

Exhibit 1

APPLICATION FOR APPROVAL
OF
DEFINITION OF "MESAVERDE"
AS USED IN DESIGNATION OF
MESAVERDE PARTICIPATING AREA
FOR

THE NORTHEAST BLANCO UNIT, I-SEC. NO. 929
SAN JUAN AND RIO ARriba COUNTIES, NEW MEXICO
AND IN SUBSEQUENT ENLARGEMENTS THEREOF

TO: The Director of The United States Geological Survey
Roswell, New Mexico

Commissioner of Public Lands
State of New Mexico
Santa Fe, New Mexico

Oil Conservation Commission
State of New Mexico
Santa Fe, New Mexico

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

Case No. 5994 Exhibit No. 1
Submitted by B + N
Hearing Date 11-10-27

Pursuant to the provisions of Section 11 of the Unit Agreement approved by the Director of the Geological Survey on April 16, 1952, by the Commissioner of Public Lands of the State of New Mexico on October 23, 1951, and by the Oil Conservation Commission of the State of New Mexico on October 31, 1951, and pursuant to a resolution duly adopted by the Advisory Committee under the Unit Operating Agreement under Unit Agreement for the Development and Operation of the Northeast Blanco Unit Area, San Juan and Rio Arriba Counties, New Mexico, Blackwood & Nichols Company, as Unit Operator, hereby submits for your approval a definition of the term "Mesaverde" as used in the Application for Approval of Mesaverde Participating Area for the Northeast Blanco Unit, I-Sec. No. 929, San Juan and Rio Arriba Counties, New Mexico, and in subsequent enlargements thereof. In support of this Application, Operator states as follows:

1. The Application for Approval of Mesaverde Participating Area was approved by the Geological Survey on November 20, 1952. The original Participating Area was subsequently enlarged five times, with your approval, so that the Mesaverde Participating Area now covers the entire Unit Area. In the original Application and in subsequent enlargements, the term "Mesaverde" was used, and was sometimes followed by the term "zone," "formation," "horizon," "group," or the like, but was never otherwise defined.

2. Pursuant to the Plan of Development for 1976, on June 26, 1976, the Unit Operator commenced drilling of its Northeast Blanco Well No. 64 located in the SE/4 of Section 24, Township 30 North, Range 8 West, Rio Arriba County, New Mexico. The well was drilled for the purpose of protecting against drainage from the traditional producing intervals; however, the Operator encountered gas production at a level above the traditional producing interval. The details of the drilling and completion of this well are set forth on Exhibit "A", "Geological and Engineering Memorandum." After the completion of the well, Tenneco Oil Company and Continental Oil Company, owners of the lease upon which this well was drilled, took the position that the production encountered in the well was not within the vertical limits of the Mesaverde Participating Area.

3. In view of the questions which had been raised concerning the vertical extent of the Participating Area, the Advisory Committee under the Unit Operating Agreement met on October 12, 1976, for purposes of considering the matter, and other Unit business, pursuant to the Advisory Committee's duty under Section 6 of the Unit Operating Agreement to approve or disapprove any Participating Area or amendments thereof. In that meeting, the Advisory Committee duly adopted the definition of "Mesaverde" set forth in the Geological and Engineering Memorandum. The Unit owners, and their respective interests, voting in favor of the adoption of the definition were as follows:

Amoco Production Company	.32975933
Blackwood & Nichols Co., Ltd.	.29805862
Jacquelyn M. Williams	.00260911
Westland Oil Development Corp.	.04940999
Total	<u>.67983705</u>

Those voting not to adopt the definition were as follows:

El Paso Natural Gas Company	.21199416
Tenneco Oil Company	.01440596
Continental Oil Company	.01440595
Total	<u>.24080607</u>

Mr. F. G. Blackwood was authorized by letter to represent the .00492448 Thayer H. Laurie and .00310743 T. H. Laurie and D. N. Mills, Tr. interests; although not present at the meeting due to illness has approved the definition of Mesaverde as presented by the Advisory Committee. This makes the total authorized approval .68786896.

Continental Oil Company has not yet furnished written authority for their .01440595 "no" vote. Therefore the authorized "no" vote is .22640012.

The definition therefore was adopted by the required affirmative vote of 65% of the voting power of the Advisory Committee, as provided in Section 5 of the Unit Operating Agreement.

4. The Geological and Engineering Memorandum discusses evidence that the accumulation found in the No. 64 Well is part of the same accumulation found in the traditional producing interval. The Memorandum also points out that the definition of Mesaverde adopted by the Advisory Committee is consistent with that term as used in geologic literature dating back to the creation of the Unit.

The Operator respectfully requests that the Director, the Commissioner and the Commission approve this Application.

DATED this 15th day of November, 1976.

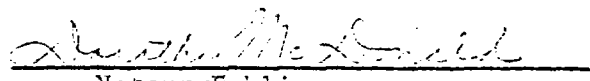
BLACKWOOD & NICHOLS COMPANY

By 
General Partner

OPERATOR

STATE OF OKLAHOMA)
) ss
COUNTY OF OKLAHOMA)

Before me, the undersigned, a notary public in and for said County and State, on the 15th day of November, 1976, personally appeared F. G. Blackwood, General Partner of Blackwood & Nichols Company, a General Partnership, to me known to be the identical person who executed the within and foregoing instrument on behalf of the partnership.


Notary Public

My commission expires:
October 12, 1980

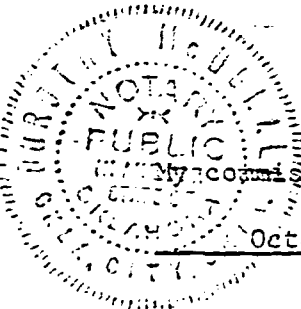


EXHIBIT "A"
NORTHEAST BLANCO UNIT, I-SEC. NO. 929
SAN JUAN AND RIO ARriba COUNTIES, NEW MEXICO
SIXTH ENLARGED PARTICIPATING AREA

GEOLOGICAL AND ENGINEERING MEMORANDUM

Q Northeast Blanco Well #64 (originally called 105A) was completed on July 10, 1976, with an open flow potential of 9,900 MCF per day. The well is located in the SE/4 of Section 24-T30N-R8W Rio Arriba County, New Mexico.

Q Well #64 (105A) is completed in open hole from 4,252' to 4,278' in a fractured sand and shale portion of the Mesaverde group above the top of the "Massive Sandstone Member" of the Cliff House sandstone. As the well
Q was being drilled from 4,258' to 4,262' the well started making gas and the
4' interval was penetrated in two minutes. A copy of the Totco time vs.
depth chart for this section is attached. The drill pipe was raised off
Q bottom and the rams were closed. The shut in pressure rose to 550 psig in
15 minutes. The valve was opened allowing gas to flow up the drill pipe
Q and the gas flow rate estimated by use of a pitot tube at 15,000 MCF per
day. The valve was closed and an immediate shut in pressure of 550 psig
was recorded.

The well was killed with 200 bbls of 35 vis. gel-water, and 4 1/2 K-55 10.5# ST & C casing was run to 4,252'.

Q A Lynes external casing to formation packer was set @ 4,119' and
50 sacks of class B cement with 2% CaCl₂ was pumped thru a stage collar at
4,085', plug down at 12:30 p.m. July 8, 1976. On July 10 the hole was
drilled out and deepened to 4,278'. The well began blowing gas at 4,251'
and upon reaching 4,278' (T.D.) was allowed to blow to clean up for 10 hrs.
Q After nipping up the tree the tubing was perforated with 10, 3/8" holes
from 4,240'-4,245'. A shut in csg. pressure of 640 psig and a shut in tbg
Q pressure of 640 psig was recorded July 12, 1976 along with a AOF of 9,900
MCFPD. The well has been connected to El Paso Natural Gas Company's line
and is shut in at present.

On August 9, 1976, Blackwood and Nichols filed Well Completion Forms (9-330) and Request for Allowable Forms (C-104). These forms were returned approved but with the Pool or Field name changed from Blanco Mesaverde to Chacra Undesignated Unit. However, the 4,252' to 4,278' interval in Well #64 (105A) does not correlate with any designated producing reservoir in the San Juan Basin. This interval is approximately 500' above the top of the "Massive Sandstone Member" of the Cliff House and 250' below the Chacra producing interval as recognized in the area.

We believe that any gas which might be produced from the #64 (105A) well would be gas which was originally in the Massive Cliff House or deeper beds and has migrated to a higher level in this very small area for the following reasons:

- Q 1. The measured surface pressure of 640 psig which is correlative with newly completed Mesaverde wells in the area, and the nearby producing well #2-43. If this were a new reservoir the pressure should be much higher.
- Q 2. When the offset wells were drilled they did not encounter gas in this interval.
- Q 3. The chemical characteristics of the gas from Well #64 (105A) and offsetting Mesaverde wells are very similar as shown in the attached gas analyses.
- Q 4. The very high natural flow rates are not usual in normal unfractured reservoirs.
- Q 5. The high penetration rate of the 4,258-4,262' interval.

Definition of Mesaverde

The completion of a gas well in a fractured sand and shale zone which is approximately 500' above the top of the "Massive Cliff House sandstone" has brought about the need to define the term Mesaverde insofar as the Northeast Blanco Unit I-Sec. 929 is concerned. The Advisory Committee of the Northeast Blanco Unit met October 12, 1976 and passed a Resolution defining Mesaverde as follows:

"RESOLVED, that the term "Mesaverde" as used in the "Application for Approval of Mesaverde Participating Area for the Northeast Blanco Unit,

I-Sec. No. 929, San Juan and Rio Arriba Counties, New Mexico", and in subsequent applications for enlargements thereof (and sometimes followed by the term "Zone", "Formation", "Horizon" or the like), all such applications duly approved by the Director of the United States Geological Survey, the Commissioner of Public Lands, State of New Mexico and the Oil Conservation Commission, State of New Mexico, is hereby defined as the stratigraphic equivalent of the interval between (i) the base of the Green Shale Marker, which occurs at a depth of 4,054 feet on the Gamma Ray-Neutron Log, dated May 31, 1957, of the Blackwood & Nichols Northeast Blanco Unit No. 34-19 Well, Section 19, Township 30 North, Range 7 West, Rio Arriba County, New Mexico, and (ii) 300 feet below the base of the Point Lookout Formation, which base occurs at a depth of 5,565 feet on the log of the foregoing well." A copy of the above referred to log is attached.

This definition is to apply to the Northeast Blanco Unit only and has no effect on any area outside the area of the Northeast Blanco Unit.

This definition will allow a reasonable and prudent development and production of hydrocarbons from the Mesaverde group. It will allow for and encourage drilling 300' below the base of the Massive Sandstone member of the Point Lookout portion of the Mesaverde group to search for an elusive, seldom present oil accumulation which could not economically be tested if a definition which limited the interval to the base of the Massive Sandstone member of the Point Lookout were adopted.

This definition also protects the ownership of presently developed Mesaverde reservoirs from thieving by fractures, etc., to intervals above the Massive Cliff House sandstone of the Mesaverde group. We believe the gas which would be produced from the #64 (105A) well is actually gas from the currently producing Mesaverde reservoir of the Northeast Blanco Unit which has migrated 500' above the Cliff House sandstone, as enumerated.

The published literature on the Mesaverde group in the San Juan Basin supports the definition adopted by the Northeast Blanco Unit Advisory Committee.

In the "Guidebook of the San Juan Basin New Mexico and Colorado" published by the New Mexico Geological Society November, 1950, a paper by Caswell Silver "The Occurrence of Gas in Cretaceous Rocks of the San Juan

Basin New Mexico and Colorado" shows clearly that the Mesaverde group is not limited to the "Massive Sandstone Members" of the Point Lookout or Cliff House. A cross section Figure 1, shows that benches of the Point Lookout extend 200'-500' below the "Massive Sandstone Member". Benches also extend 600'-800' above the top of the "Massive Sandstone Member" of the Cliff House. In A.A.P.G. Bulletin Vol. 40, No. 9, September, 1956, a paper by Beaumont, Dane and Sears, of the U.S.G.S., entitled "Revised Nomenclature of Mesaverde Group, San Juan Basin on page 2159 states that "In view of the continuity of the massive sandstone unit through this area the name Cliff House sandstone of the Mesaverde group will replace Chacra sandstone member throughout the former extent of that unit."

In U.S.G.S. Professional Paper 400-B 1960, entitled "New Information on the Areal Extent of Some Upper Cretaceous Units in Northwestern New Mexico", C. H. Dane refers to "The Hosta sandstone, a lower tongue of the Point Lookout sandstone of the Mesaverde Group." This points out the problem with limiting the lower limits to the base of the thick easily identified thick "Massive Sandstone Member" of Point Lookout Sandstone.

A cross section reproduced from A.A.P.G. Bulletin, Vol. 44, No. 1, 1960, "Upper Cretaceous Stratigraphy, Rocky Mountains" by R. J. Weimer is shown below which illustrates the continuity of deposition and transgressive/regressive relationship.

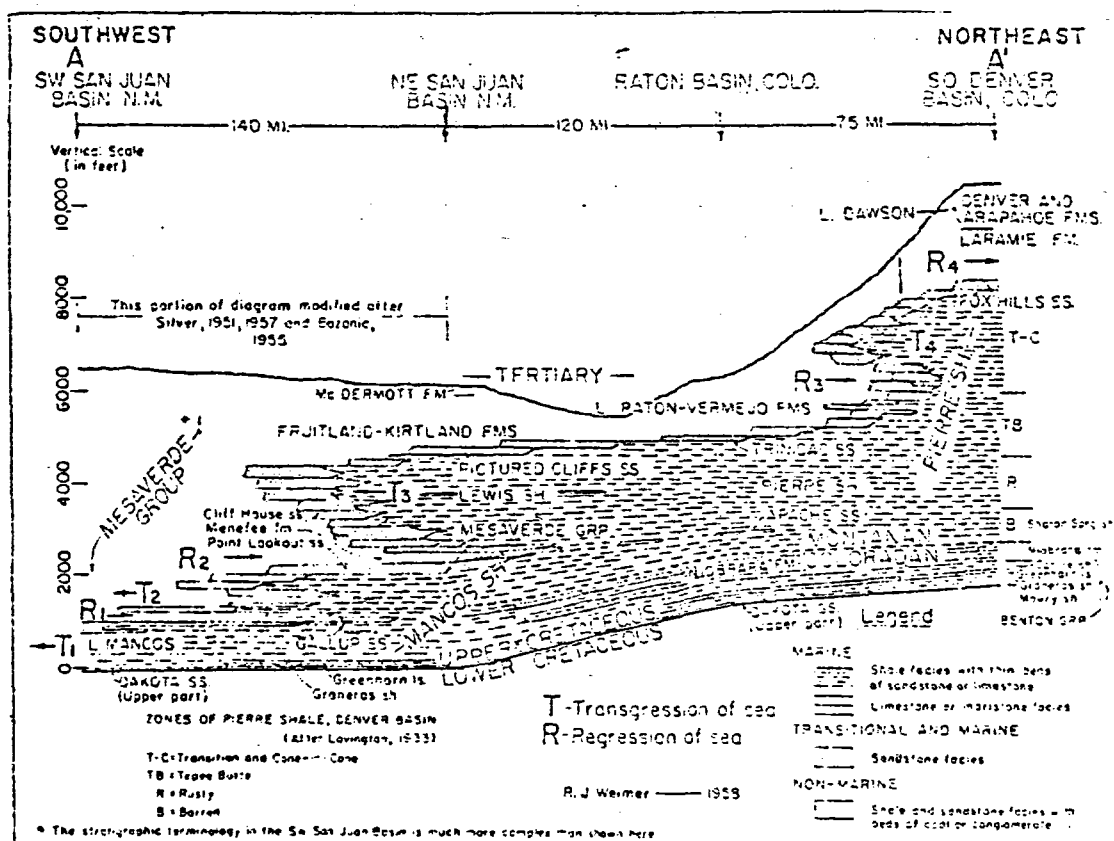


FIG. 2.—Diagrammatic restored section of Upper Cretaceous rocks extending from southwest San Juan Basin of New Mexico to south part of Denver Basin, Colorado. Tertiary rocks regionally cover erosional surface of Cretaceous strata. Diagram structurally distorts this surface.

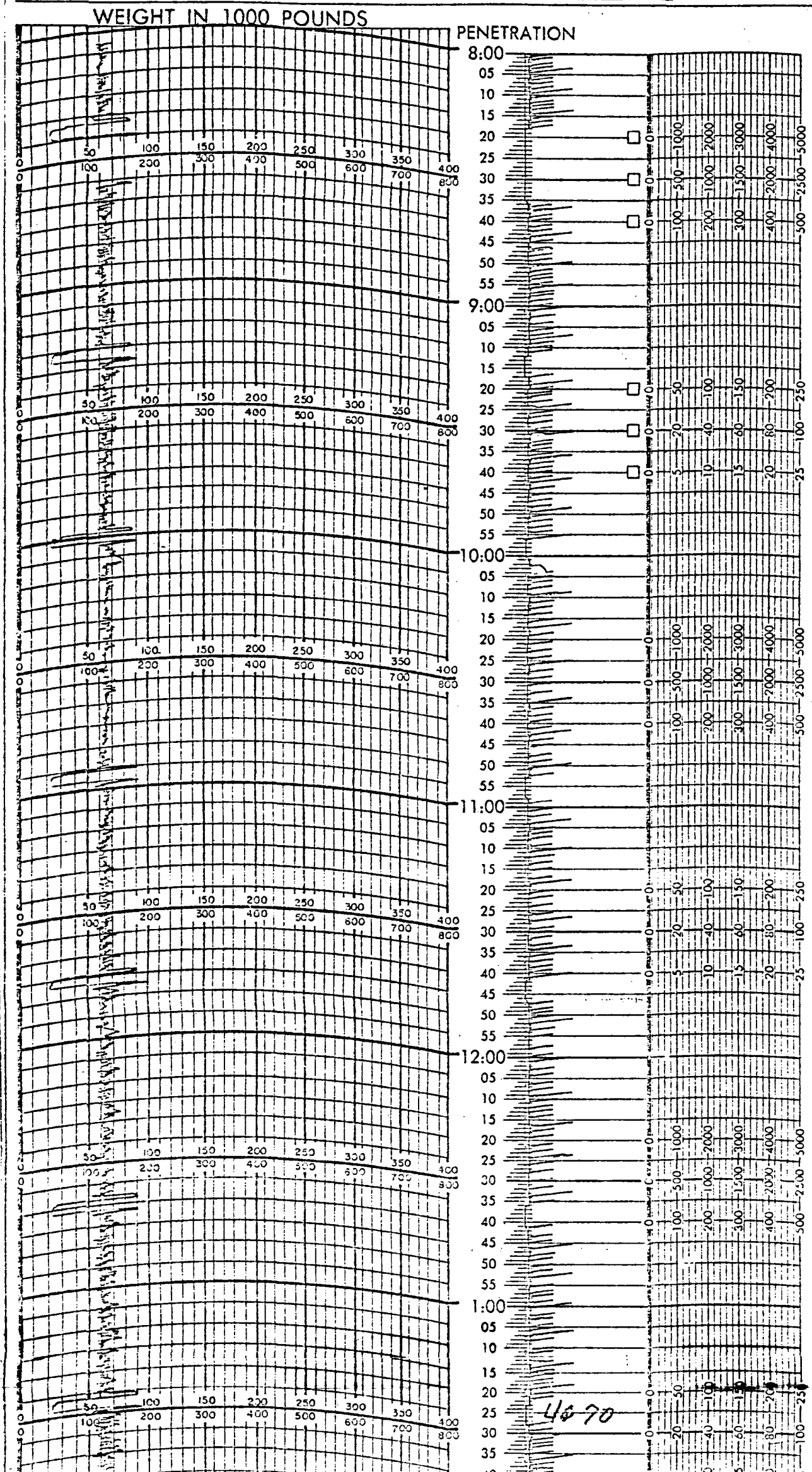
In the 1961 A.A.P.G. Book, "Geometry of Sandstone Bodies", a paper by Charles T. Hollenshead and Roy L. Pritchard entitled "Geometry of Producing Mesaverde Sandstones, San Juan Basin" in describing the "Green Marker Horizon" on page 106 stated "It is believed to represent approximate contemporaneity and therefore can be used to delineate accurately major vertical steps in the regressive Point Lookout and transgressive Cliff House Strand lines." Various benches of the Cliff House and Point Lookout sandstone are shown and mapped in the paper. We believe that the interval in which gas was encountered in Well #64 (105A) is equivalent to Bench "B" of the Cliff House sandstone as defined and mapped in this paper.

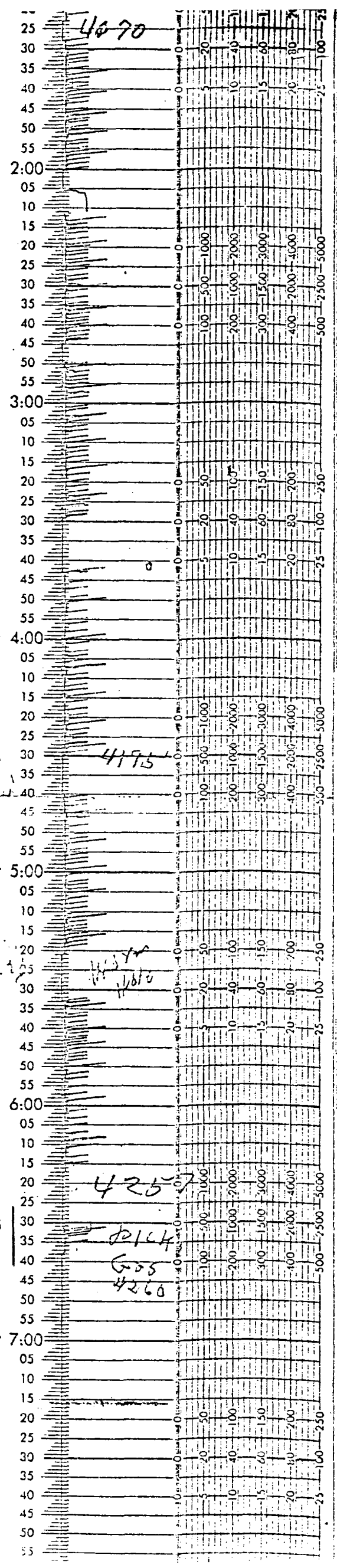
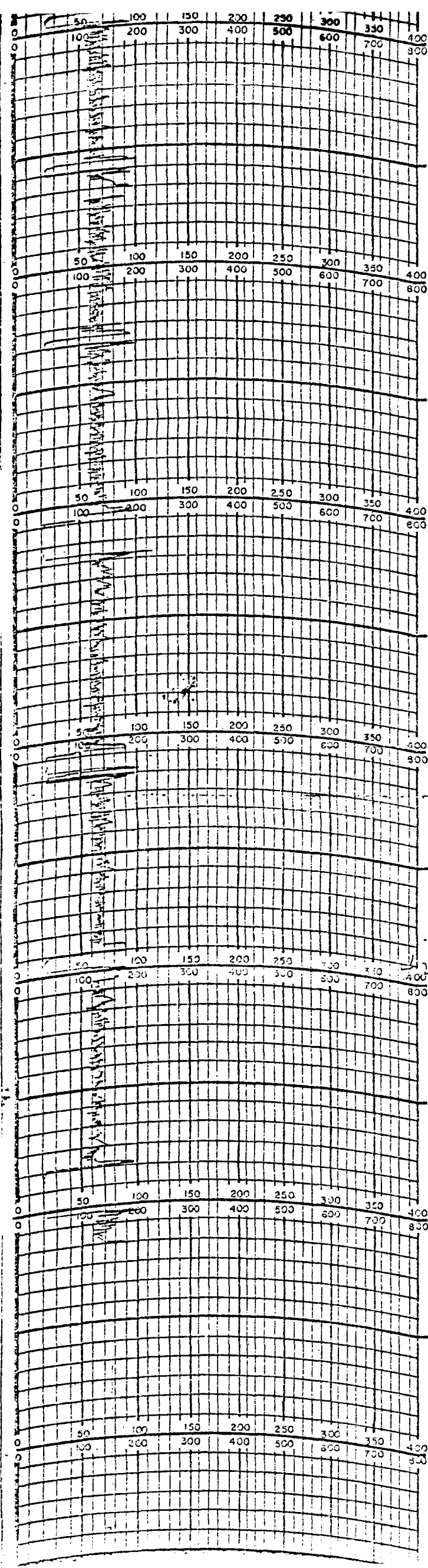
In the "Geologic Atlas of the Rocky Mountain" published in 1972 by the Rocky Mountain Association of Geologists Figure 35, taken from work by R. J. Weimer, shows the Mesaverde group from the San Juan Basin to Wyoming. The vertical limits vary greatly from one area to another.

The Mesaverde group has been described in the literature as extending from the base of the regressive Point Lookout to the top of the Cliff House sandstones. Massive Sandstone Members occur in both the Point Lookout and the Cliff House intervals. Several sandstone benches are known and mapped below the base of the "Massive Sandstone Member" of the Point Lookout and above the "Massive Sandstone Member" of the Cliff House. This definition recognizes that the system of transgressive/regressive shorelines in the Mesaverde group in the San Juan Basin is a continuum having a vertical producing column in excess of 1,400'. The definition of Mesaverde Group as adopted by the Advisory Committee of the Northeast Blanco Unit I-Sec. 929 will allow orderly development and production of hydrocarbon reserves from the Mesaverde group in the area of the Unit.

12 HOUR
OPERATOR: BLACK WOOD + NICHOLS NO: 105 A
LOCATION: NEBU STATE: NM
COUNTY: Rio Arriba T.D. OFF: 4262
DATE ON: 7-7-76 T.D. ON: 3862
TIME ON: ☐ 8:00 A.M. ☐ 8:00 P.M. FT. DRID

12 HOUR
BIT
☐ FLUID PRESSURE
☐ PUMP STROKES
☐ TORQUE
☐ RPM
☐ % MUD FLOW
☐ % PIT LEVEL





4070

4175

4257

505
4260

EX #2

**UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY**

SUBMIT IN DUPLICATE*

(See other instructions on reverse side)

Form approved,
Budget Bureau No. 43-R355.5.**WELL COMPLETION OR RECOMPLETION REPORT AND LOG***1. TYPE OF WELL: OIL ☐ GAS ☒ DRY ☐ Other ☐

2. TYPE OF COMPLETION:

NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other ☐

3. NAME OF OPERATOR

Tenneco Oil Company

4. ADDRESS OF OPERATOR

1860 Lincoln, Suite 1200 Lincoln Twr. Bldg, Denver, CO 80203

5. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*

At surface

1850 FNL & 1850 FWL

At top prod. interval reported below

At total depth

14. PERMIT NO.

DATE ISSUED

15. DATE SPudded

8/5/75

16. DATE T.D. REACHED

8/14/75

17. DATE COMPL. (Ready to prod.)

8/16/75

20. TOTAL DEPTH, MD & TVD

TD 4503'

21. PLUG, BACK T.D., MD & TVD

Open Hole

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*

4410 - 4503 (Lewis)

26. TYPE ELECTRIC AND OTHER LOGS RUN

Comp Density log, Induction Electric log

23. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
9 5/8"	36# K-55	2041	12 1/2"	200 sx. CIB + 3% CaCl ₂	None
7"	20# K-55	3458	8 3/4"	475 sx.	None
4 1/2"	10.5# K-55	4410'	6 1/8"	-200 sx.	None

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)	SIZE	DEPTH SET (MD)	PACKER SET (MD)
							4378'

31. PERFORATION RECORD (Interval, size and number)

Open Hole Completion

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
None	

33. PRODUCTION

DATE FIRST PRODUCTION		PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)				WELL STATUS (Producing or shut-in)	
8/20/75		Flowing				Shut-in	
DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
8/20/75	24	3/4	→	NA	501	NA	
FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)	
230	Packer	→	NA	3724	NA		

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.)

To be sold

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED

TITLE

Production Clerk

DATE

8/21/75

*(See Instructions and Spaces for Additional Data on Reverse Side)