

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION
OF AMERADA PETROLEUM CORPORATION
FOR AN ORDER ESTABLISHING PRORATION
UNITS AND UNIFORM SPACING OF WELLS
FOR THE BAGLEY-SILURO-DEVONIAN POOL
LEA COUNTY, NEW MEXICO

CASE NO. 249

STATEMENT OF FACTS

In August, 1949, Amerada filed its application to establish 80-acre proration units and uniform spacing of wells for the Bagley-Siluro-Devonian pool in Lea County, New Mexico. (Case No. 191)

The discovery well, known as State BTA #1 (located in NW/4 SE/4 Sec. 2-12S-33E) had been completed in the Devonian formation at a depth of 10,770 to 11,000.

Caudle #1 (SE/4 NE/4 Sec. 10-12S-33E) had been drilled as a dry hole in the Devonian. Amerada, Mid-Continent Petroleum Corporation and Texas Pacific Coal and Oil Company were each then drilling a well in the area asked to be spaced.

The application asked that the spacing order cover an area comprising 3040 acres.

It was requested that all wells be located in the NW and SE quarter of each governmental quarter-section.

An exception was asked for the Mid-Continent well (SW/4 NW/4 Sec. 1-12S-33E) then drilling.

The case was first set on September 8, 1949 and then continued to December 20, 1949.

1. FIRST HEARING

The case was first heard on December 20, 1949. Texas Pacific appeared to protest the application. At that time Amerada had three completed Devonian wells and one drilling. Texas Pacific had one completed and one drilling. There were

two Devonian dry holes, one of which was the Mid-Continent well.

Evidence was presented by both sides. Amerada filed a brief in support of its application.

On January 23, 1950, the Commission entered its order denying the application of Amerada on the ground that the evidence was insufficient to prove that one well on each 80-acre tract would efficiently drain the recoverable oil from the pool. Exhibit 1 is a copy of this Order R-2.

2. REHEARING

Amerada filed its application for rehearing together with another brief. The rehearing was denied February 8, 1950. Exhibit 2 is a copy of Order R-8.

3. APPEAL

An appeal was taken by Amerada to the District Court of Lea County, New Mexico. The case was docketed as No. 8485 and service was made. The attorneys for protestant, Texas Pacific Coal and Oil Company, requested that the court hold a pre-trial conference for the purpose of considering the nature and scope of review by the court, including the question of what evidence may be presented.

After the pre-trial conference both parties filed briefs presenting their respective views as to what evidence could be presented on appeal and the jurisdiction of the District Court.

The District Court entered an order on the pre-trial conference in which it found that the review would be confined to the existence of substantial evidence before the Commission to support the order. Amerada's contention that it was entitled to a trial de novo as provided in the statute was denied.

On December 27, 1950, after the pre-trial conference order, Amerada voluntarily dismissed its appeal with prejudice.

4. TEMPORARY ORDER

In December, 1950, Amerada filed a new application for a temporary order to establish 80-acre proration units for a period of one year. The well location pattern was the same as previously requested.

Since the entry of the original order denying the application, 13 additional producing Devonian wells had been drilled. There had been 18 wells to the Devonian formation drilled at the time of the second application.

The new application was based upon change of conditions and additional information obtained by subsequent development and also the critical shortage of tubular materials necessary for drilling operations.

The application for the temporary order was docketed No. 249. It was set for January 25, 1951, and continued to April 24, 1951.

Texas Pacific Coal and Oil Company concurred in the request for a temporary order provided the allowable was fixed at $1\frac{1}{2}$ times the normal top unit allowable.

On May 1, 1951, the Commission entered its Order R-69 establishing 80-acre proration units for a period of one year from that date. Exhibit 3 is a copy of Order R-69.

5. EXCEPTION

In December, 1950, Amerada filed an application to force pool two 40-acre tracts comprising an 80-acre unit.

However, one of the 40-acre tracts, belonging to the U. S. Government, was located so that an exception would be required in any event. Consequently on June 15, 1951, Amerada dismissed the pooling application and filed an application for an exception to Order R-69 so as to make NE/4 NE/4 Sec. 3-12S-33E a fractional 40-acre unit. The exception was granted and Cudde #5 was drilled on this tract.

6. MOTION TO SHOW CAUSE

The Commission on its own motion set the case for hearing on October 23, 1951, under No. 315, directing Amerada, Texas Pacific and other interested operators to show cause why temporary 80-acre spacing order R-69 should be continued. Exhibit 4 is a copy of the notice.

The hearing on the Commission's motion has been continued to this date. Technically, that motion is now moot, since Order R-69 expires by its own terms on May 1, 1952.

7. APPLICATION FOR EXTENSION

On March 24, 1952, Amerada filed its application for

an extension of Order R-69 in all of its particulars for an additional period of one year from May 1, 1952. Notice for this application has been properly given.

8. ISSUES INVOLVED IN PRESENT HEARING

The issues are not the same as if the case was being presented to the Commission for the first time. The Commission has already found that the evidence justified a temporary order for one year. If no waste is being committed and conditions have not changed then the order is justified for another year.

Therefore the issues properly now before the Commission are as follows:

- (1) Is any waste now being committed;
- (2) Do the same considerations impelling the granting of the temporary order still apply to justify an extension;
- (3) Are pressure maintenance operations necessary or feasible at this time.

9. TESTIMONY OF JOHN A. VEEDER, GEOLOGIST

Mr. John A. Veeder is a Geologist for Amerada Petroleum Corporation and is qualified to testify as an expert witness. The substance of his testimony is as follows:

- ✓(1) Exhibit 5 is a map of the area covered by Order R-69 which is asked to be extended.
- ✓(2) There are now 19 producing oil wells completed in the Bagley-Siluro-Devonian reservoir. Amerada owns 15 and Texas Pacific owns 4.

(3) Exhibits 6-12, both inclusive, are Schlumberger electric logs of the following wells which were drilled by Amerada to the Devonian formation:

- 6 - Caudle #5
- 7 - Mathers "A" #1
- 8 - Mathers "A" #2
- 9 - BTM #1
- 10 - BTK #1
- 11 - BTL #1
- 12 - Turner #1

(4) With these exhibits there has now been presented to the Commission Schlumberger logs of all wells which have been drilled to the Devonian in the Bagley pool.

(5) Exhibit 13 is a tabulation showing the completion data on all Amerada wells that have been completed in the Devonian.

(6) Exhibit 14 is a structure map contoured on the top of the Devonian formation.

(7) Exhibit 15 is a structure map on the top of the Devonian pay section.

(8) Two structure maps have been prepared because there is a cherty limestone impervious cap in the Devonian formation on top of the pay section which must be evaluated in considering the geology of the Bagley-Siluro-Devonian pool.

(9) Considering all of this evidence to date the probable productive limits of the Bagley Devonian pool which should be

covered by the requested spacing order is the area outlined in red on the map marked Exhibit 5. This area covers 2400 acres.

(10) From geological information obtained in the drilling of all wells to date including examination of samples and cores and the study of the Schlumberger logs, it is my opinion that the Bagley Devonian reservoir has very good vugular and fractured type porosity which is connected and continuous throughout the reservoir.

(11) Geological information obtained during the past year's development does not show any change in condition which should prevent an extension of the 80-acre spacing order for another year.

10. TESTIMONY OF R. S. CHRISTIE, PETROLEUM ENGINEER

Mr. R. S. Christie is a Petroleum Engineer for Amerada Petroleum Corporation and is qualified to testify as an expert witness. The substance of his testimony is as follows:

(1) The average gas-oil ratio of all wells in the Bagley Devonian pool is 30 cu. ft. for each barrel of oil.

(2) The gravity of the oil is 44° to 46° API.

(3) Exhibit 16 is a graph showing the oil and water production by month, cumulative production and bottom hole pressure.

(4) Bottom hole pressure and production information indicates that Bagley Devonian is a permeable reservoir under an active water drive with a high and reasonably uniform ca-

capacity to produce, even though there may be considerable variation and irregularity of porosity in the formation penetrated in each well.

(5) Productivity index tests taken in wells drilled in the Bagley-Devonian pool indicate there is good permeability throughout the reservoir.

(6) Under the present rules of the Oil Conservation Commission wells may be drilled 330 feet from the boundary lines of a 40-acre tract. This would authorize the drilling of wells 330 feet from the lines in each corner of a quarter-section and would therefore result in a distance of 1980 feet between wells. Such locations are permitted under the statewide rule of the Oil Conservation Commission and is commonly referred to as 40-acre spacing. Assuming that the statewide 40-acre spacing rule presumes efficient drainage of any reservoir spaced under authority of that rule, the result is that the present rule recognizes that efficient drainage does occur for a distance of over 990 feet from a well, or over an area equivalent to 90 acres. Eighty-acre spacing, as requested by Amerada Petroleum Corporation for the Bagley-Siluro-Devonian pool, is on a uniform spacing pattern which would result in a distance of 1866 feet between wells or the efficient drainage of an area of 80 acres in the form of a square. The 80-acre spacing proposal would require each well to drain from a distance of only 933 feet, which is 57 feet less than is permitted under statewide so-called 40-acre spacing. There are many

pools in New Mexico in which many wells have been drilled in the corner of a 40-acre tract instead of the center. This is authorized under the statewide order commonly referred to as 40-acre spacing. Many of these wells which, as authorized, are presumed to drain an area of 90 acres are producing from reservoirs that are not under an effective water drive and do not have other conditions which are conducive to a large drainage area as exist in the Bagley-Siluro-Devonian pool.

(7) The average cost of Devonian producing wells at Bagley has been approximately \$220,000.

(8) It is my opinion that one well will efficiently and economically drain a minimum area of 80 acres.

(9) It is my opinion that the allowable provided for in the present 80-acre order should be continued for another year.

(10) It is my opinion that development during the past year under the 80-acre order has not caused waste or inequity among any operators or royalty owners.

(11) The steel shortage is as critical as it was a year ago. The average per well tonnage for all wells drilled by Amerada last year was about 75 tons per well. It requires about 175 to 180 tons of steel to complete one well in the Devonian formation at Bagley, or about $2\frac{1}{2}$ times more than the average.

(12) There has been no change of conditions which would justify a denial of the extension of the 80-acre order for another year.

(13) In view of the production experience it is my opinion that a pressure maintenance program is not necessary or feasible at this time.

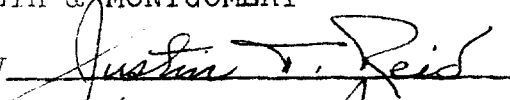
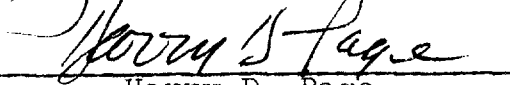
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Past experience and present conditions justify an extension of the previous temporary order for another period of one year. No waste is being committed. No injury to the reservoir will result. The correlative rights of all interested parties will be protected. All of the reasons which justified the previous order still exist. The steel shortage is still critical. All operators are in accord. Pressure maintenance operations are not necessary or feasible at this time. We therefore request that Order R-69 be extended for another period of one year from May 1, 1952, under the same terms and conditions.

Respectfully Submitted

SETH & MONTGOMERY

By



Harry D. Page


Booth Kellough

ATTORNEYS FOR AMERADA
PETROLEUM CORPORATION

64
4/5/52

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(12) There has been no change of conditions which would justify a denial of the extension of the 80-acre order for another year.

(13) In view of the production experience it is my opinion that a pressure maintenance program is not necessary or feasible at this time.

11. CONCLUSION

Past experience and present conditions justify an extension of the previous temporary order for another period of one year. No waste is being committed. No injury to the reservoir will result. The correlative rights of all interested parties will be protected. All of the reasons which justified the previous order still exist. The steel shortage is still critical. All operators are in accord. Pressure maintenance operations are not necessary or feasible at this time. We therefore request that Order R-69 be extended for another period of one year from May 1, 1952, under the same terms and conditions.

Respectfully Submitted

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By _____

Harry D. Page

Beeth Kellough

ATTORNEYS FOR AMERADA
PETROLEUM CORPORATION

TEXAS PACIFIC COAL AND OIL COMPANY

PRODUCTIVITY INDEX

New Mexico State "D" a/c-1 Well No. 1

Bagley Siluro/Devonian Field

Lea County,
New Mexico

EXHIBIT 2

Texas-Pacific

TABLE OF CONTENTS

Section

- I Static Pressure Tests
- II Pressures at choke Settings
- III Tabulated Results
- IV Graph #1 Bobs of Prod. Vs. Static Pressures
- V Graph #2 Time Vs. Static Pressures

SECTION I

STATIC PRESSURE TESTS

TEXAS PACIFIC COAL AND OIL COMPANY
PRODUCTION DEPARTMENT

SUBSURFACE PRESSURE SURVEY

FIELD Bagley- Siluro/Devonian				DATE 13 Nov., 1952	
LEASE 5 New Mexico State "D" a/c-1				WELL NO. 1	ELEVATION 4236'
WELL STATUS FLOWING		SHUT IN 100 HOURS			

DEPTH	PRESSURE	INTERVAL DIFFERENCE	GRADIENT LBS./FT.	REMARKS
0	495			TUBING PRESS. 495
6000	2535	2040	0.340	CASING PRESS. 500
8000	3220	685	0.343	FLUID TOP. Tubing Full
10000	3890	670	0.335	WATER TOP. -
10536	4070	180	0.336	TEMP. @ 10,936' - 179° F.
10736	4133	63	0.315	LAST TEST DATE 5 Nov., 1952
10936	4212	79	0.396*	PRESS. LAST TEST 4215
* High gradient 10,736' to 10,936' may indicate water; however, since gradient between 10,536' to 10,736' is low, this indication is not conclusive.				PRESS. CHANGE SINCE LAST TEST
				@ -6700' DATUM
				PLANE IS -3
				INSTRUMENT NO. 1000
				RUN BY Miller & Smith

RATE OF FLOW OIL, B/D	GAS-OIL RATIO CU. FT./BBL.	STABILIZED FLOWING PRESSURE @ _____ FT.	PRODUCTIVITY INDEX (24 HOURS)

OIL PRODUCED SINCE LAST TEST none	ACCUMULATIVE OIL PRODUCED BBLs. New Well	DATE 13 Nov., 1952
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SECTION II

PRESSURES AT CHOKE SETTINGS

TEXAS PACIFIC COAL & OIL COMPANY

Bagley Siluro-Devonian Field
New Mexico State "D" Acct. 1 No. 1
November 11, 1952

Time	Operation	Pressure @ 10936'
10:10 A.M.	Static	4212 P.S.I.
10:15 "	Opened on 14/64" choke	
11:15 "	Flowing on 14/64" choke	4058 "
12:15 P.M.	"	4055 "
1:15 "	"	4080 "
2:15 "	"	4099 "
3:15 "	"	4104 "
4:15 "	"	4113 "
4:30 "	Start off Bottom	
5:00 "	Changed to 20/64" Choke	
5:15 "	Flowing on 20/64" Choke	4003 "
6:15 "	"	4005 "
7:15 "	"	4000 "
8:15 "	"	4003 "
9:15 "	"	4012 "
10:15 "	"	4012 "
11:15 "	"	4012 "
12:15 A.M.	"	4012 "
1:15 "	"	4013 "
2:15 "	"	4013 "
3:15 "	"	4003 "
4:15 "	"	4001 "
5:15 "	"	4000 "
6:15 "	"	4012 "
7:15 "	"	4012 "
7:45 "	"	4012 "
8:00 "	Started off Bottom	
8:15 "	Changed to 26/64 " Choke	
8:30 "	Flowing on 26/64" Choke	3823 "
9:30 "	"	3815 "
10:30 "	"	3813 "
11:30 "	"	3820 "
12:30 P.M.	"	3813 "
1:30 "	"	3805 "
2:00 "	"	3805 "
2:05 "	Start off Bottom	
4:00 "	Changed to 32/64" Choke	
4:15 "	Flowing on 32/64" Choke	3810 "
4:20 "	"	3790 "
4:25 "	"	3775 "
4:30 "	"	3775 "
4:35 "	"	3777 "
4:40 "	"	3777 "
4:45 "	"	3770 "
4:50 "	"	3770 "
4:55 "	"	3770 "
5:00 "	"	3768 "
5:05 "	"	3768 "

<u>Time</u>	<u>Operation</u>	<u>Pressure @ 10936'</u>
5:10 P.M.	Flowing on 32/64" Choke	3768 P.S.I.
5:15 "	"	3770 "
5:20 "	"	3770 "
5:25 "	"	3770 "
5:30 "	"	3770 "
5:35 "	"	3758 "
5:40 "	"	3758 "
5:45 "	"	3758 "
5:50 "	Start off Bottom	
7:05 "	Shut In	3770 "
7:06 "	"	3818 "
7:07 "	"	3855 "
7:08 "	"	4024 "
7:09 "	"	4165 "
7:10 "	"	4168 "
7:15 "	"	4175 "
7:20 "	"	4175 "
7:25 "	"	4180 "
7:30 "	"	4180 "
7:35 "	"	4180 "
7:40 "	"	4194 "
7:45 "	"	4194 "
7:50 "	"	4194 "
7:55 "	"	4194 "
8:00 "	"	4194 "
8:05 "	"	4194 "
8:10 "	"	4194 "
8:15 "	"	4194 "
8:20 "	"	4203 "
8:25 "	"	4203 "
8:30 "	"	4203 "
8:35 "	"	4203 "
8:40 "	"	4203 "
8:45 "	"	4203 "
8:50 "	"	4203 "
8:55 "	"	4203 "
10:00 "	"	4205 "
10:05 "	"	4208 "
10:10 "	"	4210 "
10:45 "	"	4220 "
11:45 "	"	4220 "
12:45 A.M.	"	4220 "
1:45 "	"	4220 "
2:45 "	"	4223 "
3:45 "	"	4228 "
4:45 "	"	4228 "
5:45 "	"	4228 "
6:45 "	"	4228 "
7:45 "	"	4220 "
8:30 "	End Of Test	4220 "

SECTION III

TABULATED RESULTS

TEXAS PACIFIC COAL & OIL COMPANY

Bagley Siluro-Devonian Field
New Mexico State "D" Acct. 1 No. 1
November 11, 1952

Length of Test	Choke Size	Oil		Gas MCF (24 hrs)	B.S. & W. 10946'	BHP @	Stabilized		Gas-Oil Ratio	P.I.
		Average	Oil (24hrs)				Tbng Press.	Csing Press.		
4 hrs.	14/64"	3.5	84	4.66	0.1 of 1 %	4085	170	375	55.5-1	0.785 .66
14 hrs. 45 min.	20/64"	9.04	217	4.55	"	4012	55	300	21.5-1	1.086
5 hrs. 30 min.	26/64"	25.5	612	8.10	"	3805	22	60	13.3-1	1.506
1 hr. 30 min.	32/64"	29.0	696	19.00	"	3758	15	20	27.3-1	1.530

SECTION IV

GRAPH #1 BBLs. OF PROD. vs. STATIC PRESSURES

4200

--- STATIC PRESSURE - 4212

4100

4000

3900

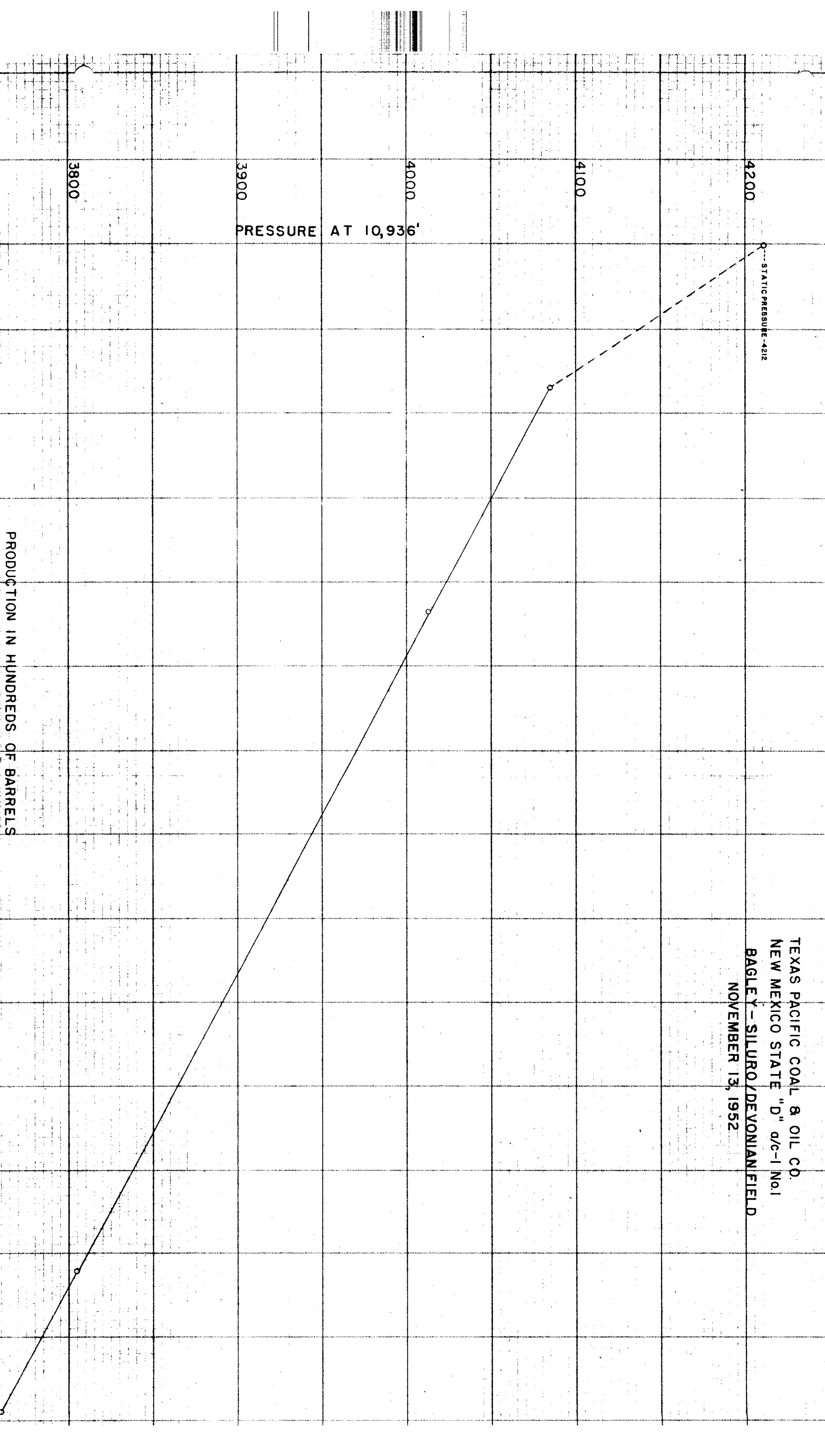
3800

PRESSURE AT 10,936'

TEXAS PACIFIC COAL & OIL CO.
NEW MEXICO STATE "D" d/c-1 No.1

BAGLEY - SILURO / DEVONIAN FIELD
NOVEMBER 13, 1952

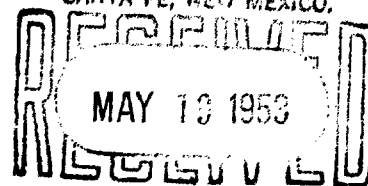
PRODUCTION IN HUNDREDS OF BARRELS



SECTION V

GRAPH #2 TIME vs. STATIC PRESSURES

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO.



BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF THE)
COMMISSION UPON ITS OWN MOTION FOR AN)
ORDER DIRECTING OPERATORS IN THE BAGLEY-)
SILURO-DEVONIAN POOL TO SHOW CAUSE WHY)
THE POOL SHALL NOT BE PLACED ON A FORTY-)
ACRE SPACING PATTERN WITH ALLOWABLE)
ADJUSTMENT)

CASE NO. 249

19 May 53

Preliminary Statement

This case was continued from the regular hearing of the Commission in April by interlocutory order R-69-B. In December, 1950, Amerada filed an application for a temporary order to establish 80-acre proration units and uniform spacing of wells for the Bagley-Siluro-Devonian Pool in Lea County, New Mexico. This application was docketed as Case No. 249 and was heard in April, 1951. On May 1, 1951, the Commission entered its Order R-69 establishing 80-acre proration units for the pool for a period of one year.

On its own motion, the Commission directed Amerada, Texas Pacific Coal and Oil Company and other interested operators to show cause why Order R-69 should be extended. The hearing on this motion was consolidated with Amerada's application for an extension of Order R-69 in April, 1952. On April 29, the Commission entered its Order R-69-A extending Order R-69 for a period of one year and in addition, requiring monthly production reports, ordering certain pressure maintenance tests be made in the pool, and directing the operators to show cause at the regular meeting of the Commission in April, 1953 why the pool should not be placed on a 40-acre spacing pattern with allowable adjustment.

The present hearing is on the Commission's motion directing operators in the field to show cause as provided by Order R-69-A. Notice of this hearing has been properly given.

Statement of Amerada's Position

At this hearing it is Amerada's contention that Order R-69-A in all its particulars should be extended for a period of one year from this date.

For cause it would show the following:

1. The Commission has twice found the evidence justified a temporary order for one year.

2. Temporary Orders R-69 and R-69-A have not resulted in waste or prejudiced correlative rights.

3. The same considerations justifying these orders still apply to a further extension of 80-acre spacing in the Bagley-Siluro-Devonian Pool for a period of one year.

4. Developments in the pool since April, 1952, also support an extension of Order R-69-A in all its particulars.

5. Forty acre spacing of the Devonian at Bagley would result in the drilling of unnecessary wells.

Testimony in Support of Amerada's Position

To save time and establish a more complete predicate for consideration of the question now before the Commission, it is requested that the records of previous hearings in this case be incorporated by reference and made a part of this record.

The first witness in support of Amerada's position is Mr. John A. Veeder. Mr. Veeder is a Geologist for Amerada Petroleum Corporation and is qualified to testify as an expert witness. The substance of his testimony is as follows:

1. The probable productive area of the Devonian at Bagley is the same as the area covered by Order R-69-A.

2. The Devonian in this area shows an anticlinal structure topped by a cap of impervious, cherty limestone.

3. There is no evidence of any structural irregularities in the area which would prevent the movement of oil through the pay.

4. The Bagley Devonian reservoir has very good vugular and fractured type porosity which is connected and continuous throughout the reservoir.

5. Nothing in the structure or lithology of the Devonian of Bagley would

indicate a need for smaller spacing units and have been set by Order R-69-A.

6. No additional geological information has been developed since April, 1952 which should prevent an extension of Order R-69-A.

The next witness in support of Amerada's position is Mr. R. S. Christie. Mr. R. S. Christie is a Petroleum Engineer for Amerada Petroleum Corporation and is qualified to testify as an expert witness. The substance of his testimony is as follows:

1. One well in the Devonian at Bagley will efficiently drain at least 80 acres.

2. One well in the Devonian at Bagley will economically drain 80 acres.

3. An extension of Order R-69-A will not cause waste and will tend to reduce the risk of creating waste.

4. An extension of Order R-69-A will not prejudice correlative right in the field.

5. A 40-acre spacing of the Devonian at Bagley would result in the drilling of unnecessary wells.

6. An extension of Order R-69-A will tend to promote efficient use of critical materials.

7. Studies of the field including its production history during the past year fully support an extension of Order R-69-A in all its particulars.

Conclusion

The question before the Commission is not a matter of first impression. R-69-A is a workable order. It has the great merit of having worked for the last two years. Operations in the pool to date fully confirm predictions made at previous hearings in this case by Amerada's witnesses with respect to pressure maintenance, efficient and economic drainage area, and reservoir behavior. We

LIST OF EXHIBITS

1. Commission's Order R-69.
2. Commission's Order R-69-A.
3. Notice of Commission with respect to this hearing.
4. Commission's Interlocutory Order R-69-B.
- E ~~5~~ Area map of the probable productive limits of the Devonian at Bagley with the locations of all wells drilled in the field.
6. Schlumberger, Amerada's BTN No. 1.
7. Completion Data Sheet on all Bagley Devonian wells.
8. Structure map contoured on top of the Devonian.
9. Structure map contoured on top of the Devonian Pay.
- J ~~10~~ A graph showing cumulative and monthly production of oil and water and the bottom hole pressure history of the Devonian Reservoir at Bagley.

believe Order R-69-A has worked fairly and efficiently from the standpoint of all concerned.

The order has not resulted in waste. It has promoted the uniform development of the field and the conservation of critical materials.

There is no evidence of any change in conditions since April, 1952 which necessitates discontinuance or modification of Order R-69 nor is there any evidence which should prevent extension of Order R-69 for another year.

Conversely, 40-acre spacing of the Devonian at Bagley would result in the drilling of unnecessary wells and would waste money and materials.