STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
P. O. Box 2088
SANTA FE, NEW MEXICO
87501

ADMINISTRATIVE ORDER

NFL 89

INFILL DRILLING FINDINGS PURSUANT TO
SECTION 271.305(b) OF THE FEDERAL ENERGY REGULATORY
COMMISSION REGULATIONS, NATURAL GAS POLICY ACT OF 1978
AND OIL CONSERVATION DIVISION ORDER NO. R-6013-A

I.

Operator ARCO OIL & GAS CO. Well Name and No. State "AZ" Well No. 2

Location: Unit H Sec. 6 Twp. 19South Rng. 35 East Cty. Lea

II.

THE DIVISION FINDS:

(1) That Section 271.305(b) of the Federal Energy Regulatory Commission Regulations promulgated pursuant to the Natural Gas Policy Act of 1978 provides that, in order for an infill well to qualify as a new onshore production well under Section 103 of said Act, the Division must find that the infill well is necessary to effectively and efficiently drain a portion of the reservoir covered by the proration unit which cannot be so drained by any existing well within that unit.

(2) That by Order No. R-6013-A, dated February 8, 1980, the Division established an administrative procedure whereby the Division Director and the Division Examiners are empowered to act for the Division and find that an infill well is necessary.

(3) That the well for which a finding is sought is completed in the Scharb-Bone Springs Pool, and the standard spacing unit in said pool is 80 acres.

(4) That a 80 -acre proration unit comprising the E/2 NE/4 of Sec. 6, Twp. 19 South Rng. 35 East, is currently dedicated to the State "AZ" Well No. 1 located in Unit A of said section.

(5) That this proration unit is (X) standard ( ) nonstandard; if nonstandard, said unit was previously approved by Order No. NA.

(6) That said proration unit is not being effectively and efficiently drained by the existing well(s) on the unit.

(7) That the drilling and completion of the well for which a finding is sought should result in the production of an additional 104,000 MCF of gas from the proration unit which would not otherwise be recovered.

(8) That all the requirements of Order No. R-6013-A have been complied with, and that the well for which a finding is sought is necessary to effectively and efficiently drain a portion of the reservoir covered by said proration unit which cannot be so drained by any existing well within the unit.

(9) That in order to permit effective and efficient drainage of said proration unit, the subject application should be approved.

IT IS THEREFORE ORDERED:

(1) That the applicant is hereby authorized to drill the well described in Section I above as an infill well on the existing proration unit described in Section II(4) above. The authorization for infill drilling granted by this order is necessary to permit the drainage of a portion of the reservoir covered by said proration unit which cannot be effectively and efficiently drained by any existing well thereon.

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

DONE at Santa Fe, New Mexico, on this 8 day of August, 19 84.

DIVISION DIRECTOR _____ EXAMINER _____

AFFIDAVIT BEFORE

NEW MEXICO OIL CONSERVATION DIVISION

IN THE MATTER OF

APPLICATION FOR WELL STATUS DETERMINATION
PURSUANT TO SECTION
103 OF THE
NATURAL GAS POLICY ACT OF 1978

AFFIDAVIT

MAY 4 1984

RECEIVED

STATE OF TEXAS

COUNTY OF DALLAS

BEFORE ME, the undersigned authority, duly commissioned and qualified within and for the State and County aforesaid, personally came and appeared Dottie J. Martinson (Affiant), Director, Gas Regulations, ARCO Oil and Gas Company, a Division of Atlantic Richfield Company (ARCO), who, being by me first duly sworn, deposed and said:

That application is hereby made to the Oil Conservation Division of the State of New Mexico to determine the status of State AZ No. 2, API No. 30-025-28189 for wellhead pricing purposes pursuant to the rules and regulations of the Oil Conservation Division of the State of New Mexico, the Federal Energy Regulatory Commission, and the Natural Gas Policy Act of 1978.

That in support of the application, Affiant states that:

(1) the surface drilling of the well for which Affiant seeks a determination was begun on or after February 19, 1977;

(2) the Division has altered or granted a waiver of any applicable well-spacing requirements and said well is an infill well drilled in accordance with Administrative Order NSL-(Application Pending).

(3) Affiant has concluded that to the best of Affiant's information, knowledge and belief, the natural gas for which Affiant seeks a determination is produced from a new, onshore production well and that such conclusion is based upon the documents filed with this application.

(4) Affiant has no knowledge of any other information not described in the application which is inconsistent with Affiant's conclusions;

(5) To the best of Affiant's knowledge and belief, all information contained in this application for category determination, pursuant to the NGPA, is true and correct including all documents, testimony and evidence submitted with the application.

Signed Dottie J. Martinson
Dottie J. Martinson

SUBSCRIBED in my presence and duly sworn to before me, this 3rd day of May, 1984.

Notary Public

My Commission Expires: September 1, 1987

State AZ No. 2

Lea County, New Mexico

AR# 46385

"Request for Infill Location"

NFL-89
File

ARCO Oil and Gas Company
Permian District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0100

April 16, 1984

Mr. Joe D. Ramey
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: State "AZ" No. 2
Infill Location
Scharb Bone Springs Pool
Lea County, New Mexico

Dear Sir:

ARCO Oil and Gas Company requests an administrative finding that the subject well is needed to effectively drain a portion of the reservoir and for the purpose of requesting gas pricing relating to the Section 103 of the Natural Gas Policy Act of 1978. The infill well, the State "AZ" No. 2, is located 1980' FNL and 660' FEL of Section 6, T-19-S, R-35-E, Lea County, New Mexico. The State "AZ" No. 1, the first well on the proration unit, was drilled in 1964. The subject well, the State "AZ" No. 2, was drilled in 1983.

The proration units for the State "AZ" Lease are 80 acres in size and ARCO feels that the State "AZ" No. 1 alone cannot effectively drain the Bone Springs. The State "AZ" No. 2 should ultimately produce 129 MBO that would not otherwise be produced.

Attached is the required information and your prompt attention is appreciated.

Very truly yours,

J. A. Fraga
Sr. Operations/Analytical Engineer

JAF:sc
Atts.

D. Filing Requirements

Rule 5. Forms C-101 and C-102. See Attachments I and II.

Rule 6. Scharb Bone Springs, 80 acre spacing.

Rule 7. Not Applicable.

Rule 8. Well histories and wellbore profile.
See Attachments III, IV, V and VI.

Rule 9. a. Formation Structure Map and Well Cross Section.
See Attachments X, XI and XII.

b. The current estimated increased ultimate recovery expected is 129 MBO from the opened Bone Springs Section in the State AZ No. 2. The expected increase is 12.1% of the calculated original oil in place in the proration unit. Gas production in association with this oil is 101 MMCF based on a produced gas oil ratio of 784 cu. ft/bbl.

This volume of increased recovery is determined using decline curve analysis and the production history decline of the State AZ No. 1. Historically, the Bone Springs has shown good initial potentials with steep declines during the first producing year. The State AZ No. 1 declined at 60%/year for the first ten months after completion and then declined at 10%/year thereafter (Attachment No. VII). Cumulative production for the State AZ No. 1 up to May, 1983, is 107 MBO with projected remaining reserves of 7 MBO. This projection is for the Upper Bone Spring section and was based on a pump rate of 5 BOPD and an economic limit of 3 BOPD. Estimated ultimate recoverable reserves for the State AZ No. 1 is 114 MBO.

The State AZ No. 2 is expected to produce at a comparable performance decline as the State AZ No. 1. As of January, 1984, the State AZ No. 2 has produced 24 MBO reserves and is producing at 134 BOPD which is two times the initial producing rate of the State AZ No. 1. Therefore, based on the current performance of the State AZ No. 2, the estimated ultimate recoverable reserves of 129 MBO were determined using an an initial stabilized rate of 245 BOPD declined exponentially at 84%/year for one year and then at 12%/year, thereafter, to an economic limit of 3 BOPD (Attachment IX). The 12% rate decline is the average for offset producers in the Scharb Field.

Rule 9. b. (continued):

Original oil in place in the proration unit was volumetrically determined to be 1.063 MMBO. The open hole logs of the State AZ No's. 1 and 2 were used to obtain the average porosity, water saturation and the feet of net pay. A reservoir volume factor of 1.35 was based on a crude gravity of 38.6% API, a produced gas oil ratio of 784 cu ft/bbl, a gas gravity of 0.6 and a reservoir temperature of 135° F.

Below is a summary of these parameters, OOIP calculations, and ultimate recovery estimates for the State AZ No. 1 and 2:

1) A = area of proration unit = 80 acres
   h = ft. of pay = 25 ft.
   Ø = average porosity = 11.56%
   Sw = average water saturation = 20%
   Bo = formation volume factor = 1.35 RVB/STB

2) $OOIP = \frac{7758\ AhØ(1 - Sw)}{Bo}$

$$= \frac{7758(80)(25)(.1156)(1 - .20)}{1.35} = \underline{1.063\ MMBO}$$

3) Ult. Rec.

Well #1 = 114 MBO or 10.7% of OOIP

Ult. Rec.

Well #2 = 129 MBO or 12.1% of OOIP

Based on the aforementioned information, the drilling of the State AZ No. 2 was necessary for the effective depletion of the proration unit.

c. Other supporting data:

1) N/A
2) Production decline curves - see Attachments VII, VIII and IX.
3) N/A

Rule 10. Duplicate applications are submitted.

Rule 11. A copy of certified mailing to operators of offset spacing units is shown as Attachment XIII.

NEW MEXICO OIL CONSERVATION COMMISSION

Form C-101
Revised 1-1-65

| | |
|---|---|
| SLE | |
| S.G.S. | |
| AND OFFICE | |
| PERATOR | |

5A. Indicate Type of Lease: STATE [X] FEE [ ]

5. State Oil & Gas Lease No.: NM-899

## APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

Type of Work

Type of Well: DRILL [X] DEEPEN [ ] PLUG BACK [ ]

OIL WELL [X] GAS WELL [ ] OTHER SINGLE ZONE [X] MULTIPLE ZONE [ ]

7. Unit Agreement Name:

8. Farm or Lease Name: State AZ

Name of Operator: ARCO Oil and Gas Company
Division of Atlantic Richfield Company

9. Well No.: 2

Address of Operator: P. O. Box 1710, Hobbs, New Mexico 88240

10. Field and Pool, or Wildcat: Scharb Bone Springs

Location of Well: UNIT LETTER H LOCATED 1980 FEET FROM THE North LINE

660 FEET FROM THE East LINE OF SEC. 6 TWP. 19S RGE. 35E NMPM

12. County: Lea

| 15. Proposed Depth | 19A. Formation | 20. Rotary or C.T. |
|---|---|---|
| 10,300' | Bone Springs | Rotary |

| Elevations (Show whether DF, RT, etc.) | 21A. Kind & Status Plug. Bond | 21B. Drilling Contractor | 22. Approx. Date work will start |
|---|---|---|---|
| 3930.59' GL | GCA #8 | Not selected | 4/20/83 |

PROPOSED CASING AND CEMENT PROGRAM

| SIZE OF HOLE | SIZE OF CASING | WEIGHT PER FOOT | SETTING DEPTH | SACKS OF CEMENT | EST. TOP |
|---|---|---|---|---|---|
| 32" | Conductor Pipe | 20" | 30' | 2½ yds Redi-mix | Surf |
| 17½" | 13-3/8" OD | 54.5# K-55 | 400' | 375 sx | Circ to surf |
| 11" | 8-5/8" OD | 28# S-80 | 4000' | 1525 sx | Circ to surf |
| 7-7/8" | 5½" OD | 15.5#, 17# K-55 | 10,300' | 675 sx | 8500' |

Propose to drill a development well to test the producing capabilities of Bone Springs formation and recover remaining reserves. If completed as a producer, allowable is to be shared with State AZ #1 on an 80-acre proration unit.

RECEIVED
APR 11 1983
CENTRAL FILES

APPROVAL VALID FOR 150 DAYS
PERMIT EXPIRES 10/6/83
UNLESS DRILLING UNDERWAY

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOWOUT PREVENTER PROGRAM, IF ANY.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Signed: Robert E. Bellinger Title: Drlg. Engr. Date: 3/31/83

(This space for State Use)

APPROVED BY: ORIGINAL SIGNED BY JERRY SEXTON DIST. I SUPERVISOR Title _____ Date MAR 6 1983

CONDITIONS OF APPROVAL, IF ANY:

ATTACHMENT I

# ACREAGE DEDICATION PLAT

Div. of Atlantic Richfield Co.

| | | | |
|---|---|---|---|
| ARCO OIL & GAS Co. | STATE AZ | | 2 |
| H 6 | 19S | 35E | LEA |
| 1930 | NORTH | 660 | EAST |
| 3930.59 | Bone Springs | Scharb | 80 |

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

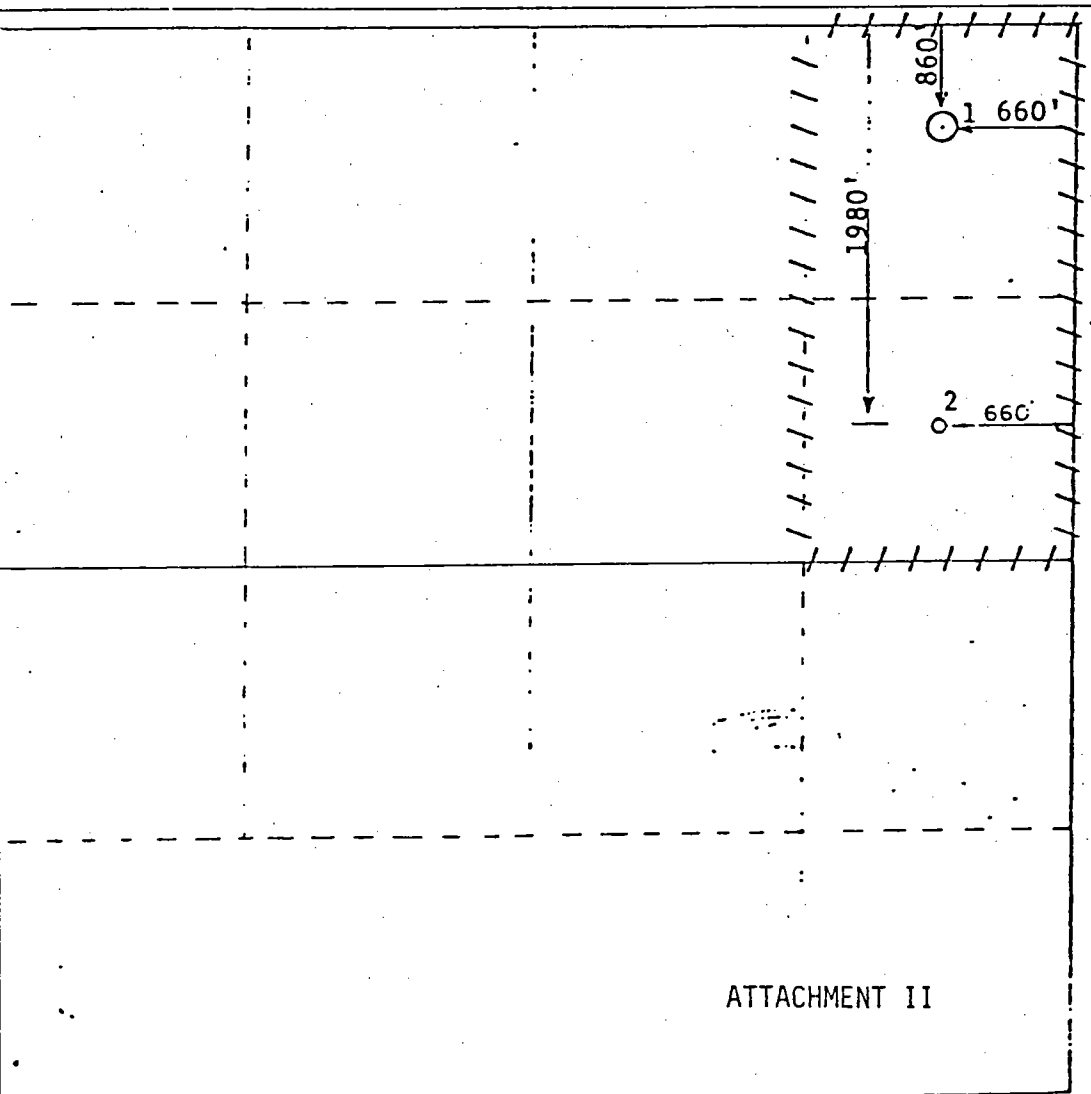
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

Yes No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, force-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.




ATTACHMENT II

CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Robert E. Ballenger

Drlg. Engr.

ARCO Oil and Gas Co.
Div of Atlantic Richfield Co.

3/31/83

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

MARCH 29, 1983

Certificate No. JOHN W. WEST 676

# ATTACHMENT III

a. State AZ No. 1
860' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 7-31-64

c: Completion Date: 9-17-64

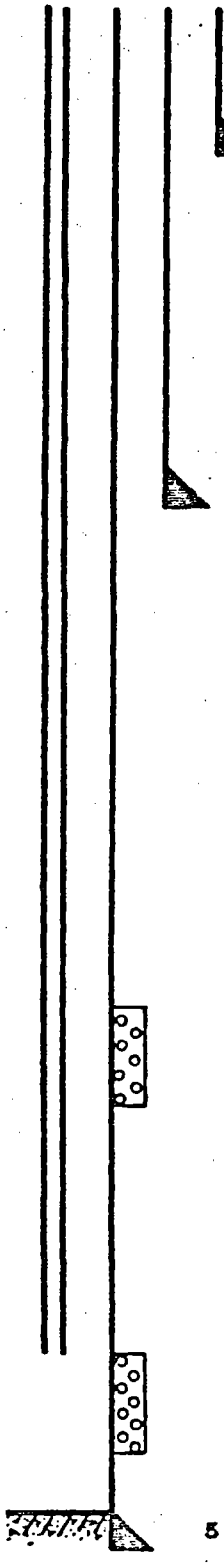
d. No mechanical problems experienced.

e. Current rate of production, December, 1983: 20 BOPD + 5 MCFPD

f. Producing well, not plugged.

g. The current performance of the State AZ No. 2 to date clearly supports the fact that the No. 2 well was necessary for the effective depletion of the proration unit (Attachment IX). The production decline curve on its north offset, ARCO's State AZ No. 1, also shows that its rate performance has not been affected with the completion of the State AZ No. 2 to the Upper Bone Springs section (Attachment VIII). The upper section has been the main producing interval on the State AZ lease since development in 1964. A lower section was tested in the State AZ No. 1 but could not be produced because of the poor stimulation response after a sand fracture treatment; therefore, the well was plugged back to the upper section. In May, 1983, a re-entry attempt and re-stimulation using higher strength proppant resulted in a successful workover to the lower section. The production graph (Attachment VIII) shows that the lower section will contribute some new reserves but of a smaller volume compared to the more prolific recovery expected from the upper section. In the drilling of the State AZ No. 2, the lower section was considered as a secondary objective. Currently, the State AZ No. 2 is producing from the upper Bone Springs section only and has the lower section isolated with a bridge plug. The lower section was opened in the AZ No. 2 and swabbed oil but is not expected to be a prolific interval due to the tight reservoir matrix. Attachments IV and VII show the present downhole status of both wells.

# STATE "AZ" NO. 1
## WELL PROFILE



13 3/8" 48# H-40 at 414' w/400 Sxs Circ

8 5/8" 24#, 32# K-55, H-40 at 3997' w/2050 Sxs

UPPER BONE SPRINGS: Perfs at 9437-62' (2 JSPF)
Acidized w/2000 Gals
IPF 351 BOPD on 10-8-64

Re-enter on May, 1983

LOWER BONE SPRINGS: Perfs at 10,106-150' (4 JSPF)
-178 Holes
Fracture Treated w/ 34,700 Gals
and 41,000 # 20/40 Interprod
After: Est 10 BOPD
Before: 0 BOPD

5 1/2" 15.5#, 17# J-55, N-80 at 10,247' w/180 Sxs

PBD at 10,163'

ATTACHMENT IV

# ATTACHMENT V

a. State AZ No. 2
1980' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 6-16-83

c. Completion Date: 8-24-83

d. No mechanical problems experienced.

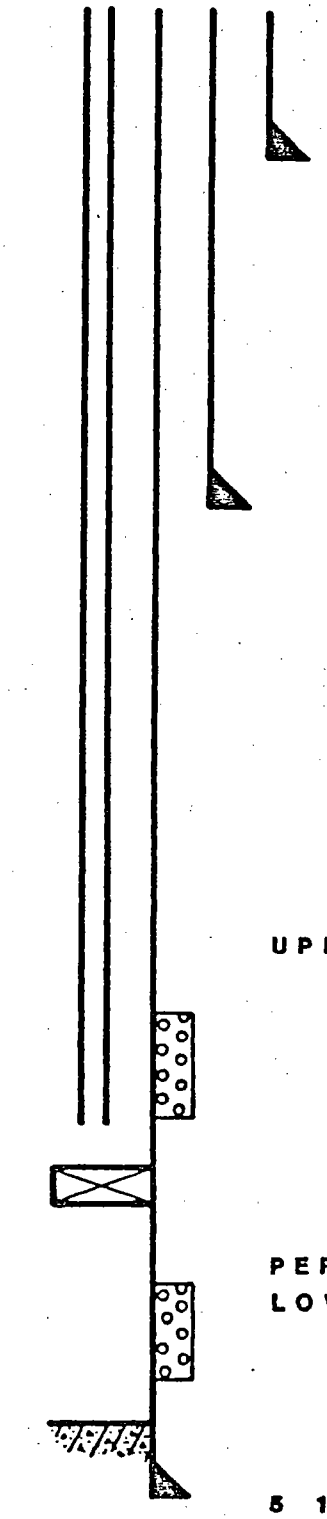
e. Current rate of production, December, 1983: 135 BOPD + 193 MCFPD.

f. Producing well, not plugged.

g. See Attachment III.

# STATE "AZ" NO. 2

## WELL PROFILE



13 3/8" 54.5# K-55 at 403' w/500 sxs Circ

8 5/8" 28# S-80 at 4000' w/1600 sxs

UPPER BONE SPRINGS: 9457 - 9476' (20 Holes)
Acid 8000 Gals 20% Titan X-L
with 25% CO2
IPF 375 BO-294 MCFPD
8/24/83

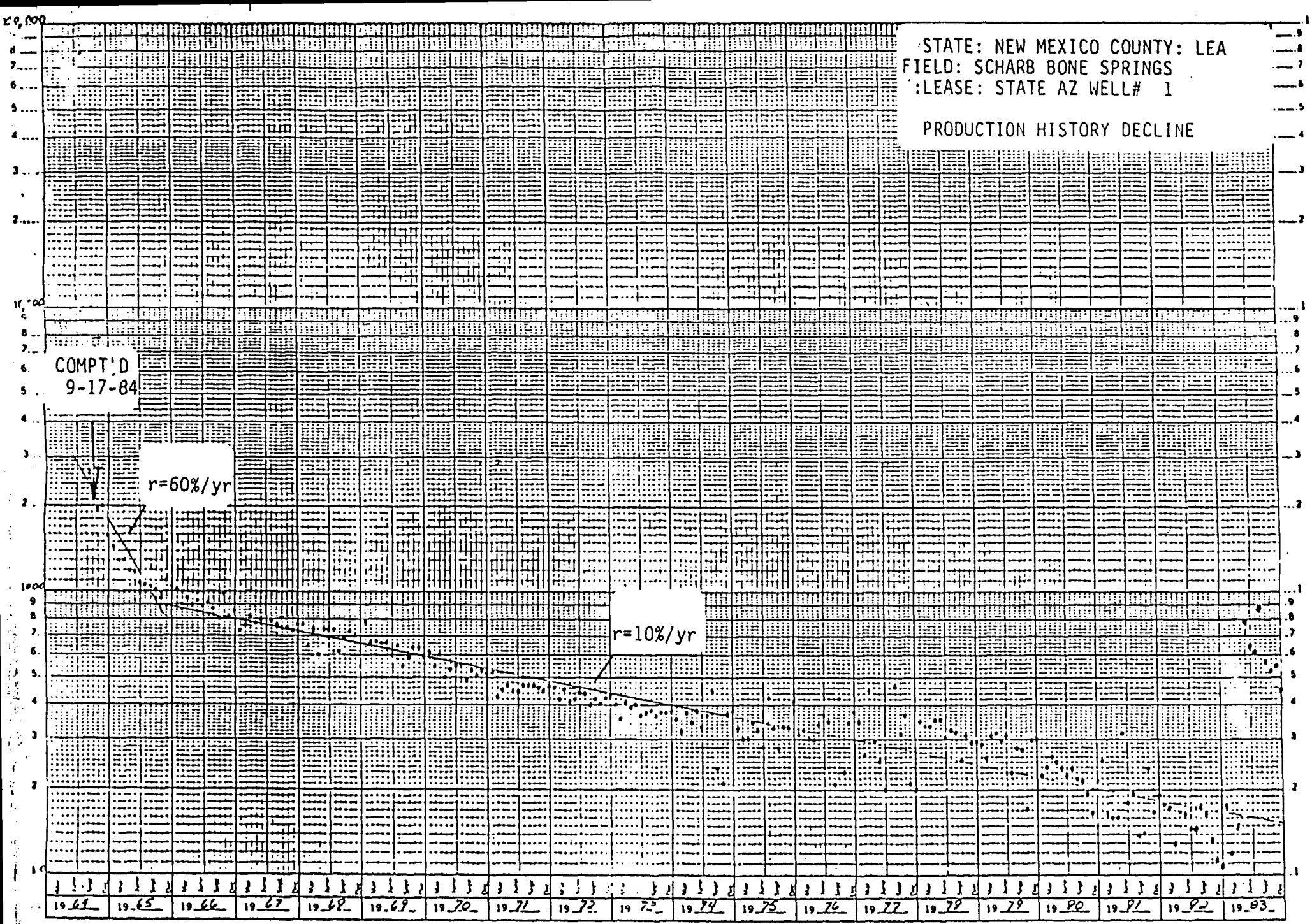
PERMANENT BRIDGE PLUG AT at 9615'

LOWER BONE SPRINGS: 10,128-161' &
10,170-178' (IJSPF)
Acid 3000 Gals
Swabbed Oil & Load Water
Est. Rate at 10 BOPD

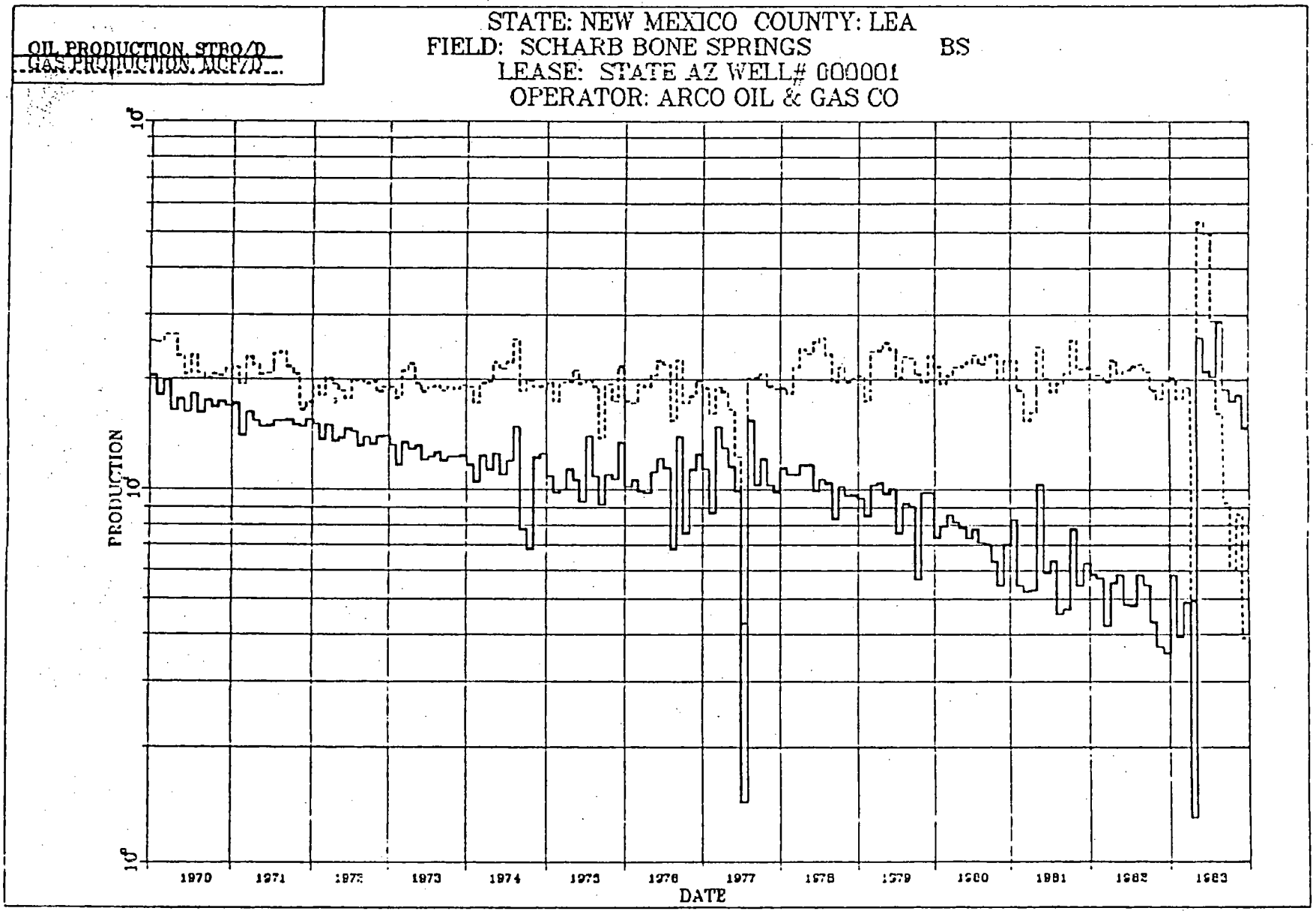
5 1/2" 15.5# & 17# K-55 at 10,300' w/ 1700Sxs

PBD at 10,220'

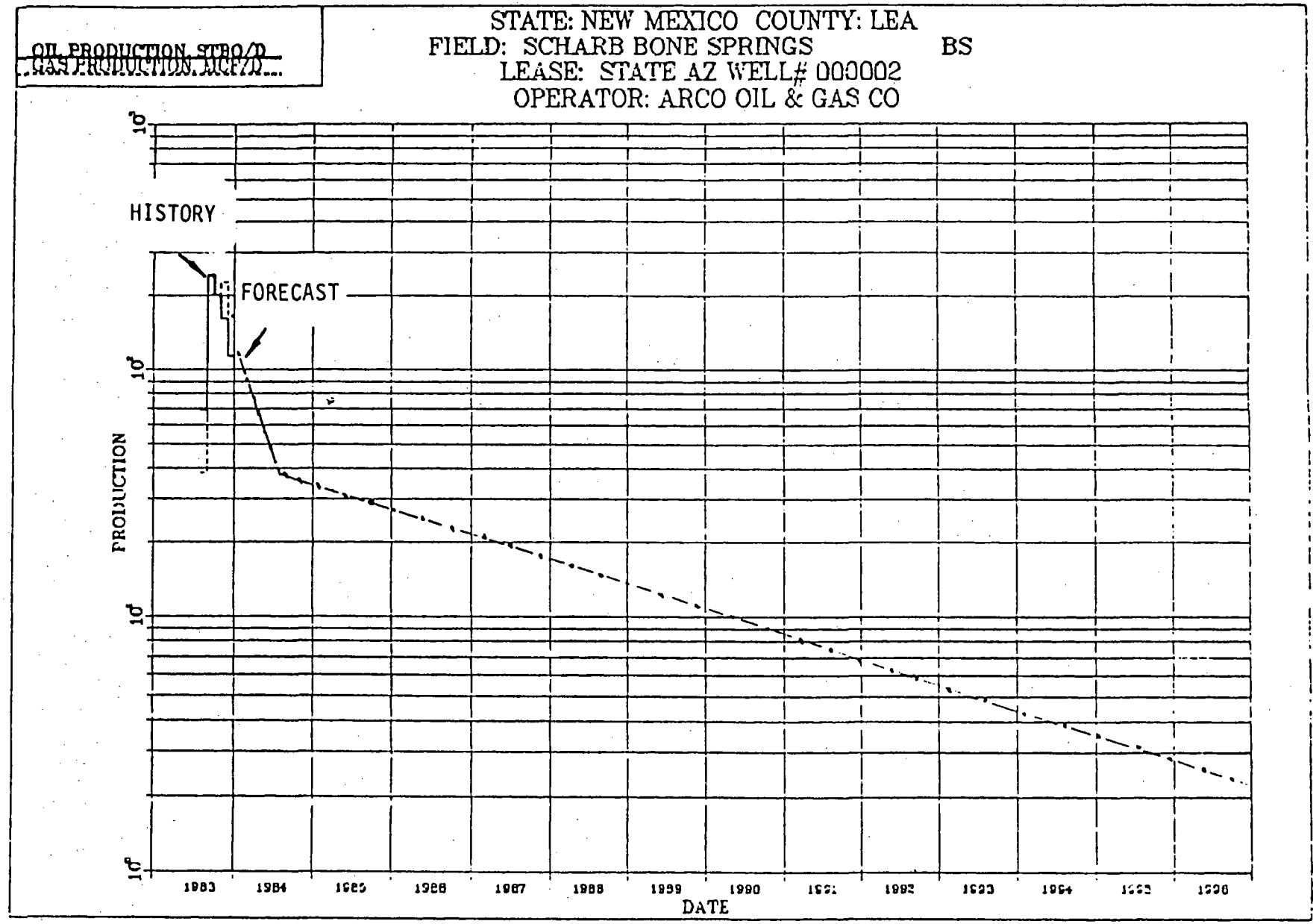
ATTACHMENT VI



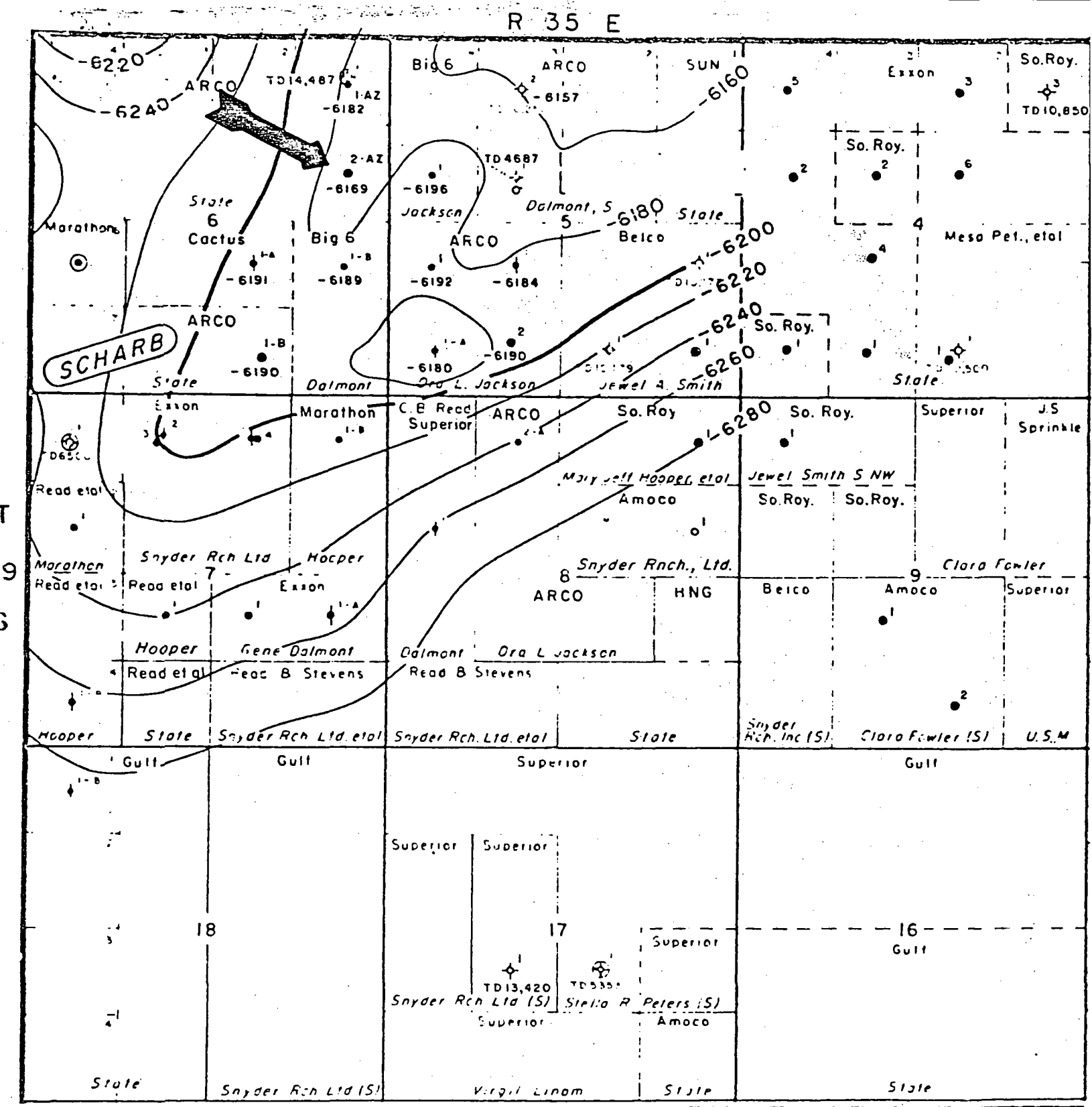

ATTACHMENT VII




ATTACHMENT VIII




ATTACHMENT IX




ATTACHMENT X

ARCO Oil and Gas Company

Permian District Midland, Texas

# SCHARB FIELD

LEA COUNTY, NEW MEXICO

## BONE SPRINGS STRUCTURE

C. I. = 20'

SCALE 1" = 2000'

| | | |
|---|---|---|
| R. FRAGA / SCHNETZLER | Drawn By: | Date 1 - 83 |
| Date 1 - 83 | Approved By: BES | Date 10-6-83 |
| Dist. WEST AREA ENGR | Dwg. No. | |

STATE "AZ" NO. 1
EL. 3924' K.B.
T.D. 10,247'

ARCO Oil and Gas
STATE "AZ" No. 2
EL. 3950.9' K.B.
TD. 10,300'

A

NORTH

GR - SONIC

CAL - LOG

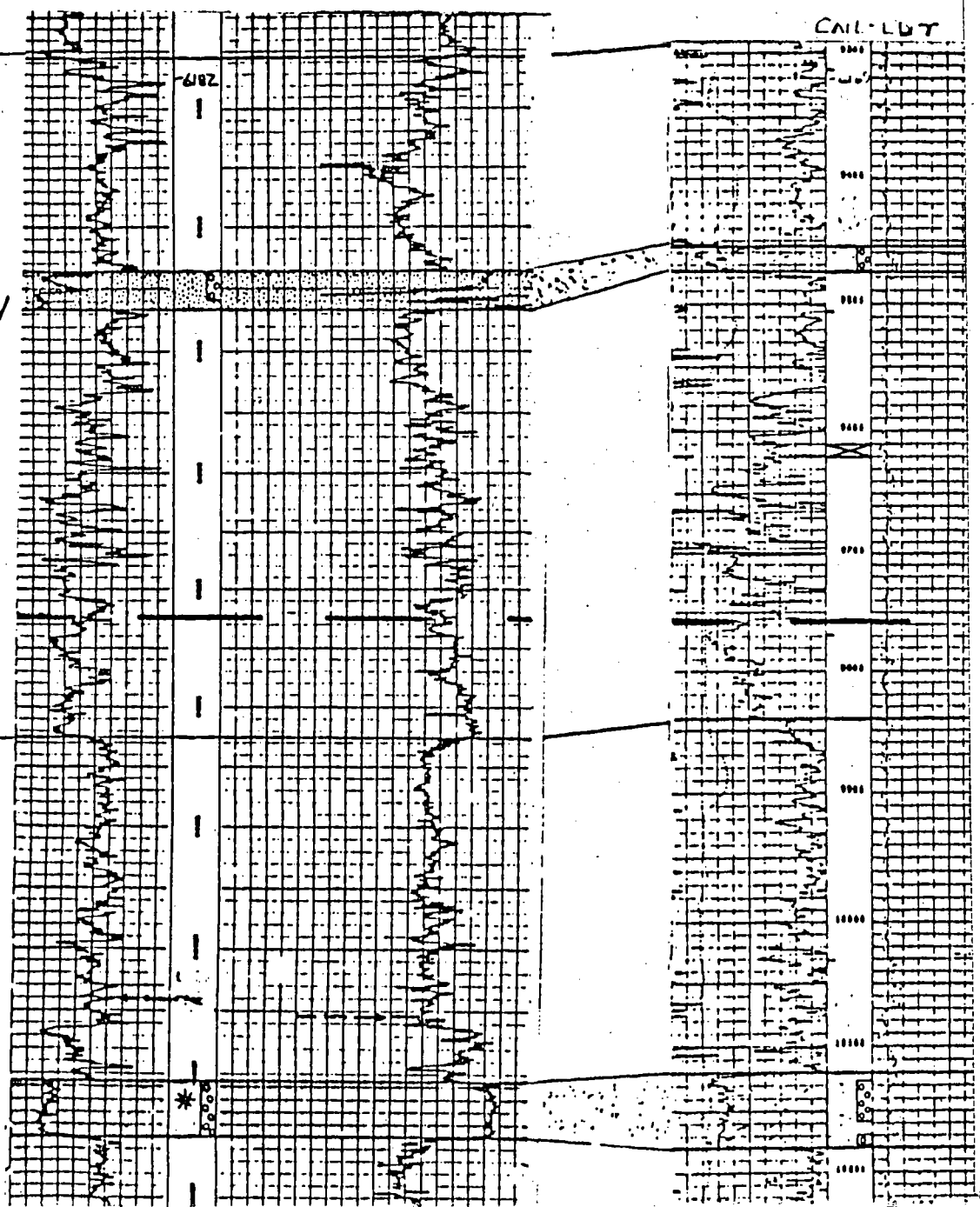
FIRST BONE SPRINGS

UPPER SECTION

-5800' SS

SECOND BONE SPRINGS

LOWER SECTION

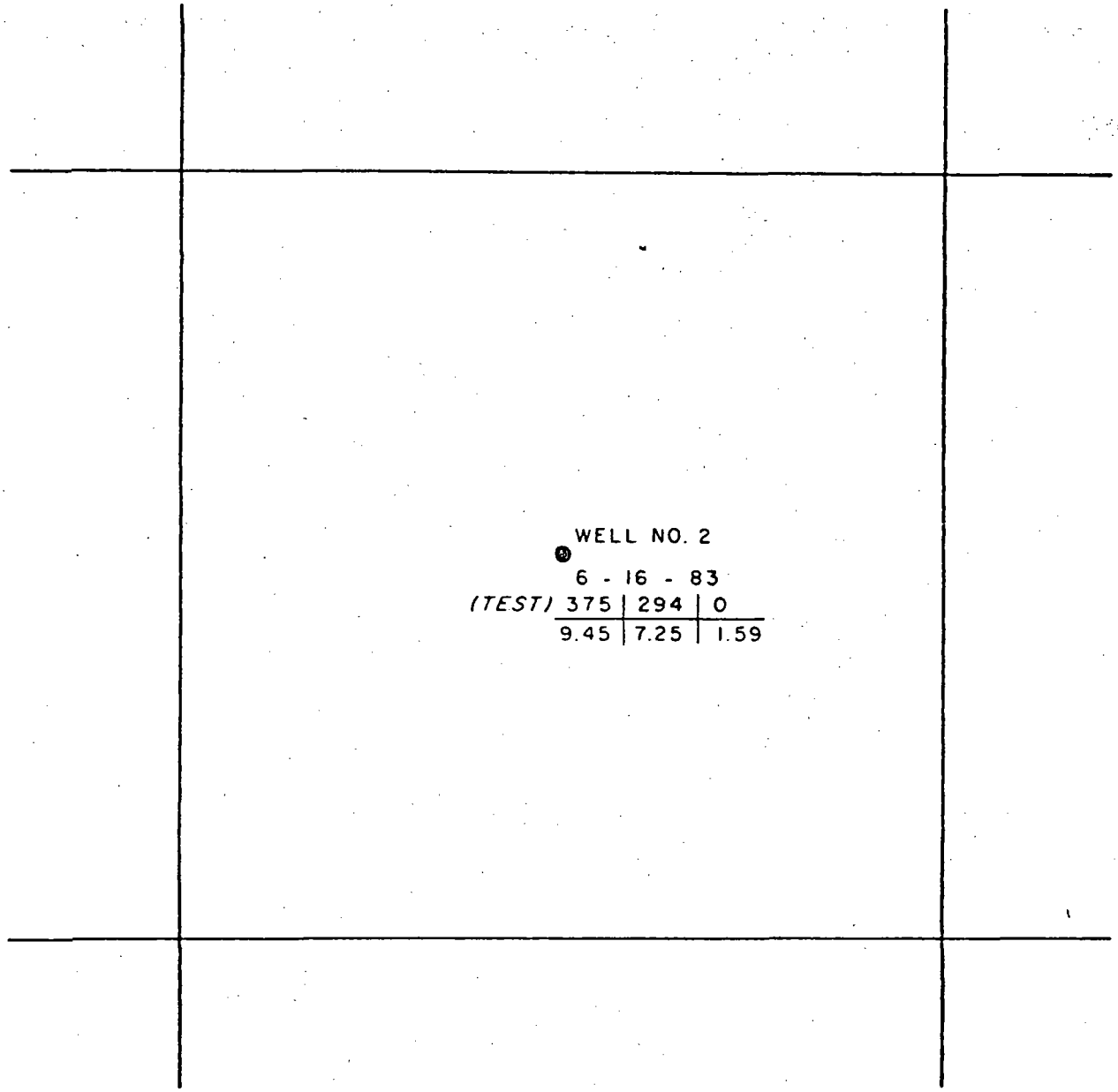


# STATE AZ
# WELL NO. 2

Lea County, New Mexico

SCALE : 1" = 300'

UNIT LETTER H SECTION 6 TOWNSHIP 19 S RANGE 35 E




● SCHARB (BONE SPRINGS)
6-16-83 SPUD DATE

| BOPD | MCFPD | BWPD |
|---|---|---|
| CUM MBO | CUM MMCF | CUM MBW |

CUMULATIVES AS OF 9 - 83

ATTACHMENT XII

ARCO Oil and Gas Company
Permian District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0100

April 16, 1984

CERTIFIED
RETURN RECEIPT
REQUESTED

OFFSET OPERATORS
(Address List Attached)

Gentlemen:

ARCO's State AZ No. 2
Scharb Bone Springs Field
Lea County, New Mexico

This is your notification that ARCO Oil and Gas, as operator of the subject well, is seeking an infill well finding from the Oil Conservation Division of the State of New Mexico. This finding is necessary before casinghead gas from this well can be classified under NGPA Section 103.

Very truly yours,

J. A. Fraga
Sr. Engineer

JAF:sc
Encl.

ATTACHMENT XIII

## OFFSET OPERATORS

Big Six Drilling Company
7500 San Felipe
Houston, Texas 77063

Joseph I. O'Neill, Jr.
P. O. Box 2840
Midland, Texas 79702

TXO Production Corporation
900 Wilco Bldg.
Midland, Texas 79701

Marathon Oil Company
P. O. Box 552
Midland, Texas 79702

AFFIDAVIT BEFORE

NEW MEXICO OIL CONSERVATION DIVISION

IN THE MATTER OF

APPLICATION FOR WELL STATUS DETERMINATION PURSUANT TO SECTION 103 OF THE NATURAL GAS POLICY ACT OF 1978

MAY 4 1984

RECEIVED

AFFIDAVIT

STATE OF TEXAS

COUNTY OF DALLAS

BEFORE ME, the undersigned authority, duly commissioned and qualified within and for the State and County aforesaid, personally came and appeared Dottie J. Martinson (Affiant), Director, Gas Regulations, ARCO Oil and Gas Company, a Division of Atlantic Richfield Company (ARCO), who, being by me first duly sworn, deposed and said:

That application is hereby made to the Oil Conservation Division of the State of New Mexico to determine the status of State AZ No. 2, API No. 30-025-28189 for wellhead pricing purposes pursuant to the rules and regulations of the Oil Conservation Division of the State of New Mexico, the Federal Energy Regulatory Commission, and the Natural Gas Policy Act of 1978.

That in support of the application, Affiant states that:

(1) the surface drilling of the well for which Affiant seeks a determination was begun on or after February 19, 1977;

(2) the Division has altered or granted a waiver of any applicable well-spacing requirements and said well is an infill well drilled in accordance with Administrative Order NSL-(Application Pending).

(3) Affiant has concluded that to the best of Affiant's information, knowledge and belief, the natural gas for which Affiant seeks a determination is produced from a new, onshore production well and that such conclusion is based upon the documents filed with this application.

(4) Affiant has no knowledge of any other information not described in the application which is inconsistent with Affiant's conclusions;

(5) To the best of Affiant's knowledge and belief, all information contained in this application for category determination, pursuant to the NGPA, is true and correct including all documents, testimony and evidence submitted with the application.

Signed Dottie J. Martinson
Dottie J. Martinson

SUBSCRIBED in my presence and duly sworn to before me, this 3rd day of May, 1984.

Notary Public

My Commission Expires: September 1, 1987

State AZ No. 2

Lea County, New Mexico

AR# 46385

"Request for Infill Location"

ARCO Oil and Gas Company
Permian District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0100

April 16, 1984

Mr. Joe D. Ramey
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: State "AZ" No. 2
Infill Location
Scharb Bone Springs Pool
Lea County, New Mexico

Dear Sir:

ARCO Oil and Gas Company requests an administrative finding that the subject well is needed to effectively drain a portion of the reservoir and for the purpose of requesting gas pricing relating to the Section 103 of the Natural Gas Policy Act of 1978. The infill well, the State "AZ" No. 2, is located 1980' FNL and 660' FEL of Section 6, T-19-S, R-35-E, Lea County, New Mexico. The State "AZ" No. 1, the first well on the proration unit, was drilled in 1964. The subject well, the State "AZ" No. 2, was drilled in 1983.

The proration units for the State "AZ" Lease are 80 acres in size and ARCO feels that the State "AZ" No. 1 alone cannot effectively drain the Bone Springs. The State "AZ" No. 2 should ultimately produce 129 MBO that would not otherwise be produced.

Attached is the required information and your prompt attention is appreciated.

Very truly yours,

J. A. Fraga
Sr. Operations/Analytical Engineer

JAF:sc
Atts.

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Rule 7. Not Applicable.

Rule 8. Well histories and wellbore profile.
See Attachments III, IV, V and VI.

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See Attachments X, XI and XII.

b. The current estimated increased ultimate recovery expected is 129 MBO from the opened Bone Springs Section in the State AZ No. 2. The expected increase is 12.1% of the calculated original oil in place in the proration unit. Gas production in association with this oil is 101 MMCF based on a produced gas oil ratio of 784 cu. ft/bbl.

This volume of increased recovery is determined using decline curve analysis and the production history decline of the State AZ No. 1. Historically, the Bone Springs has shown good initial potentials with steep declines during the first producing year. The State AZ No. 1 declined at 60%/year for the first ten months after completion and then declined at 10%/year thereafter (Attachment No. VII). Cumulative production for the State AZ No. 1 up to May, 1983, is 107 MBO with projected remaining reserves of 7 MBO. This projection is for the Upper Bone Spring section and was based on a pump rate of 5 BOPD and an economic limit of 3 BOPD. Estimated ultimate recoverable reserves for the State AZ No. 1 is 114 MBO.

The State AZ No. 2 is expected to produce at a comparable performance decline as the State AZ No. 1. As of January, 1984, the State AZ No. 2 has produced 24 MBO reserves and is producing at 134 BOPD which is two times the initial producing rate of the State AZ No. 1. Therefore, based on the current performance of the State AZ No. 2, the estimated ultimate recoverable reserves of 129 MBO were determined using an an initial stabilized rate of 245 BOPD declined exponentially at 84%/year for one year and then at 12%/year, thereafter, to an economic limit of 3 BOPD (Attachment IX). The 12% rate decline is the average for offset producers in the Scharb Field.

MAY 4 1984
RECEIVED

Rule 9. b. (continued):

Original oil in place in the proration unit was volumetrically determined to be 1.063 MMBO. The open hole logs of the State AZ No's. 1 and 2 were used to obtain the average porosity, water saturation and the feet of net pay. A reservoir volume factor of 1.35 was based on a crude gravity of 38.6% API, a produced gas oil ratio of 784 cu ft/bbl, a gas gravity of 0.6 and a reservoir temperature of 135° F.

Below is a summary of these parameters, OOIP calculations, and ultimate recovery estimates for the State AZ No. 1 and 2:

1) A = area of proration unit = 80 acres
   h = ft. of pay = 25 ft.
   Ø = average porosity = 11.56%
   Sw = average water saturation = 20%
   Bo = formation volume factor = 1.35 RVB/STB

2) $OOIP = \frac{7758\ Ah\emptyset(1 - Sw)}{Bo}$

$$= \frac{7758(80)(25)(.1156)(1 - .20)}{1.35} = \underline{1.063\ MMBO}$$

3) Ult. Rec.

Well #1 = 114 MBO or 10.7% of OOIP

Ult. Rec.

Well #2 = 129 MBO or 12.1% of OOIP

Based on the aforementioned information, the drilling of the State AZ No. 2 was necessary for the effective depletion of the proration unit.

c. Other supporting data:

1) N/A
2) Production decline curves - see Attachments VII, VIII and IX.
3) N/A

Rule 10. Duplicate applications are submitted.

Rule 11. A copy of certified mailing to operators of offset spacing units is shown as Attachment XIII.

NEW MEXICO OIL CONSERVATION COMMISSION

Form C-101
Revised 1-1-65

| | |
|---|---|
| LE | |
| S.G.S. | |
| ND OFFICE | |
| ERATOR | |

5A. Indicate Type of Lease: STATE [X] FEE [ ]

5. State Oil & Gas Lease No.: NM-899

## APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

Type of Work

Type of Well: DRILL [X] DEEPEN [ ] PLUG BACK [ ]

OIL WELL [X] GAS WELL [ ] OTHER SINGLE ZONE [X] MULTIPLE ZONE [ ]

7. Unit Agreement Name:

8. Farm or Lease Name: State AZ

Name of Operator: ARCO Oil and Gas Company
Division of Atlantic Richfield Company

9. Well No.: 2

Address of Operator: P. O. Box 1710, Hobbs, New Mexico 88240

10. Field and Pool, or Wildcat: Scharb Bone Springs

Location of Well: UNIT LETTER H LOCATED 1980 FEET FROM THE North LINE

660 FEET FROM THE East LINE OF SEC. 6 TWP. 19S RGE. 35E NMPM

12. County: Lea

| 19. Proposed Depth | 19A. Formation | 20. Rotary or C.T. |
|---|---|---|
| 10,300' | Bone Springs | Rotary |

| Elevations (Show whether DF, RT, etc.) | 21A. Kind & Status Plug. Bond | 21B. Drilling Contractor | 22. Approx. Date Work will start |
|---|---|---|---|
| 930.59' GL | GCA #8 | Not selected | 4/20/83 |

### PROPOSED CASING AND CEMENT PROGRAM

| SIZE OF HOLE | SIZE OF CASING | WEIGHT PER FOOT | SETTING DEPTH | SACKS OF CEMENT | EST. TOP |
|---|---|---|---|---|---|
| 2" | Conductor Pipe | 20" | 30' | 2½ yds Redi-mix | Surf |
| 7½" | 13-3/8" OD | 54.5# K-55 | 400' | 375 sx | Circ to surf |
| 1" | 8-5/8" OD | 28# S-80 | 4000' | 1525 sx | Circ to surf |
| -7/8" | 5½" OD | 15.5#, 17# K-55 | 10,300' | 675 sx | 8500' |

ropose to drill a development well to test the producing capabilities of Bone Springs ormation and recover remaining reserves. If completed as a producer, allowable is to e shared with State AZ #1 on an 80-acre proration unit.

RECEIVED
MAR 11 1983
CENTRAL FILES

APPROVAL VALID FOR 180 DAYS
PERMIT EXPIRES 10/6/83
UNLESS DRILLING UNDERWAY

IVE ZONE: DESCRIBE PROPOSED PROGRAM: IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOWOUT PREVENTER PROGRAM, IF ANY.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Signed: Richard E. Bullock Title: Drlg. Engr. Date: 3/31/83

(This space for State Use)

APPROVED BY: ORIGINAL SIGNED BY JERRY SEXTON DISTRICT I SUPERVISOR Title: _____ Date: MAR 6 1983

CONDITIONS OF APPROVAL, IF ANY:

ATTACHMENT I

Div. of Atlantic Richfield Co.

ARCO OIL & GAS Co. | STATE AZ | 2

| | | | |
|---|---|---|---|
| H | 6 | 19S | 35E | LEA |

1930 NORTH 660 EAST

| | | | |
|---|---|---|---|
| 3930.59 | Bone Springs | Scharb | 80 Acres |

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

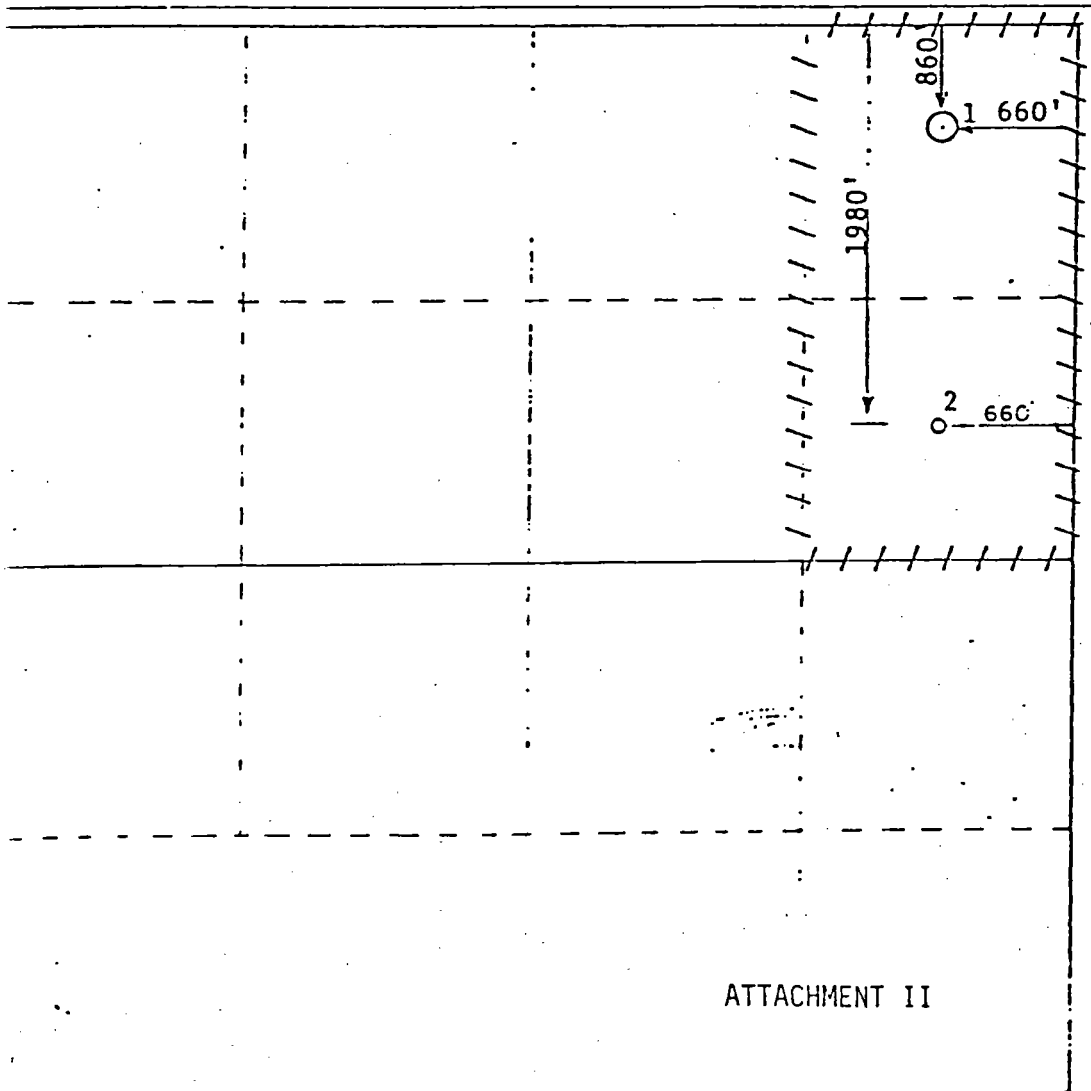
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

Yes No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, force-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.




ATTACHMENT II

CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Robert E. Ballinger

Drlg. Engr.

ARCO Oil and Gas Co.
Div of Atlantic Richfield Co.

3/31/83

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

MARCH 29, 1983

Certificate No. JOHN W. WEST 676

ATTACHMENT III

MAY 4 1984

RECEIVED

a. State AZ No. 1
860' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 7-31-64

c: Completion Date: 9-17-64

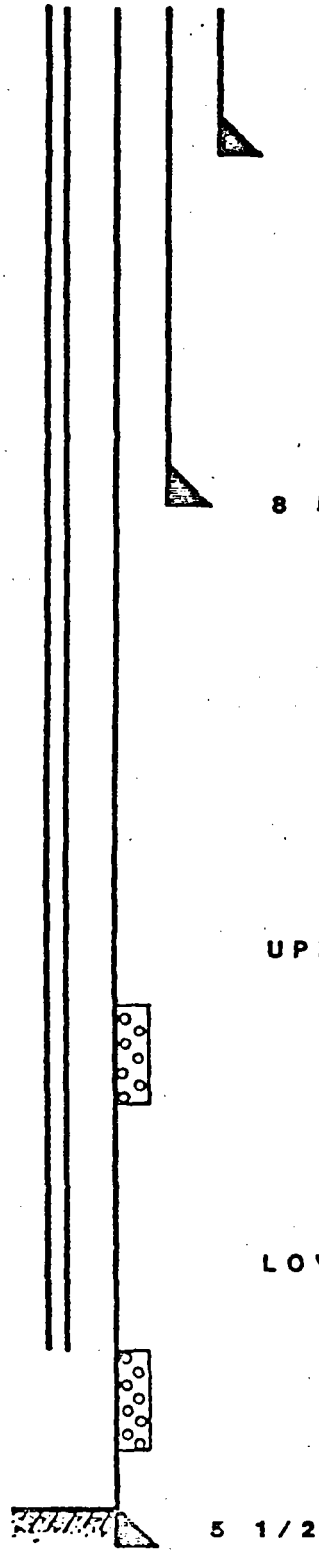
d. No mechanical problems experienced.

e. Current rate of production, December, 1983: 20 BOPD + 5 MCFPD

f. Producing well, not plugged.

g. The current performance of the State AZ No. 2 to date clearly supports the fact that the No. 2 well was necessary for the effective depletion of the proration unit (Attachment IX). The production decline curve on its north offset, ARCO's State AZ No. 1, also shows that its rate performance has not been affected with the completion of the State AZ No. 2 to the Upper Bone Springs section (Attachment VIII). The upper section has been the main producing interval on the State AZ lease since development in 1964. A lower section was tested in the State AZ No. 1 but could not be produced because of the poor stimulation response after a sand fracture treatment; therefore, the well was plugged back to the upper section. In May, 1983, a re-entry attempt and re-stimulation using higher strength proppant resulted in a successful workover to the lower section. The production graph (Attachment VIII) shows that the lower section will contribute some new reserves but of a smaller volume compared to the more prolific recovery expected from the upper section. In the drilling of the State AZ No. 2, the lower section was considered as a secondary objective. Currently, the State AZ No. 2 is producing from the upper Bone Springs section only and has the lower section isolated with a bridge plug. The lower section was opened in the AZ No. 2 and swabbed oil but is not expected to be a prolific interval due to the tight reservoir matrix. Attachments IV and VII show the present downhole status of both wells.

# STATE "AZ" NO. 1
## WELL PROFILE



13 3/8" 48# H-40 at 414' w/400 Sxs Circ

8 5/8" 24#, 32# K-55, H-40 at 3997' w/2050 Sxs

UPPER BONE SPRINGS: Perfs at 9437-62' (2 JSPF)
Acidized w/2000 Gals
IPF 351 BOPD on 10-8-64

Re-enter on May, 1983

LOWER BONE SPRINGS: Perfs at 10,106-150' (4 JSPF)
-178 Holes
Fracture Treated w/ 34,700 Gals
and 41,000 # 20/40 Interprod
After: Est 10 BOPD
Before: 0 BOPD

5 1/2" 15.5#, 17# J-55, N-80 at 10,247' w/180 Sxs

PBD at 10,163'

ATTACHMENT IV

# ATTACHMENT V

a. State AZ No. 2
1980' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 6-16-83

c. Completion Date: 8-24-83

d. No mechanical problems experienced.

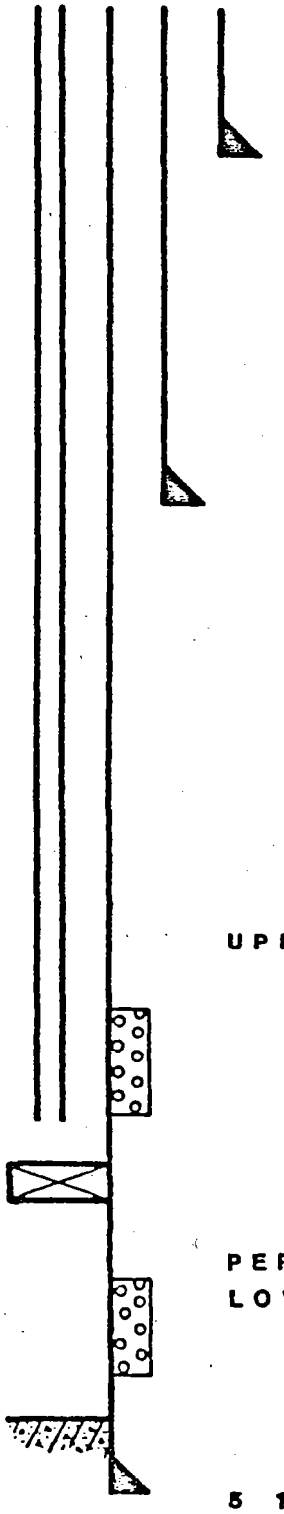
e. Current rate of production, December, 1983: 135 BOPD + 193 MCFPD.

f. Producing well, not plugged.

g. See Attachment III.

# STATE "AZ" NO. 2

## WELL PROFILE



13 3/8" 54.5# K-55 at 403' w/500 sxs Circ

8 5/8" 28# S-80 at 4000' w/1600 sxs

UPPER BONE SPRINGS: 9457 - 9476' (20 Holes)
Acid 8000 Gals 20% Titan X-L
with 25% CO2
IPF 375 BO-294 MCFPD
8/24/83

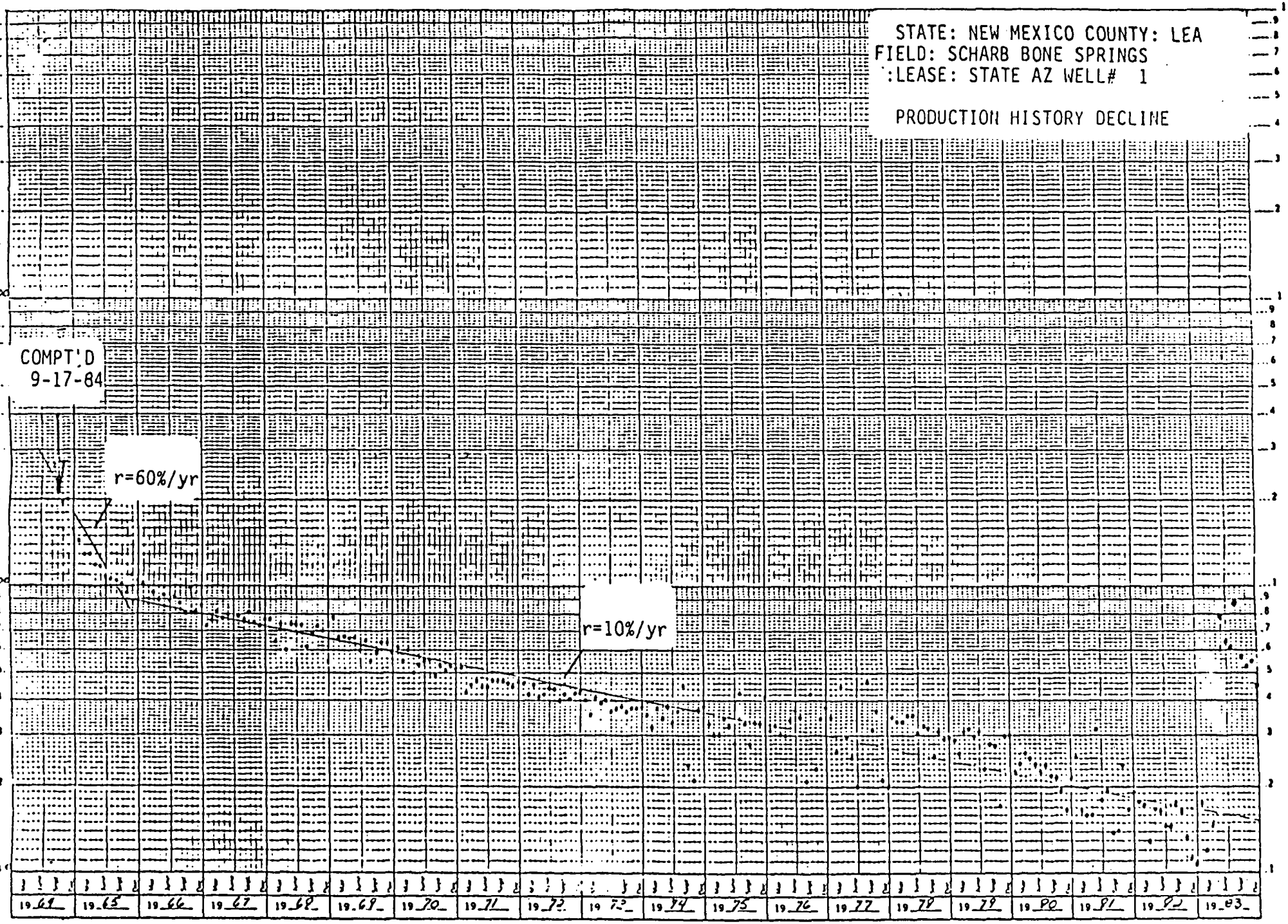
PERMANENT BRIDGE PLUG AT at 9615'

LOWER BONE SPRINGS: 10,128-161' &
10,170-178' (IJSPF)
Acid 3000 Gals
Swabbed Oil & Load Water
Est. Rate at 10 BOPD

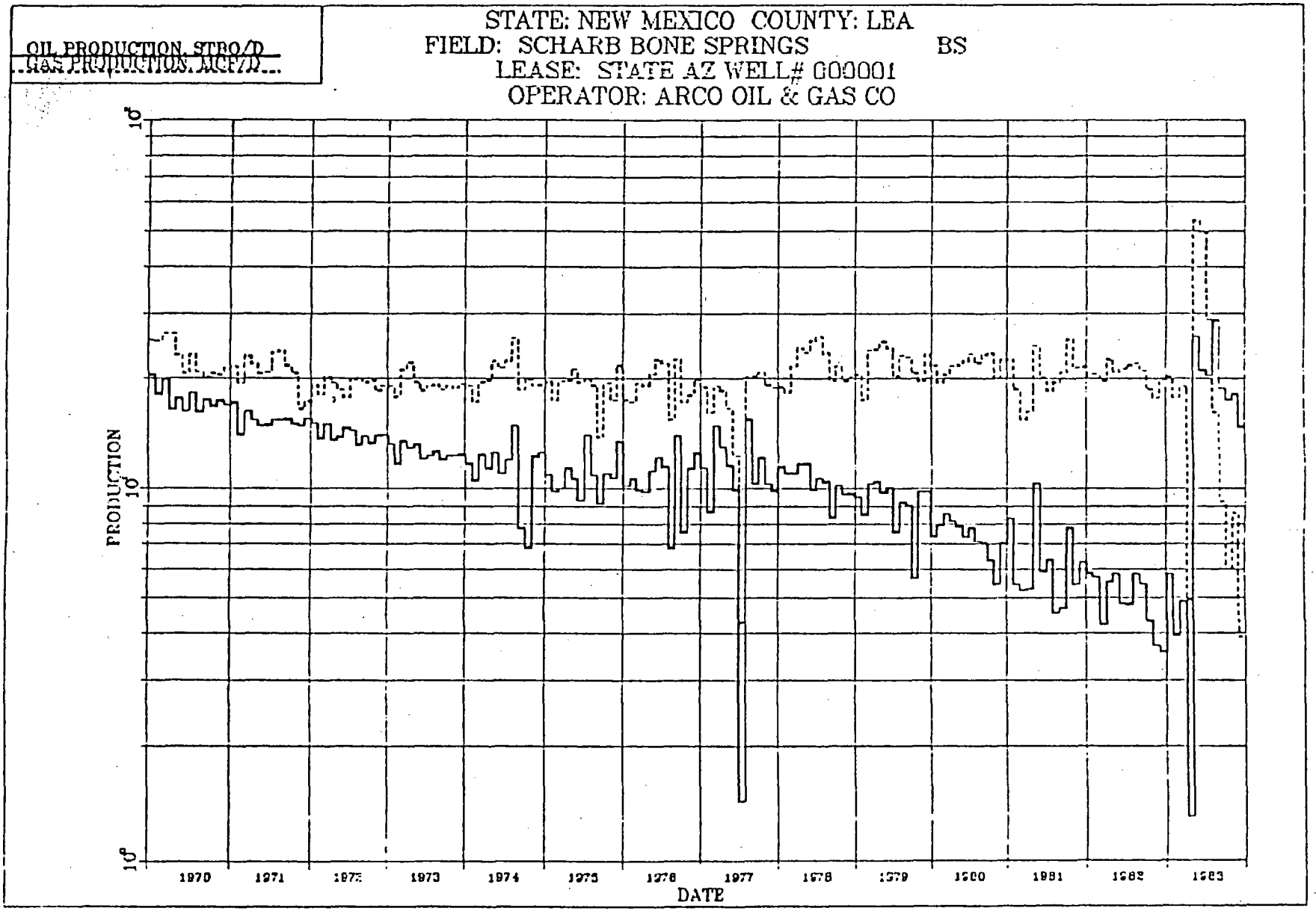
5 1/2" 15.5# & 17# K-55 at 10,300' w/ 1700Sxs

PBD at 10,220'

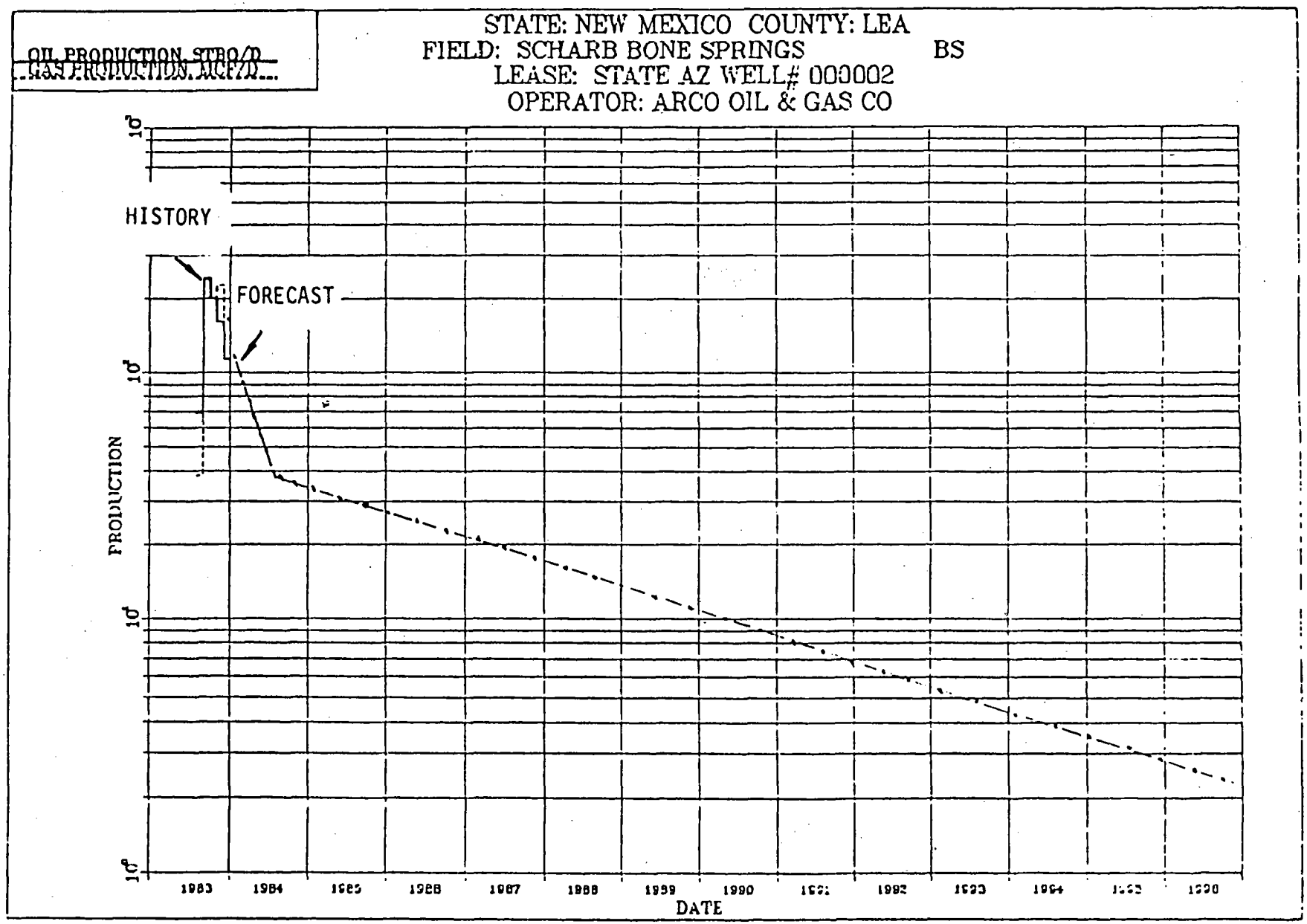
ATTACHMENT VI



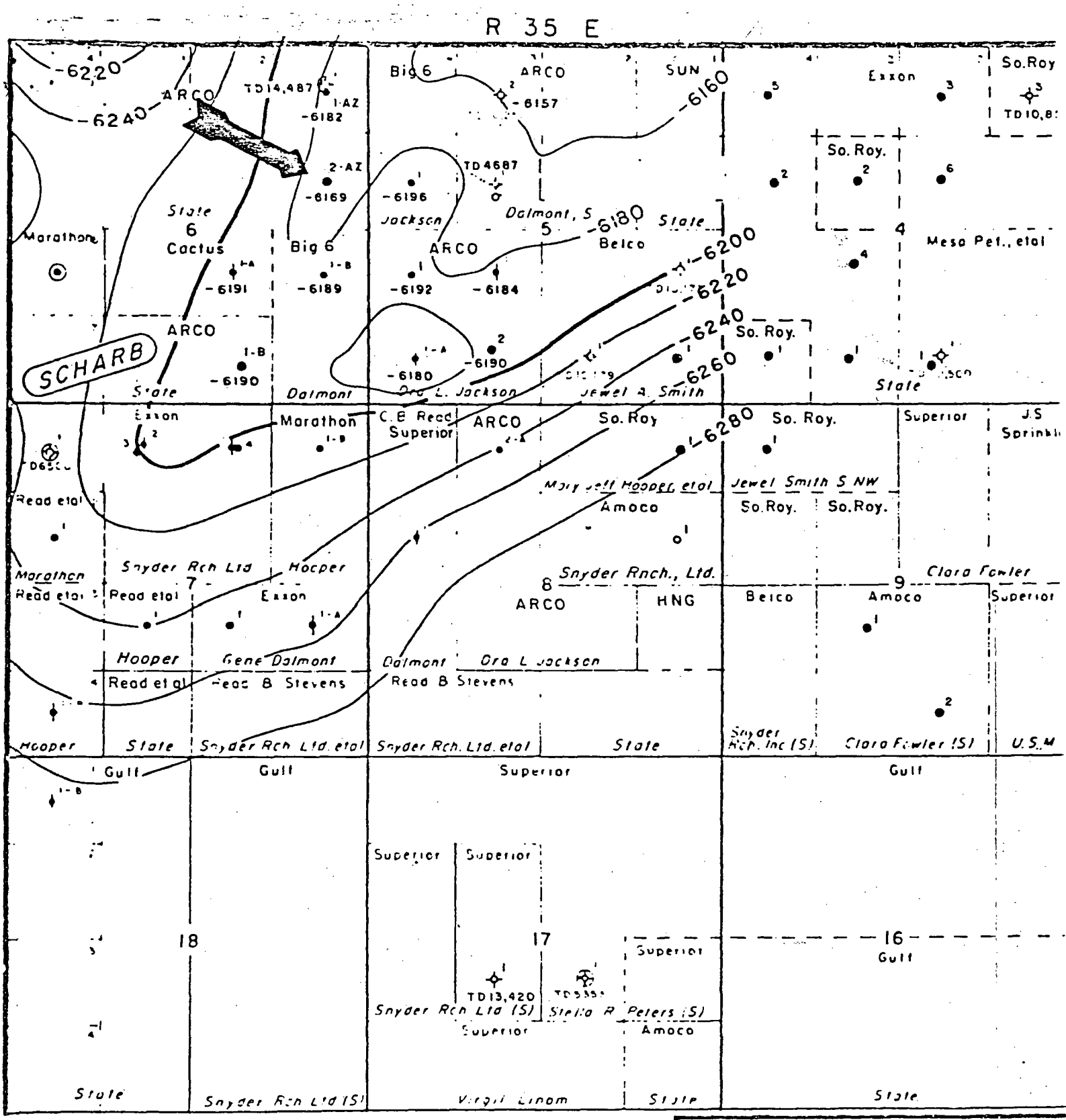

ATTACHMENT VII




ATTACHMENT VIII




ATTACHMENT IX




ATTACHMENT X

ARCO Oil and Gas Company

Permian District Midland, Texas

# SCHARB FIELD

LEA COUNTY, NEW MEXICO

## BONE SPRINGS STRUCTURE

C. I. = 20'

SCALE 1" = 2000'

| | | |
|---|---|---|
| R. FRAGA/SCHNETZLER | Drawn By: | Date: 1-83 |
| Date: 1-83 | Reviewed By: BES | Date: 10-6-83 |
| WEST AREA ENGR | Dwg. No. | |

STATE AZ NO. 1
EL. 3924' K.B.
T.D. 10,247'

STATE "AZ" No. 2
EL. 3950.9' K.B.
TD. 10,300'

A
NORTH

GR - SONIC

CNL - LDT

A'
SOUTH

FIRST BONE SPRINGS

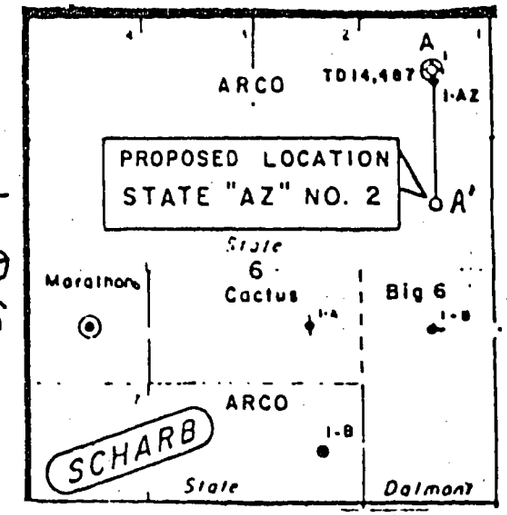
UPPER SECTION

-5800' SS

SECOND BONE SPRINGS

LOWER SECTION

INDEX MAP
R 35 E




ARCO Oil and Gas Company
Permian District Midland, Texas

SCHARB FIELD
Lea County, New Mexico

CROSS SECTION A-A'

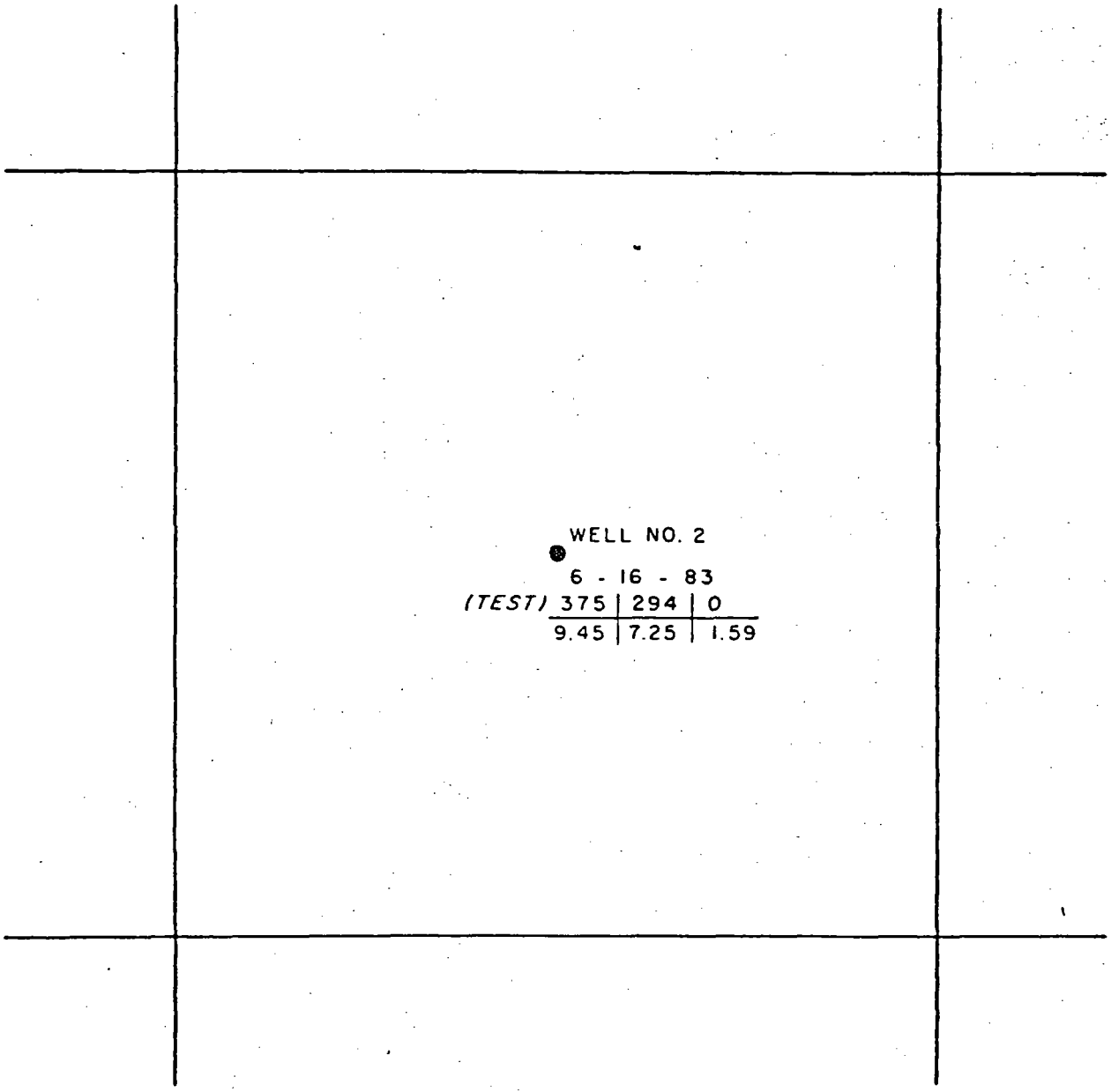
ATTACHMENT XI

TONY FRAGA

# STATE AZ
# WELL NO. 2

Lea County, New Mexico
SCALE : 1" = 300'

UNIT LETTER H SECTION 6 TOWNSHIP 19 S RANGE 35 E




● SCHARB (BONE SPRINGS)
6-16-83 SPUD DATE

| BOPD | MCFPD | BWPD |
|---|---|---|
| CUM MBO | CUM MMCF | CUM MBW |

CUMULATIVES AS OF 9 - 83

ATTACHMENT XII

ARCO Oil and Gas Company
Permian District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0100

April 16, 1984

CERTIFIED
RETURN RECEIPT
REQUESTED

OFFSET OPERATORS
(Address List Attached)

Gentlemen:

ARCO's State AZ No. 2
Scharb Bone Springs Field
Lea County, New Mexico

This is your notification that ARCO Oil and Gas, as operator of the subject well, is seeking an infill well finding from the Oil Conservation Division of the State of New Mexico. This finding is necessary before casinghead gas from this well can be classified under NGPA Section 103.

Very truly yours,

J. A. Fraga
Sr. Engineer

JAF:sc
Encl.

ATTACHMENT XIII

## OFFSET OPERATORS

Big Six Drilling Company
7500 San Felipe
Houston, Texas 77063

Joseph I. O'Neill, Jr.
P. O. Box 2840
Midland, Texas 79702

TXO Production Corporation
900 Wilco Bldg.
Midland, Texas 79701

Marathon Oil Company
P. O. Box 552
Midland, Texas 79702

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
P. O. Box 2088
SANTA FE, NEW MEXICO
87501

Application Received 4/23/84
ADMINISTRATIVE ORDER
NFL 89

INFILL DRILLING FINDINGS PURSUANT TO
SECTION 271.305(b) OF THE FEDERAL ENERGY REGULATORY
COMMISSION REGULATIONS, NATURAL GAS POLICY ACT OF 1978
AND OIL CONSERVATION DIVISION ORDER NO. R-6013-A

I.

Operator ARCO Oil & Gas Company Well Name and No. State "AZ" Well No. 2

Location: Unit H Sec. 6 Twp. 19 South Rng. 35 East Cty. Lea

II.

THE DIVISION FINDS:

(1) That Section 271.305(b) of the Federal Energy Regulatory Commission Regulations promulgated pursuant to the Natural Gas Policy Act of 1978 provides that, in order for an infill well to qualify as a new onshore production well under Section 103 of said Act, the Division must find that the infill well is necessary to effectively and efficiently drain a portion of the reservoir covered by the proration unit which cannot be so drained by any existing well within that unit.

(2) That by Order No. R-6013-A, dated February 8, 1980, the Division established an administrative procedure whereby the Division Director and the Division Examiners are empowered to act for the Division and find that an infill well is necessary.

(3) That the well for which a finding is sought is completed in the Scharb-Bone Springs Pool, and the standard spacing unit in said pool is 80 acres.

(4) That a 80 -acre proration unit comprising the E/2 NE/4 of Sec. 6, Twp. 19 South, Rng. 35 East, is currently dedicated to the State "AZ" Well No. 1 located in Unit A of said section.

(5) That this proration unit is (✓) standard ( ) nonstandard; if nonstandard, said unit was previously approved by Order No. NA.

(6) That said proration unit is not being effectively and efficiently drained by the existing well(s) on the unit.

(7) That the drilling and completion of the well for which a finding is sought should result in the production of an additional 101,000 MCF of gas from the proration unit which would not otherwise be recovered.

(8) That all the requirements of Order No. R-6013-A have been complied with, and that the well for which a finding is sought is necessary to effectively and efficiently drain a portion of the reservoir covered by said proration unit which cannot be so drained by any existing well within the unit.

(9) That in order to permit effective and efficient drainage of said proration unit, the subject application should be approved.

IT IS THEREFORE ORDERED:

(1) That the applicant is hereby authorized to drill the well described in Section I above as an infill well on the existing proration unit described in Section II(4) above. The authorization for infill drilling granted by this order is necessary to permit the drainage of a portion of the reservoir covered by said proration unit which cannot be effectively and efficiently drained by any existing well thereon.

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

DONE at Santa Fe, New Mexico, on this _____ day of _____, 19_____.

DIVISION DIRECTOR ___ EXAMINER ___

**ARCO Oil and Gas Company**
Permian District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0100



April 16, 1984

Mr. Joe D. Ramey
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: State "AZ" No. 2
Infill Location
Scharb Bone Springs Pool
Lea County, New Mexico

Dear Sir:

ARCO Oil and Gas Company requests an administrative finding that the subject well is needed to effectively drain a portion of the reservoir and for the purpose of requesting gas pricing relating to the Section 103 of the Natural Gas Policy Act of 1978. The infill well, the State "AZ" No. 2, is located 1980' FNL and 660' FEL of Section 6, T-19-S, R-35-E, Lea County, New Mexico. The State "AZ" No. 1, the first well on the proration unit, was drilled in 1964. The subject well, the State "AZ" No. 2, was drilled in 1983.

The proration units for the State "AZ" Lease are 80 acres in size and ARCO feels that the State "AZ" No. 1 alone cannot effectively drain the Bone Springs. The State "AZ" No. 2 should ultimately produce 129 MBO that would not otherwise be produced.

Attached is the required information and your prompt attention is appreciated.

Very truly yours,

J. A. Fraga
Sr. Operations/Analytical Engineer

JAF:sc
Atts.

D. Filing Requirements

Rule 5. Forms C-101 and C-102. See Attachments I and II.

Rule 6. Scharb Bone Springs, 80 acre spacing.

Rule 7. Not Applicable.

Rule 8. Well histories and wellbore profile.
See Attachments III, IV, V and VI.

Rule 9. a. Formation Structure Map and Well Cross Section.
See Attachments X, XI and XII.

b. The current estimated increased ultimate recovery expected is 129 MBO from the opened Bone Springs Section in the State AZ No. 2. The expected increase is 12.1% of the calculated original oil in place in the proration unit. Gas production in association with this oil is 101 MMCF based on a produced gas oil ratio of 784 cu. ft/bbl.

This volume of increased recovery is determined using decline curve analysis and the production history decline of the State AZ No. 1. Historically, the Bone Springs has shown good initial potentials with steep declines during the first producing year. The State AZ No. 1 declined at 60%/year for the first ten months after completion and then declined at 10%/year thereafter (Attachment No. VII). Cumulative production for the State AZ No. 1 up to May, 1983, is 107 MBO with projected remaining reserves of 7 MBO. This projection is for the Upper Bone Spring section and was based on a pump rate of 5 BOPD and an economic limit of 3 BOPD. Estimated ultimate recoverable reserves for the State AZ No. 1 is 114 MBO.

The State AZ No. 2 is expected to produce at a comparable performance decline as the State AZ No. 1. As of January, 1984, the State AZ No. 2 has produced 24 MBO reserves and is producing at 134 BOPD which is two times the initial producing rate of the State AZ No. 1. Therefore, based on the current performance of the State AZ No. 2, the estimated ultimate recoverable reserves of 129 MBO were determined using an an initial stabilized rate of 245 BOPD declined exponentially at 84%/year for one year and then at 12%/year, thereafter, to an economic limit of 3 BOPD (Attachment IX). The 12% rate decline is the average for offset producers in the Scharb Field.

Rule 9. b. (continued):

Original oil in place in the proration unit was volumetrically determined to be 1.063 MMBO. The open hole logs of the State AZ No's. 1 and 2 were used to obtain the average porosity, water saturation and the feet of net pay. A reservoir volume factor of 1.35 was based on a crude gravity of 38.6% API, a produced gas oil ratio of 784 cu ft/bbl, a gas gravity of 0.6 and a reservoir temperature of 135° F.

Below is a summary of these parameters, OOIP calculations, and ultimate recovery estimates for the State AZ No. 1 and 2:

1) A = area of proration unit = 80 acres
   h = ft. of pay = 25 ft.
   Ø = average porosity = 11.56%
   Sw = average water saturation = 20%
   Bo = formation volume factor = 1.35 RVB/STB

2) $$OOIP = \frac{7758\ AhØ(1 - Sw)}{Bo}$$

$$= \frac{7758(80)(25)(.1156)(1 - .20)}{1.35} = \underline{1.063\ MMBO}$$

3) Ult. Rec.

Well #1 = 114 MBO or 10.7% of OOIP

Ult. Rec.

Well #2 = 129 MBO or 12.1% of OOIP

Based on the aforementioned information, the drilling of the State AZ No. 2 was necessary for the effective depletion of the proration unit.

c. Other supporting data:

1) N/A
2) Production decline curves - see Attachments VII, VIII and IX.
3) N/A

Rule 10. Duplicate applications are submitted.

Rule 11. A copy of certified mailing to operators of offset spacing units is shown as Attachment XIII.

NEW MEXICO OIL CONSERVATION COMMISSION

| | | |
|---|---|---|
| SANTA FE | | |
| FILE | | |
| U.S.G.S. | | |
| LAND OFFICE | | |
| OPERATOR | | |

Form C-101
Revised 1-1-65

5A. Indicate Type of Lease: STATE [X] FEE [ ]

5. State Oil & Gas Lease No.: NM-899

## APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. Type of Work

b. Type of Well: DRILL [X] DEEPEN [ ] PLUG BACK [ ]
OIL WELL [X] GAS WELL [ ] OTHER SINGLE ZONE [X] MULTIPLE ZONE [ ]

7. Unit Agreement Name:

8. Farm or Lease Name: State AZ

2. Name of Operator: ARCO Oil and Gas Company
Division of Atlantic Richfield Company

9. Well No.: 2

3. Address of Operator: P. O. Box 1710, Hobbs, New Mexico 88240

10. Field and Pool, or Wildcat: Scharb Bone Springs

4. Location of Well: UNIT LETTER H LOCATED 1980 FEET FROM THE North LINE
AND 660 FEET FROM THE East LINE OF SEC. 6 TWP. 19S RGE. 35E NMPM

12. County: Lea

| 19. Proposed Depth | 19A. Formation | 20. Rotary or C.T. |
|---|---|---|
| 10,300' | Bone Springs | Rotary |

| 21. Elevations (Show whether DF, RT, etc.) | 21A. Kind & Status Plug. Bond | 21B. Drilling Contractor | 22. Approx. Date work will start |
|---|---|---|---|
| 3930.59' GL | GCA #8 | Not selected | 4/20/83 |

23. PROPOSED CASING AND CEMENT PROGRAM

| SIZE OF HOLE | SIZE OF CASING | WEIGHT PER FOOT | SETTING DEPTH | SACKS OF CEMENT | EST. TOP |
|---|---|---|---|---|---|
| 32" | Conductor Pipe | 20" | 30' | 2½ yds Redi-mix | Surf |
| 17½" | 13-3/8" OD | 54.5# K-55 | 400' | 375 sx | Circ to surf |
| 11" | 8-5/8" OD | 28# S-80 | 4000' | 1525 sx | Circ to surf |
| 7-7/8" | 5½" OD | 15.5#, 17# K-55 | 10,300' | 675 sx | 8500' |

Propose to drill a development well to test the producing capabilities of Bone Springs formation and recover remaining reserves. If completed as a producer, allowable is to be shared with State AZ #1 on an 80-acre proration unit.

RECEIVED
APR 11 1983
CENTRAL FILES

APPROVAL VALID FOR 150 DAYS
PERMIT EXPIRES 10/6/83
UNLESS DRILLING UNDERWAY

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOWOUT PREVENTER PROGRAM, IF ANY.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Signed Robert E. Bellinger Title Drlg. Engr. Date 3/31/83

Hobbs
Dallas
Ct. Mo.

(This space for State Use)

APPROVED BY ORIGINAL SIGNED BY JERRY SEXTON DISTRICT I SUPERVISOR TITLE _____ DATE MAR 6 1983

CONDITIONS OF APPROVAL, IF ANY:

ATTACHMENT I

NEW MEXICO OIL CONSERVATION COMMISSION
WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C-102
Revised 10-1-78

All distances must be from the outer boundaries of the Section

| | | | |
|---|---|---|---|
| Operator: Div. of Atlantic Richfield Co. ARCO OIL & GAS Co. | | Lease: STATE AZ | Well No.: 2 |
| Unit Letter: H | Section: 6 | Township: 19S | Range: 35E | County: LEA |
| Actual Footage Location: 1930 feet from the NORTH line and 660 feet from the EAST line | | | |
| Ground Level Elev.: 3930.59 | Producing Formation: Bone Springs | Pool: Scharb | Dedicated Acreage: 80 Acres |

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

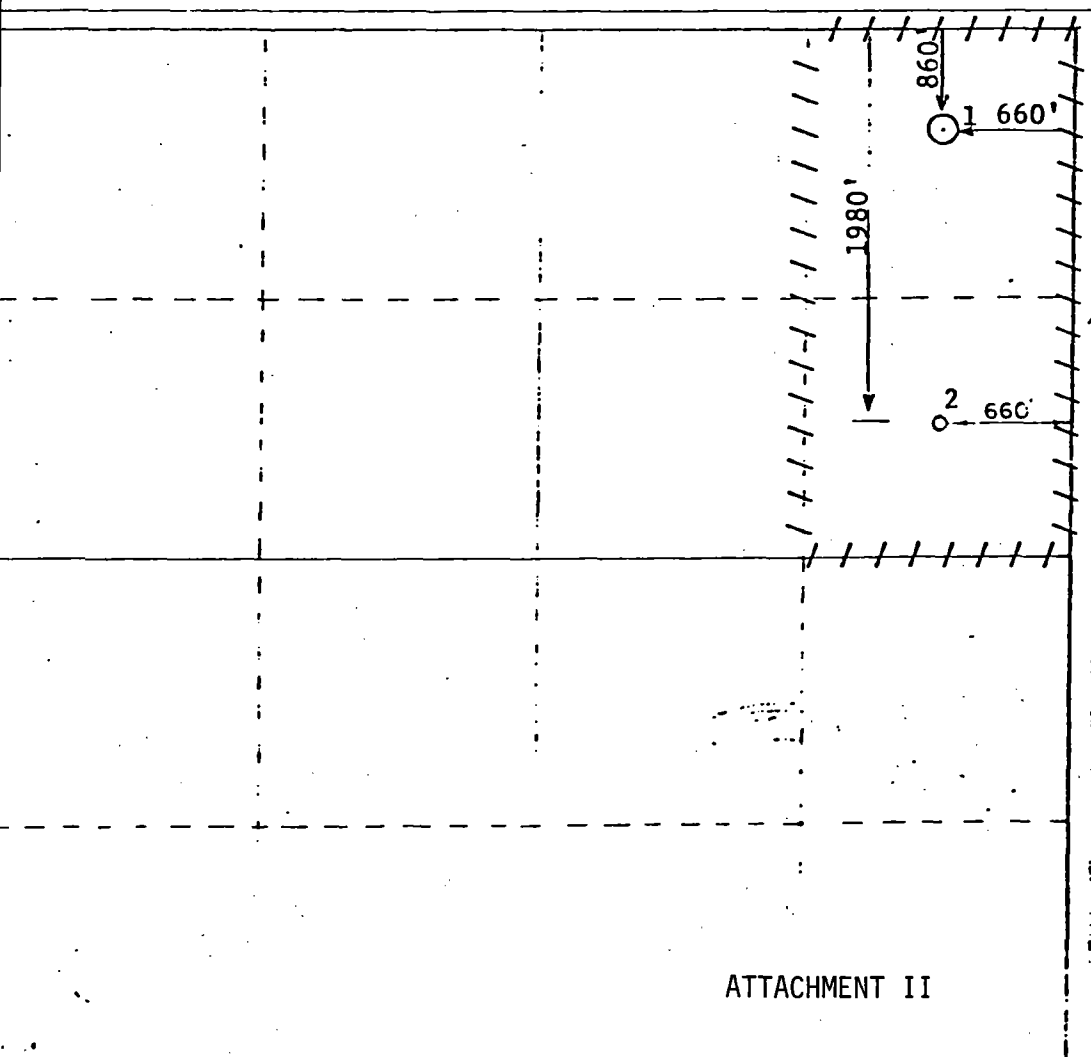
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

Yes No If answer is "yes," type of consolidation _____

If answer is "no" list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.




ATTACHMENT II

CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief

Name: Robert E. Baldridge
Position: Drlg. Engr.
Company: ARCO Oil and Gas Co. Div of Atlantic Richfield Co.
Date: 3/31/83

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief

Date Surveyed: MARCH 29, 1983
Registered Professional Engineer and/or Land Surveyor
Certificate No.: JOHN W. WEST 676

# ATTACHMENT III

a. State AZ No. 1
860' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 7-31-64

c: Completion Date: 9-17-64

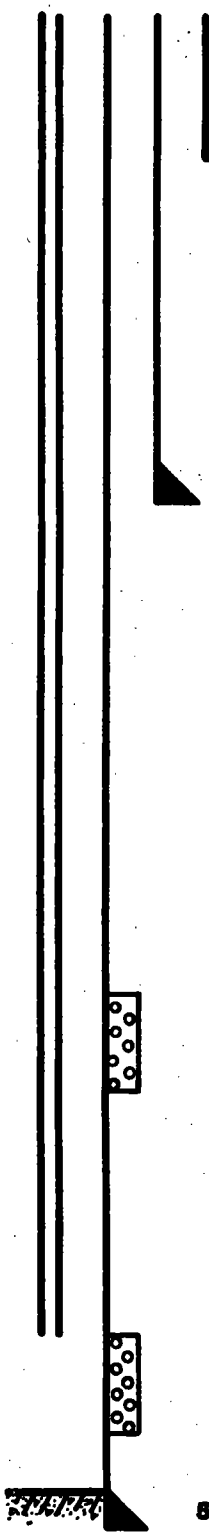
d. No mechanical problems experienced.

e. Current rate of production, December, 1983: 20 BOPD + 5 MCFPD

f. Producing well, not plugged.

g. The current performance of the State AZ No. 2 to date clearly supports the fact that the No. 2 well was necessary for the effective depletion of the proration unit (Attachment IX). The production decline curve on its north offset, ARCO's State AZ No. 1, also shows that its rate performance has not been affected with the completion of the State AZ No. 2 to the Upper Bone Springs section (Attachment VIII). The upper section has been the main producing interval on the State AZ lease since development in 1964. A lower section was tested in the State AZ No. 1 but could not be produced because of the poor stimulation response after a sand fracture treatment; therefore, the well was plugged back to the upper section. In May, 1983, a re-entry attempt and re-stimulation using higher strength proppant resulted in a successful workover to the lower section. The production graph (Attachment VIII) shows that the lower section will contribute some new reserves but of a smaller volume compared to the more prolific recovery expected from the upper section. In the drilling of the State AZ No. 2, the lower section was considered as a secondary objective. Currently, the State AZ No. 2 is producing from the upper Bone Springs section only and has the lower section isolated with a bridge plug. The lower section was opened in the AZ No. 2 and swabbed oil but is not expected to be a prolific interval due to the tight reservoir matrix. Attachments IV and VII show the present downhole status of both wells.

# STATE "AZ" NO. 1
## WELL PROFILE



13 3/8" 48# H-40 at 414' w/400 Sxs Circ

8 5/8" 24#, 32# K-55, H-40 at 3997' w/2050 Sxs

UPPER BONE SPRINGS: Perfs at 9437-62' (2 JSPF)
Acidized w/2000 Gals
IPF 351 BOPD on 10-8-64

Re-enter on May, 1983

LOWER BONE SPRINGS: Perfs at 10,106-150' (4 JSPF)
-178 Holes
Fracture Treated w/ 34,700 Gals
and 41,000 # 20/40 Interprod
After: Est 10 BOPD
Before: 0 BOPD

5 1/2" 15.5#, 17# J-55, N-80 at 10,247' w/180 Sxs

PBD at 10,163'

ATTACHMENT IV

ATTACHMENT V

a. State AZ No. 2
1980' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 6-16-83

c. Completion Date: 8-24-83

d. No mechanical problems experienced.

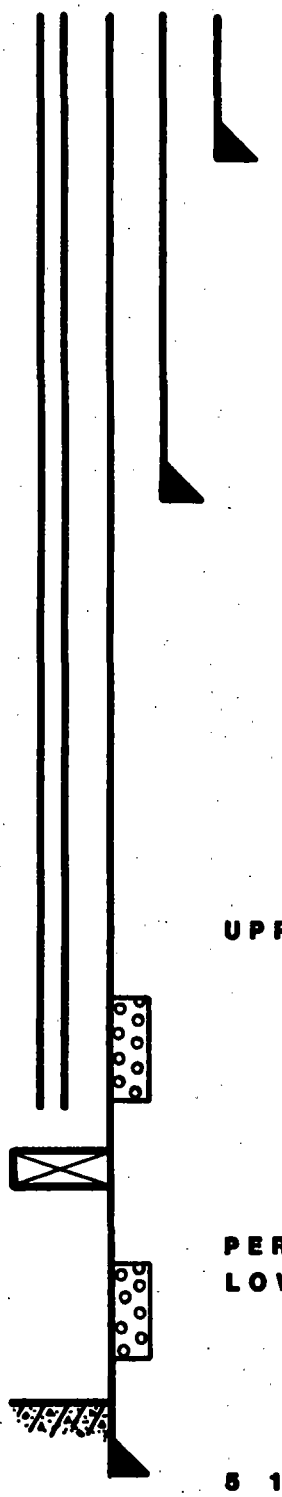
e. Current rate of production, December, 1983: 135 BOPD + 193 MCFPD.

f. Producing well, not plugged.

g. See Attachment III.

# STATE "AZ" NO. 2

## WELL PROFILE



13 3/8" 54.5# K-55 at 403' w/500 sxs Circ

8 5/8" 28# S-80 at 4000' w/1600 sxs

UPPER BONE SPRINGS: 9457 - 9476' (20 Holes)
Acid 8000 Gals 20% Titan X-L
with 25% CO2
IPF 375 BO-294 MCFPD
8/24/83

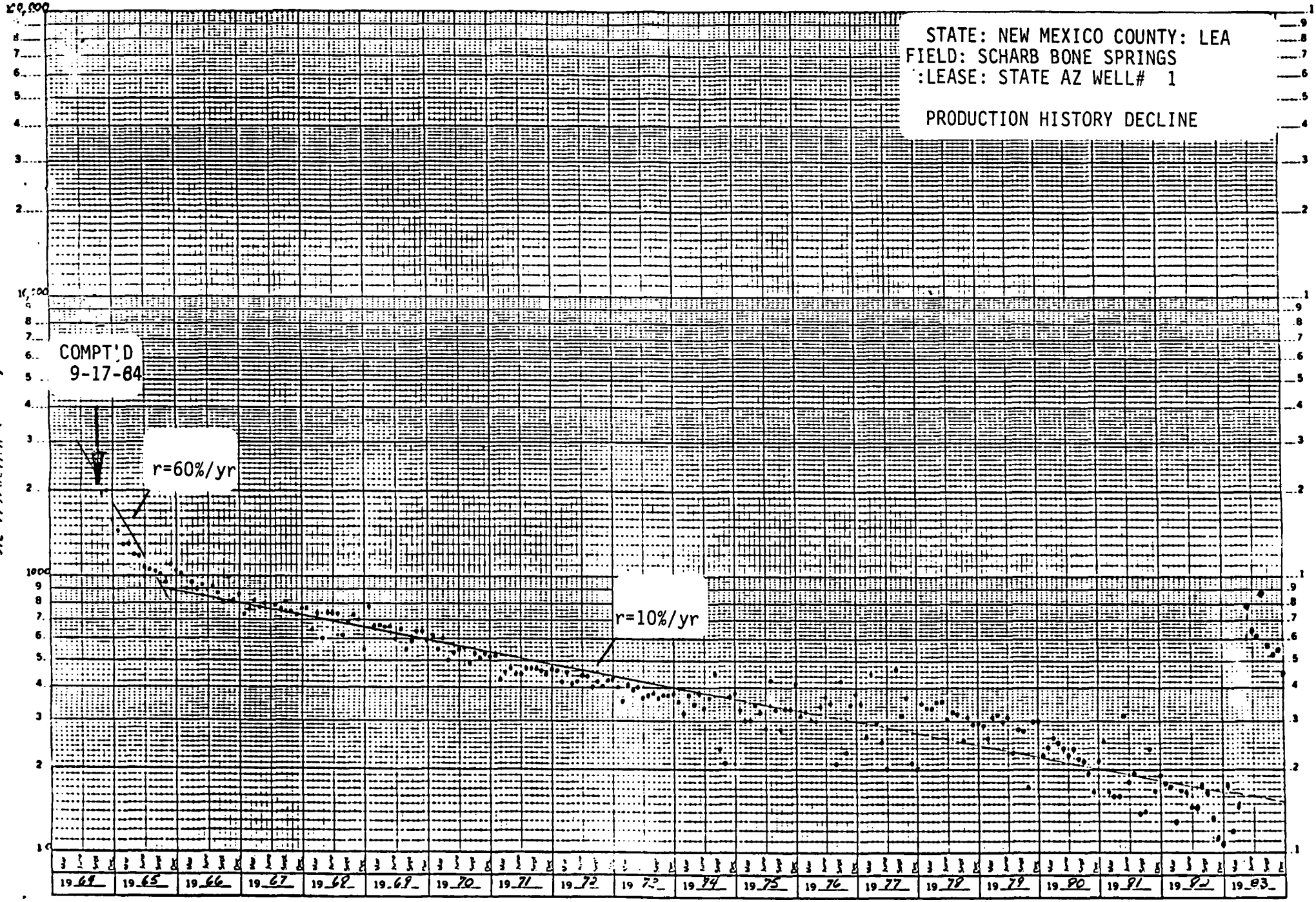
PERMANENT BRIDGE PLUG AT at 9615'

LOWER BONE SPRINGS: 10,129-161' &
10,170-178' (1JSPF)
Acid 3000 Gals
Swabbed Oil & Load Water
Est. Rate at 10 BOPD

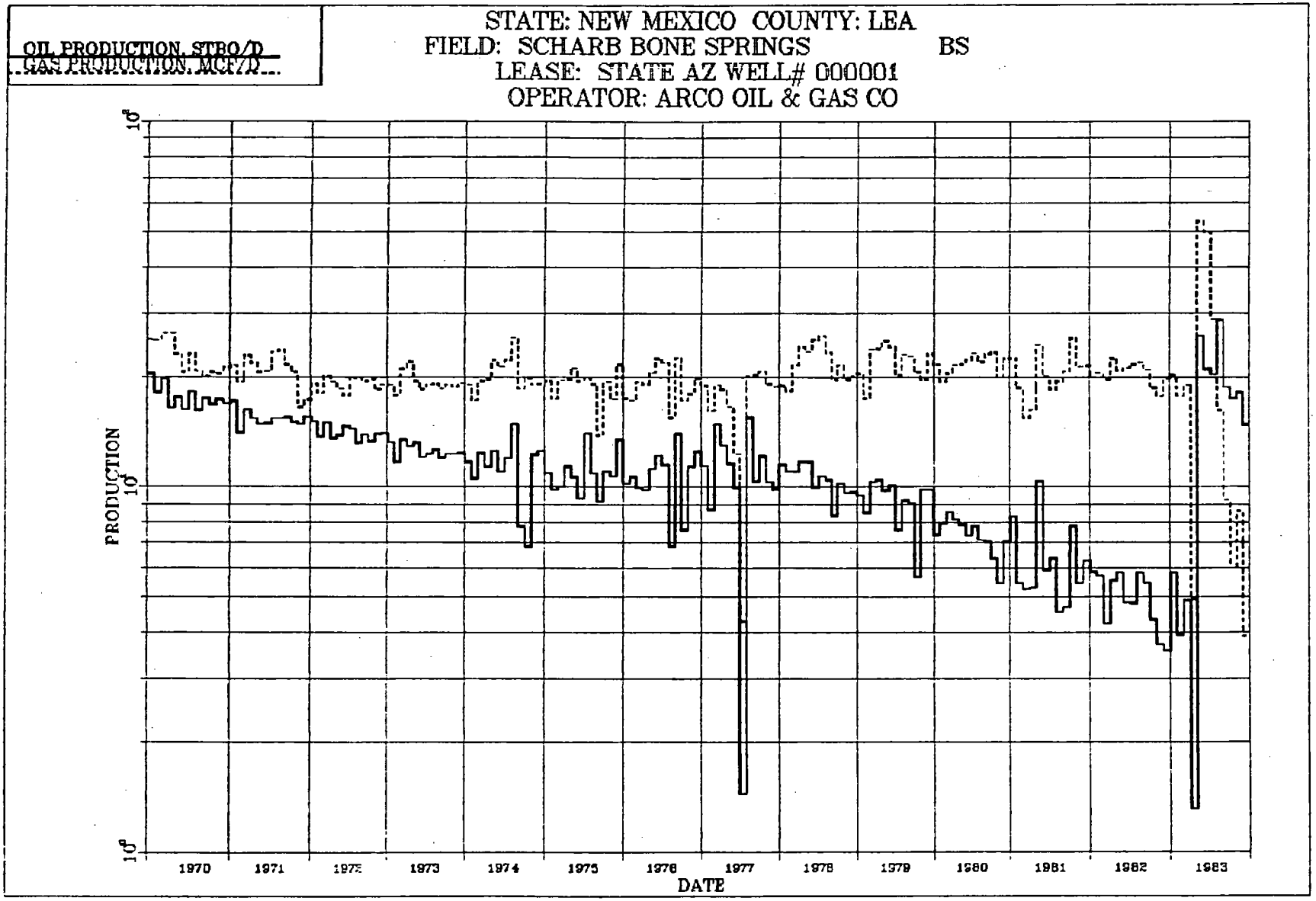
5 1/2" 15.5# & 17# K-55 at 10,300' w/ 1700Sxs

PBD at 10,220'

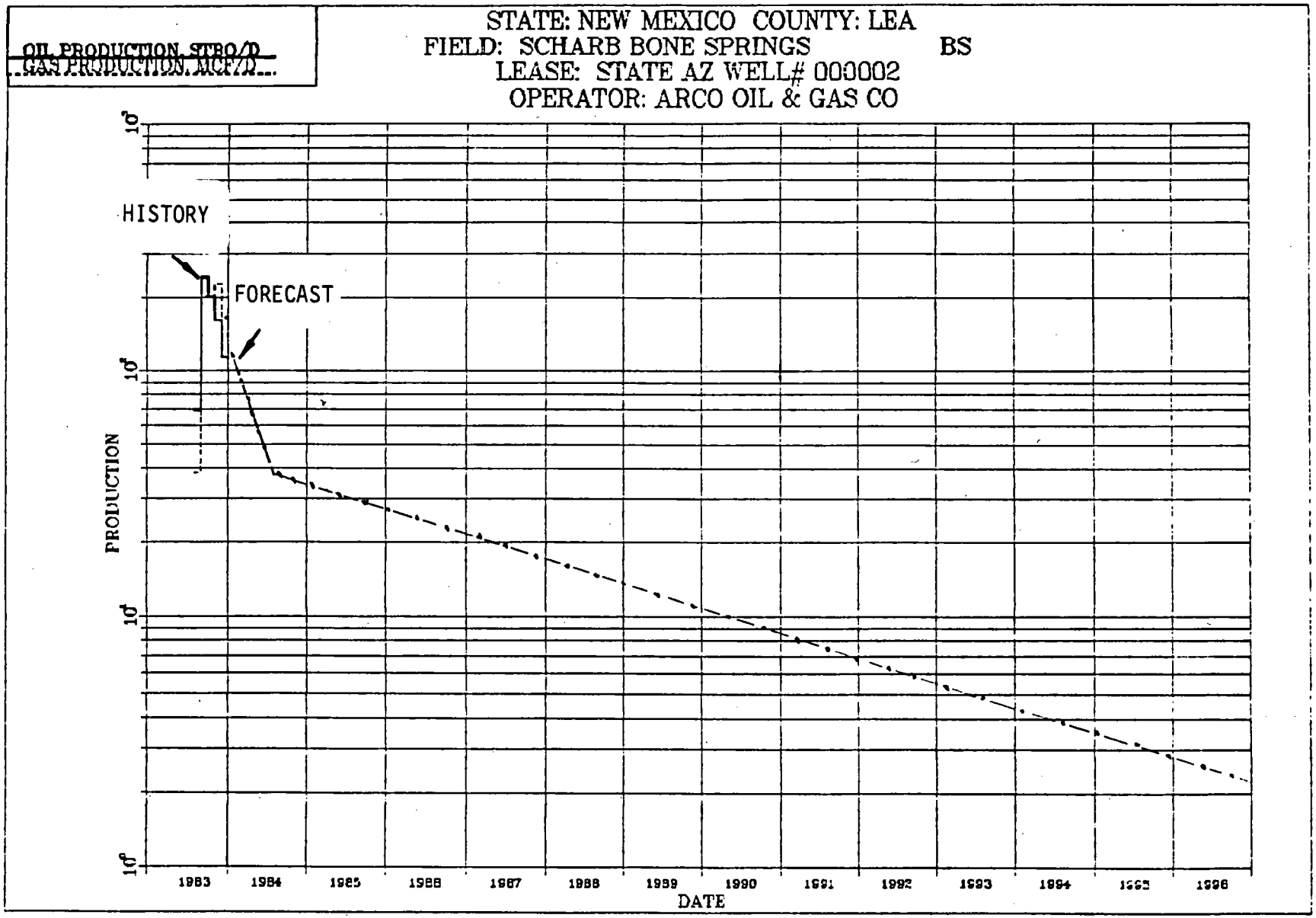
ATTACHMENT VI



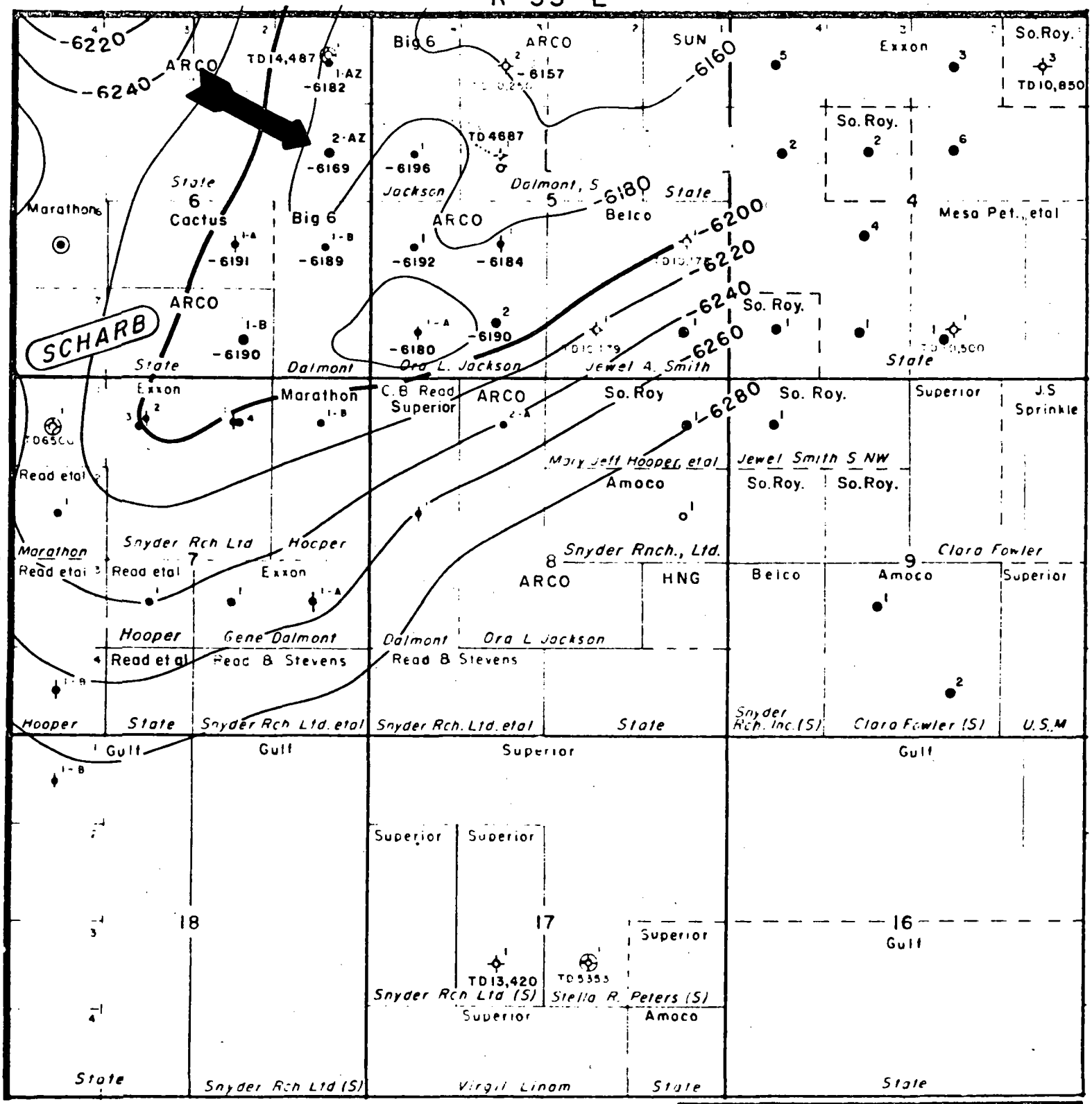

ATTACHMENT VII




ATTACHMENT VIII




ATTACHMENT IX




ARCO Oil and Gas Company
Division of Atlantic Richfield Company
Permian District Midland, Texas

# SCHARB FIELD

LEA COUNTY, NEW MEXICO

## BONE SPRINGS STRUCTURE

C. I. = 20'

SCALE 1" = 2000'

| | | | |
|---|---|---|---|
| By FRAGA/SCHNETZLER | Drawn By | Date 1-83 | |
| Date 1-83 | Reviewed By BES | Date 10-6-83 | |
| Dept. WEST AREA ENGR. | Dwg. No. | | |

ATTACHMENT X

ARCO
STATE "AZ" NO. 1
EL. 3924' K.B.
T.D. 10,247'

ARCO Oil and Gas Company
STATE "AZ" No. 2
EL. 3950.9' K.B.
TD. 10,300'

A
NORTH

GR-SONIC

CNL-LDT

A'
SOUTH

FIRST BONE SPRINGS

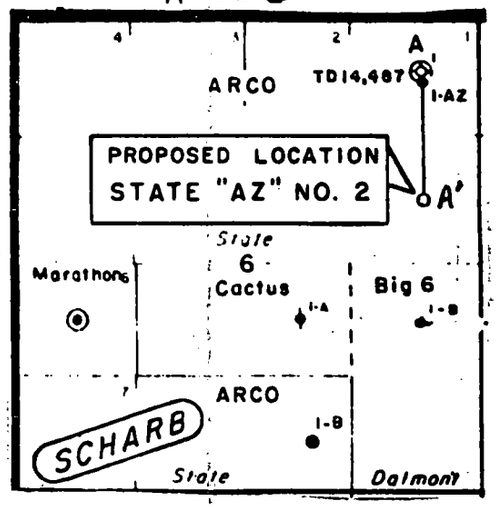
UPPER SECTION

-5800' SS

SECOND BONE SPRINGS

LOWER SECTION

INDEX MAP
R 35E




ARCO Oil and Gas Company
Permian District Midland, Texas

SCHARB FIELD
Lea County, New Mexico

CROSS SECTION A-A'

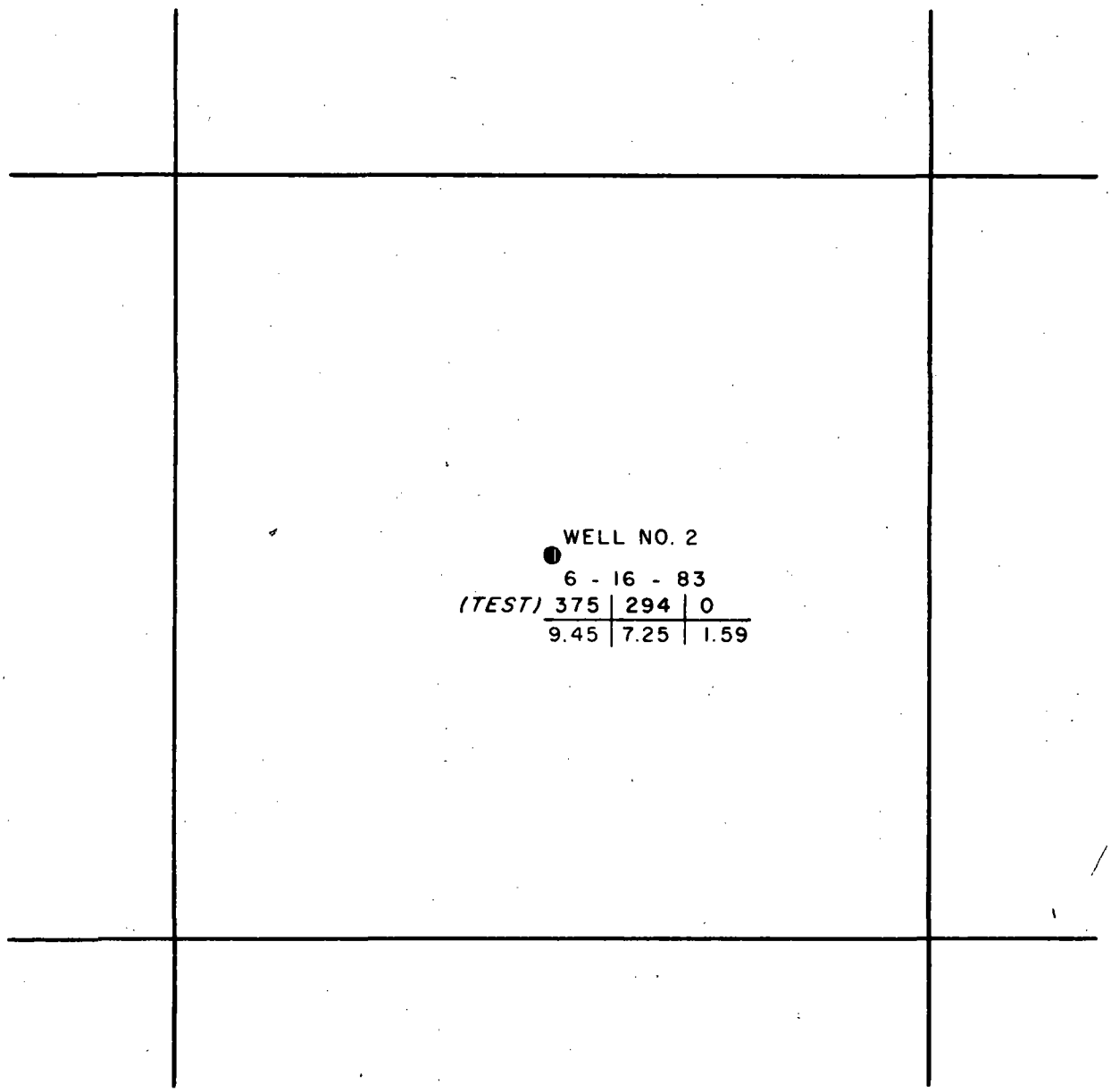
ATTACHMENT XI

| | | | |
|---|---|---|---|
| TONY FRAGA | Drawn By: R C T | Date 11-17-83 |
| 11-17-83 | Revised By | Date |

# STATE AZ
# WELL NO. 2

Lea County, New Mexico
SCALE : 1" = 300'

UNIT LETTER H SECTION 6 TOWNSHIP 19 S RANGE 35 E




● SCHARB (BONE SPRINGS)
6-16-83 SPUD DATE

| BOPD | MCFPD | BWPD |
|---|---|---|
| CUM MBO | CUM MMCF | CUM MBW |

CUMULATIVES AS OF 9 - 83

ATTACHMENT XII

**ARCO Oil and Gas Company**
Permian District
Post Office Box 1610
Midland. Texas 79702
Telephone 915 684 0100

April 16, 1984

CERTIFIED
RETURN RECEIPT
REQUESTED

OFFSET OPERATORS
(Address List Attached)

Gentlemen:

ARCO's State AZ No. 2
Scharb Bone Springs Field
Lea County, New Mexico

This is your notification that ARCO Oil and Gas, as operator of the subject well, is seeking an infill well finding from the Oil Conservation Division of the State of New Mexico. This finding is necessary before casinghead gas from this well can be classified under NGPA Section 103.

Very truly yours,

J. A. Fraga
Sr. Engineer

JAF:sc
Encl.

ATTACHMENT XIII

## OFFSET OPERATORS

Big Six Drilling Company
7500 San Felipe
Houston, Texas 77063

Joseph I. O'Neill, Jr.
P. O. Box 2840
Midland, Texas 79702

TXO Production Corporation
900 Wilco Bldg.
Midland, Texas 79701

Marathon Oil Company
P. O. Box 552
Midland, Texas 79702

ARCO Oil and Gas Company
Permian District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0100



April 16, 1984

Mr. Joe D. Ramey
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: State "AZ" No. 2
Infill Location
Scharb Bone Springs Pool
Lea County, New Mexico

Dear Sir:

ARCO Oil and Gas Company requests an administrative finding that the subject well is needed to effectively drain a portion of the reservoir and for the purpose of requesting gas pricing relating to the Section 103 of the Natural Gas Policy Act of 1978. The infill well, the State "AZ" No. 2, is located 1980' FNL and 660' FEL of Section 6, T-19-S, R-35-E, Lea County, New Mexico. The State "AZ" No. 1, the first well on the proration unit, was drilled in 1964. The subject well, the State "AZ" No. 2, was drilled in 1983.

The proration units for the State "AZ" Lease are 80 acres in size and ARCO feels that the State "AZ" No. 1 alone cannot effectively drain the Bone Springs. The State "AZ" No. 2 should ultimately produce 129 MBO that would not otherwise be produced.

Attached is the required information and your prompt attention is appreciated.

Very truly yours,

J. A. Fraga
Sr. Operations/Analytical Engineer

JAF:sc
Atts.

D. Filing Requirements

Rule 5. Forms C-101 and C-102. See Attachments I and II.

Rule 6. Scharb Bone Springs, 80 acre spacing.

Rule 7. Not Applicable.

Rule 8. Well histories and wellbore profile.
See Attachments III, IV, V and VI.

Rule 9. a. Formation Structure Map and Well Cross Section.
See Attachments X, XI and XII.

b. The current estimated increased ultimate recovery expected is 129 MBO from the opened Bone Springs Section in the State AZ No. 2. The expected increase is 12.1% of the calculated original oil in place in the proration unit. Gas production in association with this oil is 101 MMCF based on a produced gas oil ratio of 784 cu. ft/bbl.

This volume of increased recovery is determined using decline curve analysis and the production history decline of the State AZ No. 1. Historically, the Bone Springs has shown good initial potentials with steep declines during the first producing year. The State AZ No. 1 declined at 60%/year for the first ten months after completion and then declined at 10%/year thereafter (Attachment No. VII). Cumulative production for the State AZ No. 1 up to May, 1983, is 107 MBO with projected remaining reserves of 7 MBO. This projection is for the Upper Bone Spring section and was based on a pump rate of 5 BOPD and an economic limit of 3 BOPD. Estimated ultimate recoverable reserves for the State AZ No. 1 is 114 MBO.

The State AZ No. 2 is expected to produce at a comparable performance decline as the State AZ No. 1. As of January, 1984, the State AZ No. 2 has produced 24 MBO reserves and is producing at 134 BOPD which is two times the initial producing rate of the State AZ No. 1. Therefore, based on the current performance of the State AZ No. 2, the estimated ultimate recoverable reserves of 129 MBO were determined using an an initial stabilized rate of 245 BOPD declined exponentially at 84%/year for one year and then at 12%/year, thereafter, to an economic limit of 3 BOPD (Attachment IX). The 12% rate decline is the average for offset producers in the Scharb Field.

Rule 9. b. (continued):

Original oil in place in the proration unit was volumetrically determined to be 1.063 MMBO. The open hole logs of the State AZ No's. 1 and 2 were used to obtain the average porosity, water saturation and the feet of net pay. A reservoir volume factor of 1.35 was based on a crude gravity of 38.6% API, a produced gas oil ratio of 784 cu ft/bbl, a gas gravity of 0.6 and a reservoir temperature of 135° F.

Below is a summary of these parameters, OOIP calculations, and ultimate recovery estimates for the State AZ No. 1 and 2:

1) A = area of proration unit = 80 acres
   h = ft. of pay = 25 ft.
   Ø = average porosity = 11.56%
   Sw = average water saturation = 20%
   Bo = formation volume factor = 1.35 RVB/STB

2) $OOIP = \frac{7758\ AhØ(1 - Sw)}{Bo}$

$$= \frac{7758(80)(25)(.1156)(1 - .20)}{1.35} = \underline{1.063\ MMBO}$$

3) Ult. Rec.

Well #1 = 114 MBO or 10.7% of OOIP

Ult. Rec.

Well #2 = 129 MBO or 12.1% of OOIP

Based on the aforementioned information, the drilling of the State AZ No. 2 was necessary for the effective depletion of the proration unit.

c. Other supporting data:

1) N/A
2) Production decline curves - see Attachments VII, VIII and IX.
3) N/A

Rule 10. Duplicate applications are submitted.

Rule 11. A copy of certified mailing to operators of offset spacing units is shown as Attachment XIII.

NEW MEXICO OIL CONSERVATION COMMISSION

| | |
|---|---|
| SANTA FE | |
| FILE | |
| U.S.G.S. | |
| LAND OFFICE | |
| OPERATOR | |

Form C-101
Revised 1-1-65

5A. Indicate Type of Lease: STATE [X] FEE [ ]

5. State Oil & Gas Lease No.: NM-899

## APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. Type of Work:
DRILL [X] DEEPEN [ ] PLUG BACK [ ]

b. Type of Well:
OIL WELL [X] GAS WELL [ ] OTHER SINGLE ZONE [X] MULTIPLE ZONE [ ]

7. Unit Agreement Name:

8. Farm or Lease Name: State AZ

2. Name of Operator: ARCO Oil and Gas Company
Division of Atlantic Richfield Company

9. Well No.: 2

3. Address of Operator: P. O. Box 1710, Hobbs, New Mexico 88240

10. Field and Pool, or Wildcat: Scharb Bone Springs

4. Location of Well: UNIT LETTER H LOCATED 1980 FEET FROM THE North LINE
AND 660 FEET FROM THE East LINE OF SEC. 6 TWP. 19S RGE. 35E NMPM

12. County: Lea

| 15. Proposed Depth | 19A. Formation | 20. Rotary or C.T. |
|---|---|---|
| 10,300' | Bone Springs | Rotary |

| 21. Elevations (Show whether DF, RT, etc.) | 21A. Kind & Status Plug. Bond | 21B. Drilling Contractor | 22. Approx. Date Work will start |
|---|---|---|---|
| 3930.59' GL | GCA #8 | Not selected | 4/20/83 |

### PROPOSED CASING AND CEMENT PROGRAM

| SIZE OF HOLE | SIZE OF CASING | WEIGHT PER FOOT | SETTING DEPTH | SACKS OF CEMENT | EST. TOP |
|---|---|---|---|---|---|
| 32" | Conductor Pipe | 20" | 30' | 2½ yds Redi-mix | Surf |
| 17½" | 13-3/8" OD | 54.5# K-55 | 400' | 375 sx | Circ to surf |
| 11" | 8-5/8" OD | 28# S-80 | 4000' | 1525 sx | Circ to surf |
| 7-7/8" | 5½" OD | 15.5#, 17# K-55 | 10,300' | 675 sx | 8500' |

Propose to drill a development well to test the producing capabilities of Bone Springs formation and recover remaining reserves. If completed as a producer, allowable is to be shared with State AZ #1 on an 80-acre proration unit.

RECEIVED
MAR 11 1983
CENTRAL FILES

APPROVAL VALID FOR 150 DAYS
PERMIT EXPIRES 10/6/83
UNLESS DRILLING UNDERWAY

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOWOUT PREVENTER PROGRAM, IF ANY.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Name: Richard E. Bullock Title: Drlg. Engr. Date: 3/31/83

(This space for State Use)

APPROVED BY: ORIGINAL SIGNED BY JERRY SEXTON DIST. I SUPERVISOR TITLE _____ DATE MAR 6 1983

CONDITIONS OF APPROVAL, IF ANY:

ATTACHMENT I

Division of Atlantic Richfield Co.

ARCO OIL & GAS Co. | STATE AZ | 2

| H | 6 | 19S | 35E | LEA |
|---|---|---|---|---|

1930 NORTH 660 EAST

| 3930.59 | Bone Springs | Scharb | 80 |
|---|---|---|---|

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

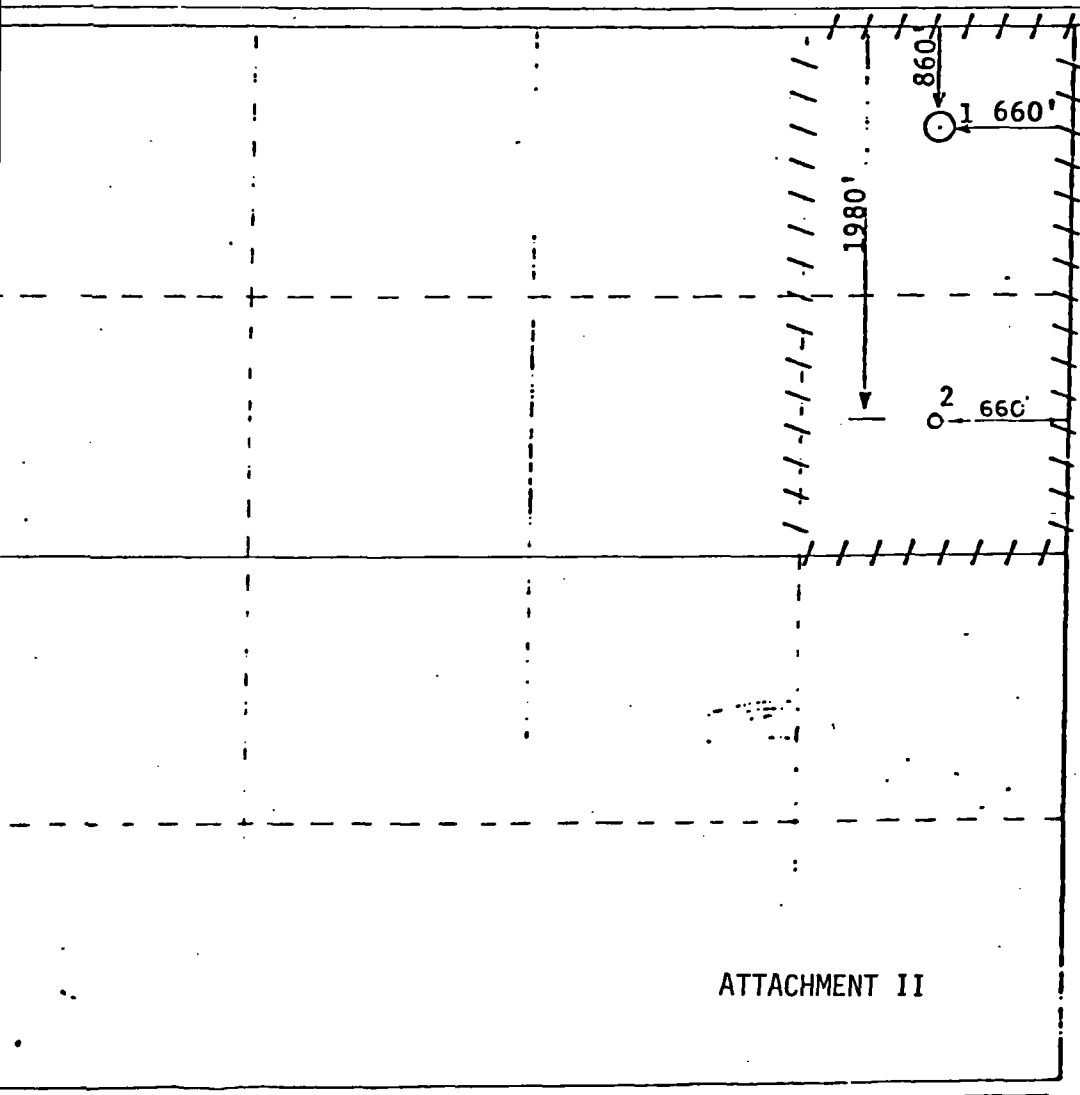
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

☐ Yes ☐ No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, force-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.




ATTACHMENT II

CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief

Robert E. Ballweg

Name: Drlg. Engr.

Company: ARCO Oil and Gas Co.
Div of Atlantic Richfield Co.

Date: 3/31/83

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief

Date Surveyed: MARCH 29, 1983

Registered Professional Engineer and/or Land Surveyor

Certificate No. JOHN W. WEST 676

# ATTACHMENT III

a. State AZ No. 1
860' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 7-31-64

c: Completion Date: 9-17-64

d. No mechanical problems experienced.

e. Current rate of production, December, 1983: 20 BOPD + 5 MCFPD

f. Producing well, not plugged.

g. The current performance of the State AZ No. 2 to date clearly supports the fact that the No. 2 well was necessary for the effective depletion of the proration unit (Attachment IX). The production decline curve on its north offset, ARCO's State AZ No. 1, also shows that its rate performance has not been affected with the completion of the State AZ No. 2 to the Upper Bone Springs section (Attachment VIII). The upper section has been the main producing interval on the State AZ lease since development in 1964. A lower section was tested in the State AZ No. 1 but could not be produced because of the poor stimulation response after a sand fracture treatment; therefore, the well was plugged back to the upper section. In May, 1983, a re-entry attempt and re-stimulation using higher strength proppant resulted in a successful workover to the lower section. The production graph (Attachment VIII) shows that the lower section will contribute some new reserves but of a smaller volume compared to the more prolific recovery expected from the upper section. In the drilling of the State AZ No. 2, the lower section was considered as a secondary objective. Currently, the State AZ No. 2 is producing from the upper Bone Springs section only and has the lower section isolated with a bridge plug. The lower section was opened in the AZ No. 2 and swabbed oil but is not expected to be a prolific interval due to the tight reservoir matrix. Attachments IV and VII show the present downhole status of both wells.

# STATE "AZ" NO. 1
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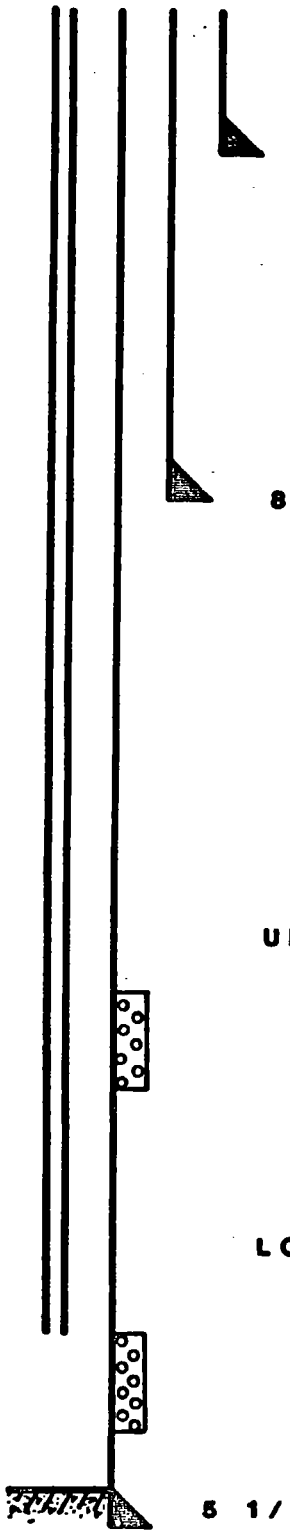

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-178 Holes
Fracture Treated w/ 34,700 Gals
and 41,000 # 20/40 Interprod
After: Est 10 BOPD
Before: 0 BOPD

5 1/2" 15.5#, 17# J-55, N-80 at 10,247' w/180 Sxs

PBD at 10,163'

ATTACHMENT IV

ATTACHMENT V

a. State AZ No. 2
1980' FNL & 660' FEL
Section 6, T-19-S, R-35-E
Lea County, New Mexico

b. Spud Date: 6-16-83

c. Completion Date: 8-24-83

d. No mechanical problems experienced.

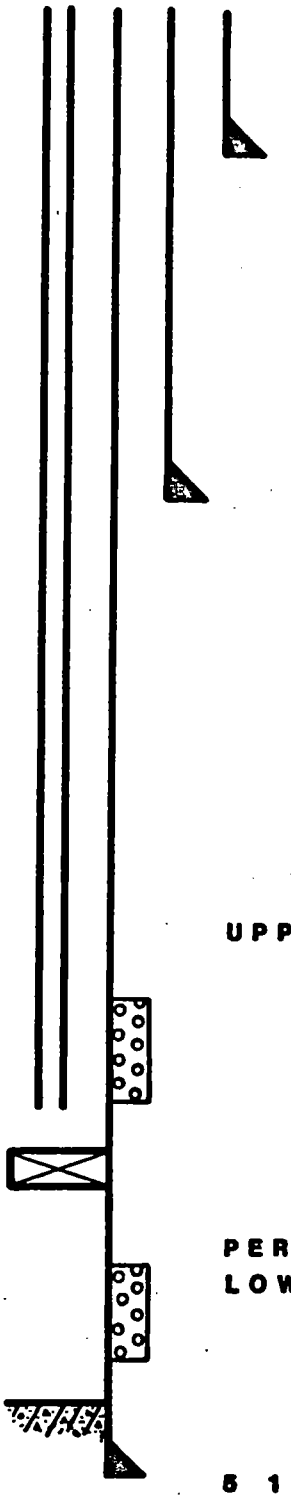
e. Current rate of production, December, 1983: 135 BOPD + 193 MCFPD.

f. Producing well, not plugged.

g. See Attachment III.

# STATE "AZ" NO. 2

## WELL PROFILE



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with 25% CO2
IPF 375 BO-294 MCFPD
8/24/83

PERMANENT BRIDGE PLUG AT at 9615'

LOWER BONE SPRINGS: 10,129-161' &
10,170-178' (1JSPF)
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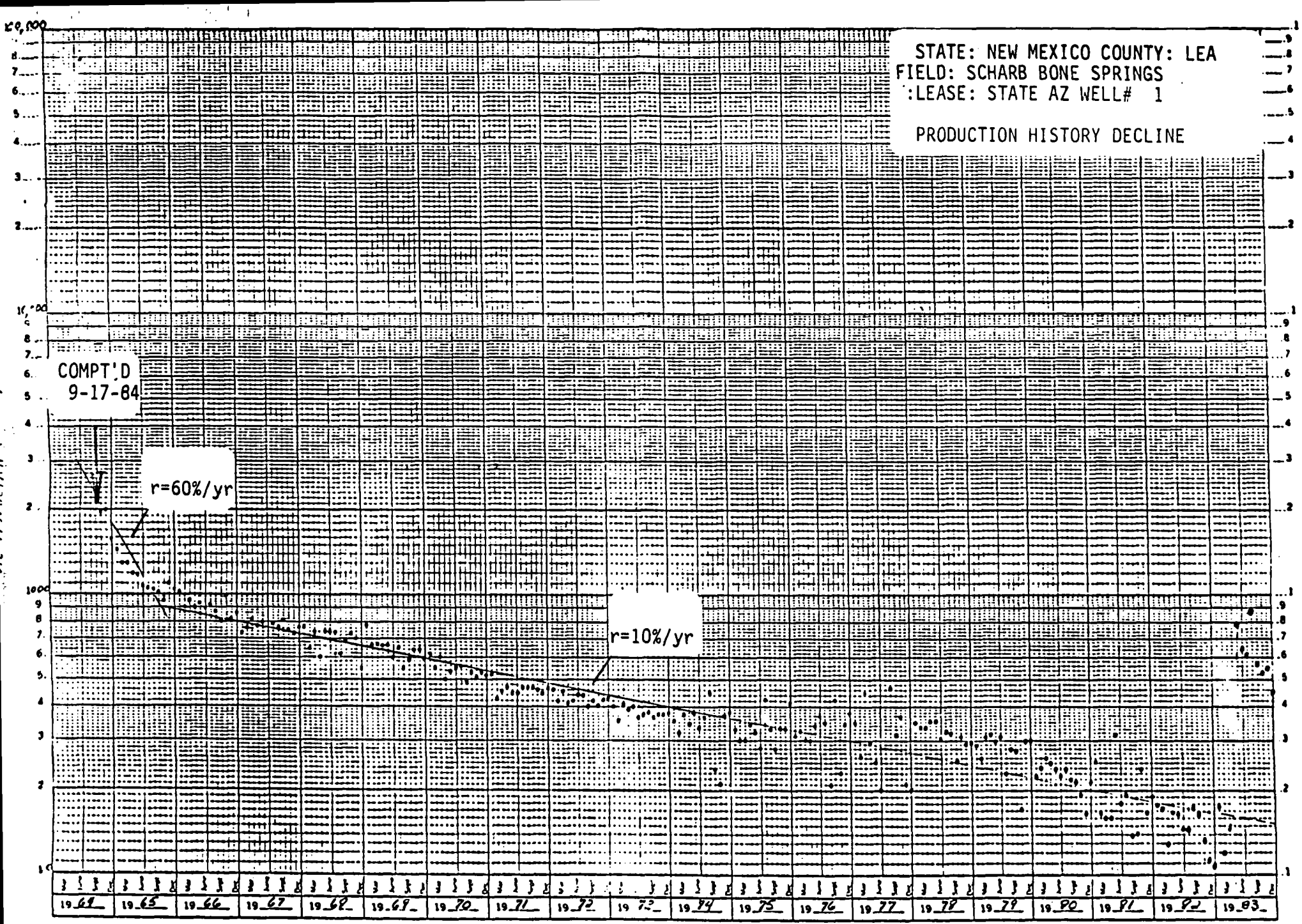
Est. Rate at 10 BOPD

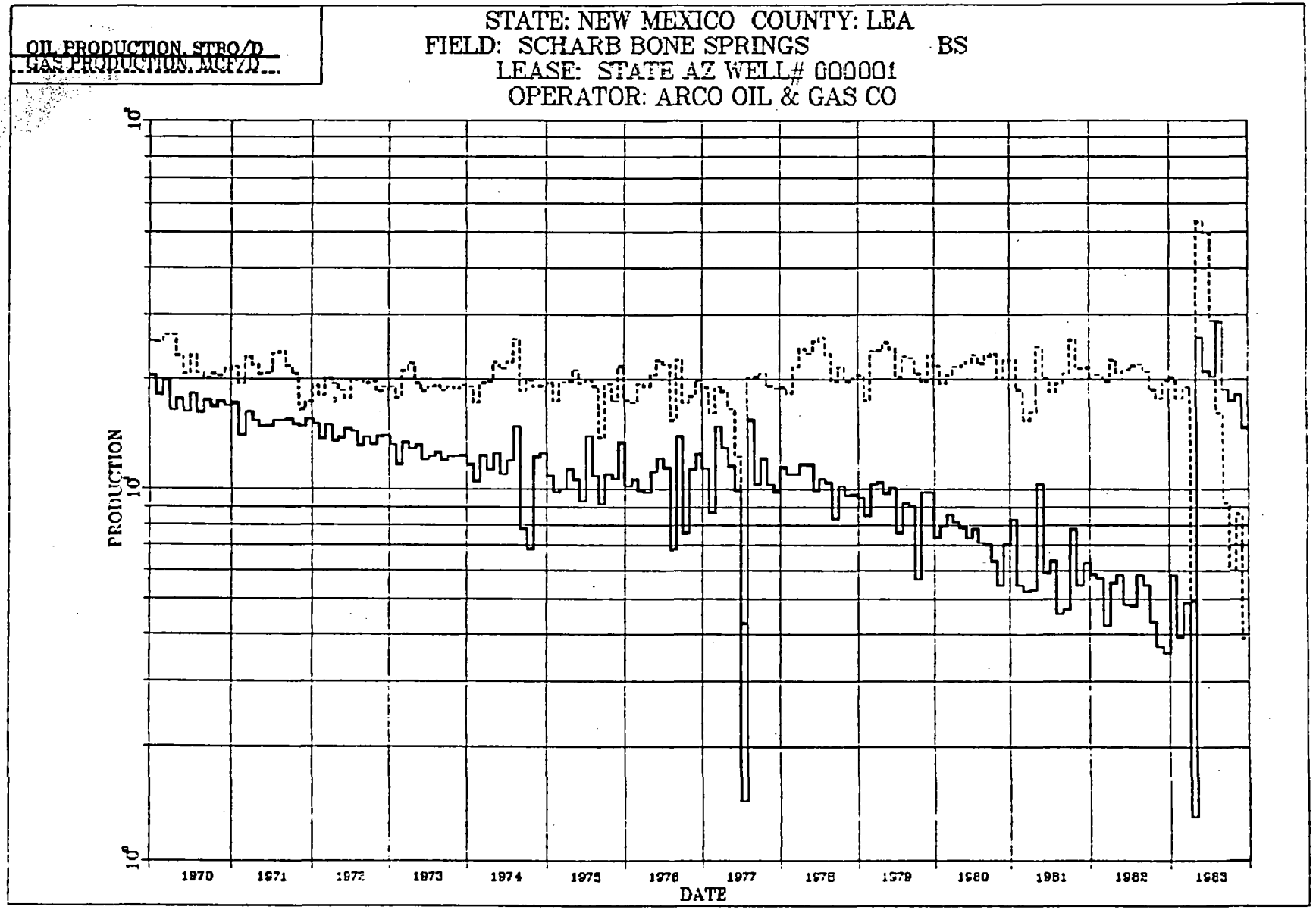
5 1/2" 15.5# & 17# K-55 at 10,300' w/ 1700Sxs

PBD at 10,220'

ATTACHMENT VI




ATTACHMENT VII

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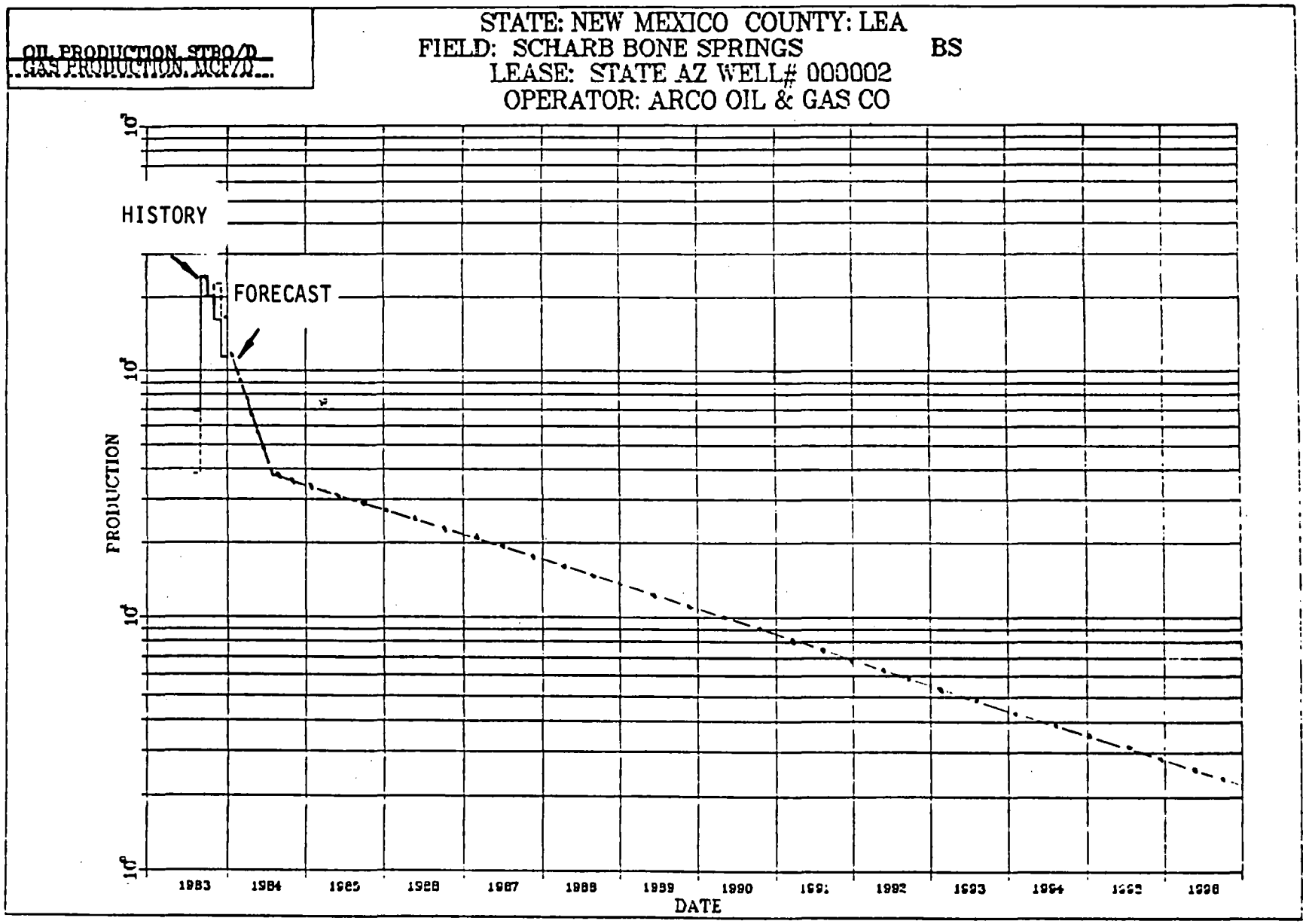


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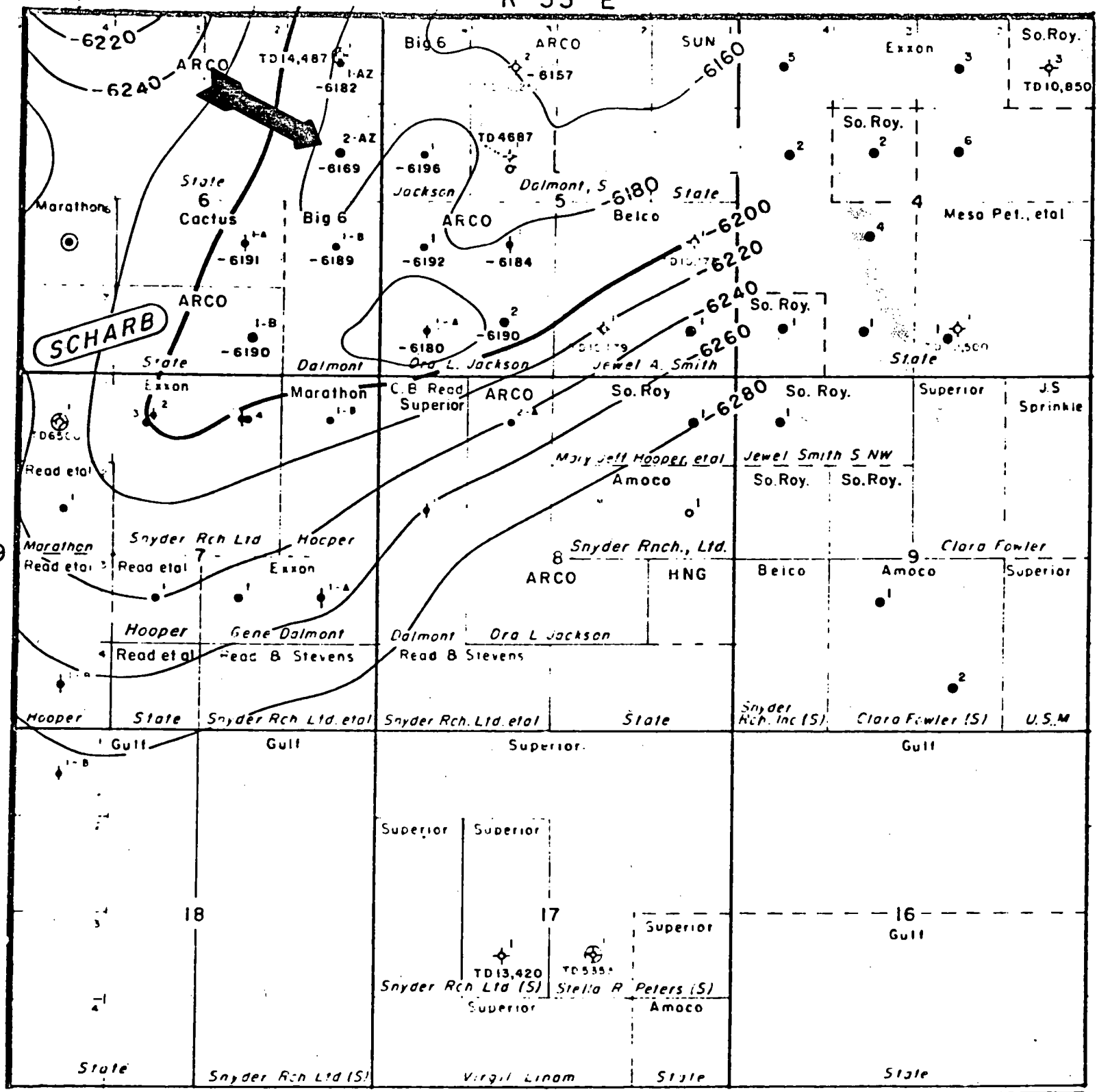



ATTACHMENT X

ARCO Oil and Gas Company

Permian District Midland, Texas

# SCHARB FIELD

LEA COUNTY, NEW MEXICO

## BONE SPRINGS STRUCTURE

C. I. = 20'

SCALE 1" = 2000'

| | | |
|---|---|---|
| By FRAGA/SCHNETZLER | Drawn By | Date 1-83 |
| Date 1-83 | Reviewed By BES | Date 10-6-83 |
| WEST AREA ENGR | Dwg. No. | |

ARCO
STATE "AZ" NO. 1
EL. 3924' K.B.
T.D. 10,247'

ARCO Oil and Gas Company
STATE "AZ" No. 2
EL. 3950.9' K.B.
TD. 10,300'

A
NORTH

GR-SONIC

CAL-LOG

A'
SOUTH

FIRST BONE SPRINGS

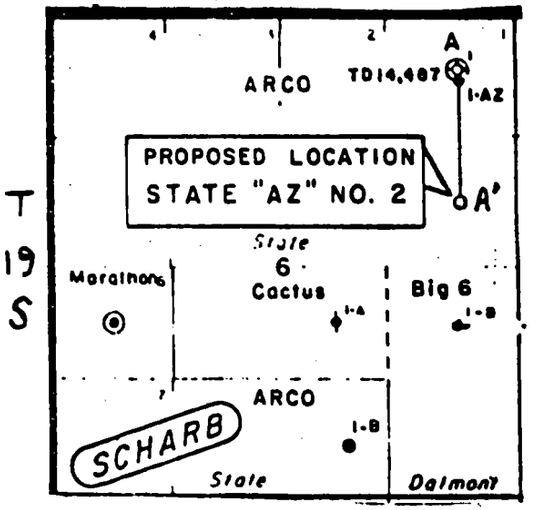
UPPER SECTION

-5800' SS

SECOND BONE SPRINGS

LOWER SECTION

INDEX MAP
R 35E




ARCO Oil and Gas Company
Permian District Midland, Texas

SCHARB FIELD
Lea County, New Mexico

CROSS SECTION A-A'

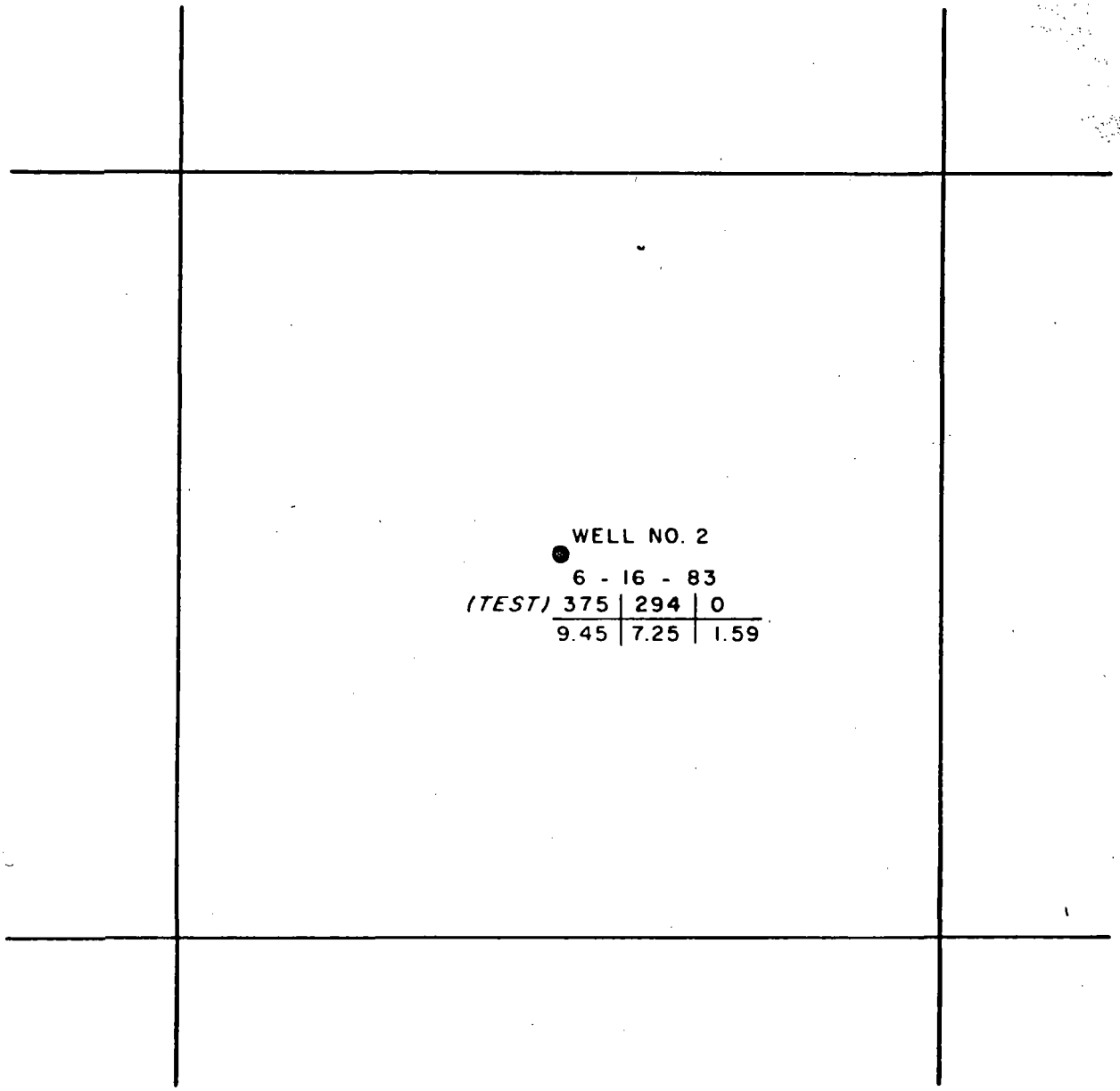
ATTACHMENT XI

TONY FRAGA
11-17-83

# STATE AZ
# WELL NO. 2

Lea County, New Mexico
SCALE : 1" = 300'

UNIT LETTER H SECTION 6 TOWNSHIP 19 S RANGE 35 E




● SCHARB (BONE SPRINGS)
6-16-83 SPUD DATE

| BOPD | MCFPD | BWPD |
|---|---|---|
| CUM MBO | CUM MMCF | CUM MBW |

CUMULATIVES AS OF 9 - 83

ATTACHMENT XII

ARCO Oil and Gas Company
Permian District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0100

April 16, 1984

CERTIFIED
RETURN RECEIPT
REQUESTED

OFFSET OPERATORS
(Address List Attached)

Gentlemen:

ARCO's State AZ No. 2
Scharb Bone Springs Field
Lea County, New Mexico

This is your notification that ARCO Oil and Gas, as operator of the subject well, is seeking an infill well finding from the Oil Conservation Division of the State of New Mexico. This finding is necessary before casinghead gas from this well can be classified under NGPA Section 103.

Very truly yours,

J. A. Fraga
Sr. Engineer

JAF:sc
Encl.

ATTACHMENT XIII

## OFFSET OPERATORS

Big Six Drilling Company
7500 San Felipe
Houston, Texas 77063

Joseph I. O'Neill, Jr.
P. O. Box 2840
Midland, Texas 79702

TXO Production Corporation
900 Wilco Bldg.
Midland, Texas 79701

Marathon Oil Company
P. O. Box 552
Midland, Texas 79702