660 feet to any outer boundary of such tract nor closer than 330 feet to any quarter-quarter section or subdivision inner boundary nor closer than 1320 feet to the nearest well drilling to or capable of producing from the same pool.

Unless otherwise provided in the special pool rules, each development well for a defined gas pool of Pennsylvanian age or older which was created and defined by the Commission after June 1, 1964, shall be located on a designated drilling tract consisting of 320 surface contiguous acres, more or less, comprising any two contiguous quarter sections of a single governmental section, being a legal subdivision of the U. S. Public Land Surveys. Any such well having more than 160 acres dedicated to it shall be located not closer than 660 feet to the nearest side boundary of the dedicated tract nor closer than 1980 feet to the nearest end boundary nor closer than 330 feet to any quarter-quarter section or subdivision inner boundary. (For the purpose of this rule, "side" boundary and "end" boundary are as defined in Section B I (a) of this rule.)

(b) <u>San Juan, Rio Arriba, and Sandoval Counties</u>

Unless otherwise provided in special pool rules, each development well for a defined gas pool shall be located on a designated drilling tract consisting of 160 surface contiguous acres more or less, substantially in the form of a square which is a quarter section, being a legal subdivision of the U. S. Public Land Surveys, and shall be located not closer than 790 feet to any outer boundary of the tract nor closer than 130 feet to any quarter-quarter section line or subdivision inner boundary.

(c) <u>All counties except Lea, Chaves, Eddy, Roosevelt, San Juan, Rio Arriba, and Sandoval</u>

Unless otherwise provided in special pool rules, each development well for a defined gas pool shall be located on a designated drilling tract consisting of 160 surface contiguous acres, more or less, substantially in the form of a square which is a quarter section, being a legal subdivision of the U. S. Public

Land Surveys, and shall be located not closer than 660 feet to any outer boundary of such tract nor closer than 330 feet to any quarter-quarter section or subdivision inner boundary nor closer than 1320 feet to the nearest well drilling to or capable of producing from the same pool.

D. ACREAGE ASSIGNMENT, COMPLETED WELLS

I. Well Tests and Classification

It shall be the responsibility of the operator of any wildcat gas well or development gas well to which more than 40 acres has been dedicated to conduct a potential test within 30 days following completion of the well and to file the same with the Commission within 10 days following completion of the tests. (See Rule 401.)

Date of completion for a gas well shall be the date a christmas tree is installed or 30 days following conclusion of active completion work on the well, whichever date comes first.

Upon making a determination that the well should not properly be classified as a gas well, the Commission will reduce the acreage dedicated to the well.

Failure of the operator to file the aforesaid tests within the specified time will also subject the well to such acreage reduction.

II. Non-Standard Units

Any completed gas well which does not have the required amount of acreage dedicated to it for the pool or formation in which it is completed may not be produced until a standard unit for the well has been formed and dedicated or until a non-standard unit has been approved.

The Secretary-Director of the Commission may grant administrative approval to non-standard gas units without notice and hearing when an application has been filed for a non-standard unit and the unorthodox size or shape of the unit is necessitated by a variation in the legal subdivision of the U. S. Public Land Surveys, or the following facts exist and the following provisions are complied with:

(a) The non-standard unit consists of quarter-quarter sections or lots that are contiguous by a common bordering side.

(b) The non-standard unit lies wholly within a single governmental quarter section if the well is completed in a pool or formation for which 160 acres is the standard unit size or wholly within a single governmental half section if the well is completed in a pool or formation for which 320 acres is the standard unit size.

(c) The applicant presents written consent in the form of waivers from all offset operators and from all operators owning interests in the quarter section (for 160-acre pools or formations) or the half section (for 320-acre pools or formations) in which the non-standard unit is situated and which acreage is not included in said non-standard unit.

(d) In lieu of paragraph (c) of this rule, the applicant may furnish proof of the fact that all of the aforesaid operators were notified by registered or certified mail of his intent to form such non-standard unit. The Secretary-Director may approve the application if no such operator has entered an objection to the formation of such non-standard unit within 30 days after the Secretary-Director has received the application.

E. Notice of Intention to Drill (C-101) for any well shall designate the exact legal subdivision allotted to the well and no C-101 will be approved by the Commission or any of its agents without proper designation of acreage.

F. The Secretary-Director of the Commission shall have authority to grant an exception to the well location requirements of Sections B and C above without notice and hearing where application has been filed in due form and

1. The necessity for the unorthodox location is based on topographical conditions, and

2. (a) All owners of 40-acre tracts directly or diagonally offsetting the 40-acre tract upon which the unorthodox location is proposed have consented in writing to the proposed location, or

(b) In lieu of paragraph 2(a) of this rule, the applicant may furnish proof of the fact that all of said offset operators were notified by registered or certified mail of his intent to drill an unorthodox location. The Secretary-Director of the Commission may approve the application if no offset operator has entered an objection to the unorthodox location within 20 days after the Secretary-Director has received the application.

G. Whenever an exception is granted, the Commission may take such action as will offset any advantage which the person securing the exception may obtain over other producers by reason of the unorthodox location.

H. If the drilling tract is within an allocated oil pool or is placed within such allocated pool at any time after completion of the well and the drilling tract consists of less than 39 1/2 acres or more than 40 1/2 acres, the top unit allowable for such well shall be increased or decreased in the proportion that the number of acres in the drilling tract bears to 40.

I. If the drilling tract is within an allocated gas pool or is subsequently placed within an allocated gas pool, and the drilling tract consists of less than 158 acres or more than 162 acres in 160-acre pools, or less than 316 acres or more than 324 acres in 320-acre pools, the top allowable for such well shall be decreased or increased in the proportion that the number of acres in the drilling tract bears to a standard unit for the pool.

J. In computing acreage under H and I above, minor fractions of an acre shall not be counted but 1/2 acre or more shall count as 1 acre.

K. The provisions of H and I above shall apply only to wells completed after January 1, 1950. Nothing herein contained shall affect in any manner any well completed prior to the effective date of this rule and no adjustments shall be made in the allowable production for any such wells by reason of these rules.

L. In order to prevent waste the Commission may, after notice and hearing, fix different spacing requirements and require greater acreage for drilling tracts in any defined oil pool or in any defined gas pool notwithstanding the provisions of B and C above.

M. The Commission may approve the pooling or communitization of fractional lots of 20.49 acres or less with another oil proration unit when:

1. The units involved are contiguous;

2. They are part of the same basic lease, carrying the same royalty interest; and

3. The ownership of the units involved is common.

Application to the Commission for pooling shall be accompanied by three (3) copies of a certified plat showing the dimensions and acreage involved in the pooling, the ownership of all leases and royalty interests involved, and the location of any proposed wells.

Applicant shall furnish all operators who directly and diagonally offset the units involved a copy of the application to the Commission, and shall include with his application a written statement that all offset operators have been properly notified. Offset operators shall include only those operators who have offset properties within the State of New Mexico. The Commission shall wait at least ten days before approving any such pooling, and shall approve such pooling only in the absence of objection from any offset operator. In the event that an operator objects to the pooling, the Commission shall consider the matter only after proper notice and hearing.

The Commission may waive the ten-day waiting period requirement if the applicant furnishes the Commission with the written consent to the pooling by all offset operators involved.

The Commission may consider that the requirements of subparagraphs 2 and 3 of paragraph M of this rule have been fulfilled if the applicant furnishes with each copy of each application to the Commission a copy of an executed pooling agreement communitizing the units involved.

Each well drilled on any communitized tract shall be located in the approximate geographical center of the combined units with a tolerance of 150 feet for topographical conditions, but in any event shall not be located closer than 330 feet to the outer boundaries of the proposed proration unit or communitized tract.

(2) That Rule 301 (a) of the Commission Statewide Rules and Regulations is hereby amended to read in its entirety as follows:

(a) Each operator shall take a gas-oil ratio test no sooner than 20 days nor later than 30 days following the completion or recompletion of each oil well, if (1) the well is a wildcat, or (2) the well is located in a pool which is not exempt from the requirements of this rule. (Wells completed within one mile of the outer boundary of a defined oil pool producing from the same formation shall be governed by the provisions of this rule which are applicable to the pool). The results of the test shall be reported to the Commission on Form C-116 within 10 days following completion of the test. The gas-oil ratio thus reported shall become effective for proration purposes on the first day of the calendar month following the date they are reported.

Each operator shall also take an annual gas-oil ratio test of each producing oil well, located within a pool not exempted from the requirements of this rule, during a period prescribed by the Commission. A gas-oil ratio survey schedule shall be established by the Commission setting forth the period in which gas-oil ratio tests are to be taken for each pool wherein a test is required. The gas-oil ratio test applicable shall be such test designated by the Commission, made by such method and means, and in such manner as the Commission in its discretion may prescribe from time to time.

(3) That Rule 401 of the Commission Statewide Rules and Regulations is hereby amended to read in its entirety as follows:

RULE 401. METHOD OF DETERMINING NATURAL GAS WELL POTENTIAL

All operators shall conduct tests to determine the daily open flow potential volumes of all natural gas wells from which gas is being used or marketed. Such tests shall be reported on forms prescribed by the Commission within 60 days after: (1) the date of initial connection of the well to a gas transportation facility and (2) the date of reconnection following workover.

To establish comparable open flow capacity, wells shall be tested in accordance with the New Mexico Oil Conservation Commission "Manual for Back-Pressure Test for Natural Gas Wells." In the event the Commission approves an alternate method for testing, all wells producing from a common source of supply shall be tested in a uniform and comparable manner.

All gas wells which are not connected to a gas gathering facility shall be tested within 30 days following the installation of a christmas tree. Tests shall be taken in accordance with the "Procedure for Testing Unconnected Gas Wells" contained in Supplement I to the New Mexico Oil Conservation Commission "Manual for Back-Pressure Tests for Natural Gas Wells." Tests shall be reported on Form C-122 in compliance with Rule 1121 and shall be filed within 10 days following completion of the test.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JACK M. CAMPBELL, Chairman

E. S. WALKER, Member

S E A L

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

esr/

SUPPLEMENT I

TO

MANUAL FOR

BACK PRESSURE TEST FOR NATURAL GAS WELLS

STATE OF NEW MEXICO

THE TESTING PROCEDURE OUTLINED HEREIN IS TO BE USED FOR TESTING UNCONNECTED GAS WELLS AS REQUIRED BY COMMISSION RULE 104 D I AND RULE 401, AS AMENDED

MAY 25, 1964

SUPPLEMENT I

NEW MEXICO OIL CONSERVATION COMMISSION PROCEDURE

FOR TESTING UNCONNECTED GAS WELLS

Rules 104 D I and 401 of the Commission Rules and Regulations require that unconnected gas wells be tested to determine their potential within 30 days following the installation of a Christmas tree and the results of such tests reported to the Commission on Form C-122 within 10 days following the completion of the tests.

Unless specific test procedures are applicable to a given well or pool, the following procedures are to be used in so testing any unconnected gas well. It is anticipated that by the use of the Constant Time Multipoint Test with four one-hour flows, the loss of gas will be held to a minimum and good test results still obtained. The pre-test flow to clear the well-bore of accumulated liquids should also, in the interest of conservation, be closely watched and held to the absolute minimum required to achieve clean-out.

More extensive testing of an unconnected gas well than that outlined herein is not permitted except upon written authority from the appropriate District Office of the Commission.

A. L. PORTER, Jr.
Secretary-Director

July 1, 1964

Test Procedure

Constant Time Multipoint Test For Unconnected Wells

A. Shut-in Pressure

1. The well shall be blown to the atmosphere for a sufficient length of time to clear the well-bore of accumulated liquids.

2. The well shall be shut in until the rate of pressure build-up is less than 1/10 of one per cent over a 30-minute period. Pressures, psig, shall be recorded.

B. Flow Tests

1. After recording the shut-in pressure, a series of four 1-hour flow rates and the pressures corresponding to each flow rate shall be taken. Any shut-in time between flow rates shall be held to a minimum. These rates shall be run in an increasing flow-rate sequence. In the case of high liquid ratio wells or unusual temperature conditions, a decreasing flow-rate sequence may be used if the increasing sequence method did not result in the alignment of points. If the decreasing sequence method is used, a statement giving the reasons why the use of such method was necessary, together with a copy of the data taken by the increasing sequence method, shall be furnished the Commission. If previous testing in a given area has shown that the decreasing sequence method is necessary for an accurate test, a test by the increasing sequence method will not be required.

   It shall be noted that the flow periods for this test are limited to one hour for each rate of flow. Longer flow periods of unconnected wells shall not be made without special permission from the Commission.

2. The lowest flow rate shall be a rate sufficient to keep the well clear of all liquids.

3. One criterion as to acceptability of the test is a good spread of data points. In order to assure a good spread of points, the wellhead flowing pressure, psig, at the lowest flow rate should be no more than 95 per cent of the well's shut-in pressure, psig, and at the highest flow rate should be no more than 75 per cent of the well's shut-in pressure, psig. If accurate data

cannot be obtained in accordance with the foregoing provisions, an explanation shall be furnished the Commission.

4. All flow rate measurements shall be obtained by the use of an orifice meter, critical flow prover, positive choke, or other authorized metering device in good operating condition. When an orifice meter is used as the metering device, the meter shall be calibrated and the diameters of the orifice plate and meter run verified as to size, condition, and compliance with acceptable standards. The differential pen shall be zeroed before starting the test.

5. The barometric pressure shall be recorded as 13.2 psia in Southeast New Mexico and 12.0 psia in Northwest New Mexico.

6. The specific gravity of the separator gas and of the produced liquid shall be determined and recorded.

7. At the end of each flow rate, the following information shall be recorded:

   (a) Flowing wellhead pressure

   (b) Static column wellhead pressure if it can be obtained

   (c) Rate of liquid production

   (d) Flowing wellhead temperature

   (e) All data pertinent to the gas metering device

C. Calculations

1. General

A wellhead absolute open flow as determined from the wellhead equation, $Q = C(P_c^2 - P_w^2)^n$, is normally found to be equivalent to the bottom-hold absolute open flow as determined from the bottom-hole equation, $Q = C(P_f^2 - P_s^2)^n$, when the wellhead shut-in pressure of all wells in a given reservoir is below 2000 psig. Under this condition, either a wellhead absolute open flow or a bottom-hole absolute open flow is acceptable.

2. Bottom-hole Calculations

   (a) Bottom-hole pressures shall be calculated to a datum at the mid-point of the producing section open to flow. The point of entry into the tubing may be used as the datum if it is not more than 100 feet above or below the mid-point of the producing section open to flow.

(b) Under all shut-in conditions and under flowing conditions, when the static column wellhead pressures can be obtained, the bottom-hole pressures shall be calculated as shown in Calculation Example No. 6, Page 28 of the Commission Manual for Back Pressure Test for Natural Gas Wells.

(c) When the bottom-hole pressures are recorded by use of a properly calibrated bottom-hole pressure bomb and corrected to the proper datum, these pressures may be used in the bottom-hole formula.

(d) When liquid accumulation in the well-bore during the shut-in period appreciably affects the wellhead shut-in pressure, the calculation of the bottom-hole pressure shall be made as shown in Calculation Example No. 7, Page 34 of the Manual.

3. Wellhead Calculations

(a) The static column wellhead pressure must be obtained if possible.

(b) When only the flowing wellhead pressures can be obtained, the static column wellhead pressures shall be calculated as shown in Calculation Example No. 5, Page 25 of the Manual.

(c) When liquid accumulation in the well-bore during the shut-in period appreciably affects the wellhead shut-in pressure, appropriate correction of the surface pressure shall be made. This correction shall be made in the manner shown in Calculation Example No. 7, Page 34 of the Manual, or, at the option of the operator, by using a bottom-hole pressure bomb and correcting to wellhead conditions as shown in Case II of Calculation Example No. 6, Page 28 of the Manual.

D. Reports

Upon completion of the test, all calculations shall be shown on Commission Form C-122. Three copies of this form and the back pressure curve described below shall be submitted to the Commission.

E. Plotting

1. The points for the back-pressure curve shall be accurately and neatly plotted on equal-scale log-log paper (3-inch cycles are recommended) and a straight line drawn through the best

average of three or more points. When no reasonable relationship can be established among three or more points, the well shall be retested.

2. The cotangent of the angle this line makes with the volume (horizontal) coordinate is the exponent "n" which is used in the back-pressure equation. The exponent "n" shall always be calculated as shown in Calculation Example No. 1, Page 9 of the Manual.

3. If the exponent "n" calculates out to be greater than 1.000 or less than 0.500, the well shall be retested.

4. If, after retesting the well, no reasonable alignment can be established through three or more points, then a straight line shall be drawn through the best average of at least three points of the retest and exponent "n" calculated as described above.

    (a) If the exponent "n" is greater than 1.000, a straight line with an exponent value of 1.000 shall be drawn through the point corresponding to the highest rate of flow which was used in establishing the line whose value was more than 1.000.

    (b) If the exponent "n" is less than 0.500, a straight line with an exponent value of 0.500 shall be drawn through the point corresponding to the lowest rate of flow which was used in establishing the line whose value was less than 0.500.

5. The constant time data points are ordinarily used only to determine the value of the exponent "n". Usually the back-pressure curve is drawn through the stabilized data point and parallel to the line established by the constant time data points. This establishes a Stabilized Absolute Open Flow. The back-pressure curve for this test shall be drawn through the one-hour constant time points. The One-hour Absolute Open Flow may then be determined from this back-pressure curve or calculated as shown in Calculation Example No. 1, Page 7 of the Back Pressure Test Manual.