UIL CONSERVATION DIVISION P. O. Box 2088

SANTA FE, NEW MEXICO

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARIMENT 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

Dperator <u>ARCO OIL & GAS CO.</u> Well Name and No. <u>State "AZ" Well No. 2</u> Location: Unit H Sec. 6 Twp.19South Rng35 East Cty. Lea

THE DIVISION FINDS ..

tI.

(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 gualify 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, an	d the standard spaci	ng unit in said pool	is	<u>80 `</u>		_ acres.	
[4]) That a _	80	acre proratio	on unit comprising the	E/2	NE/4	. •		
٦ť	Sec. 6		19 South Rng. 3	5 East, is currently	dedicate	d to the	State "A	Z" Well	Ļ
	No.	<u></u>	located in U	nit <u>A</u> of same	ld section	•		• • •	•

(5) That this proration unit is (K) 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 vell(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 <u>104,000</u> 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 uny existing well thereon.

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

JONE	at	Santa	Fe,	New	Mexico,	on	this_		day	of	<u>Auqust</u>	<u></u>	84
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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:

- 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. noon

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

Notary Public

My Commission Expires: September 1, 1987

NFL-89 File State AZ No.

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,

o A/X

J. A. Fraga Sr. Operations/Analytical Engineer

JAF:sc Atts. ARCO Oil and Gas Company State AZ No. 2 Page 2

- 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. ARCO Oil and Gas Companh State AZ No. 2 Page 3

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.
 - \emptyset = average porosity = 11.56%
 - Sw = average water saturation = 20%
 - Bo = formation volume factor = 1.35 RVB/STB

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

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

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:

N/A
 Production decline curves - see Attachments VII, VIII and IX.
 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.

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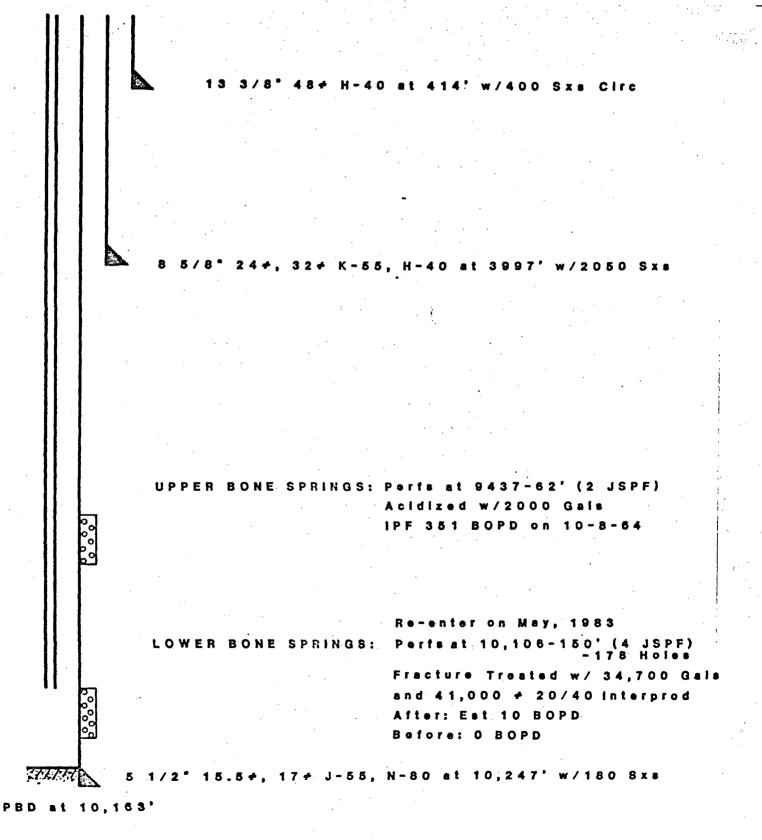
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	· ·		ATTACHMEN	TII	<u>i</u> <u>i</u> <u>i</u> <u>i</u> <u>i</u> <u>i</u> <u>i</u> <u>i</u>	<u>MARCH 29,1983</u>

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.
- The current performance of the State AZ No. 2 to date clearly supports q. 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.

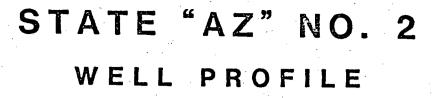


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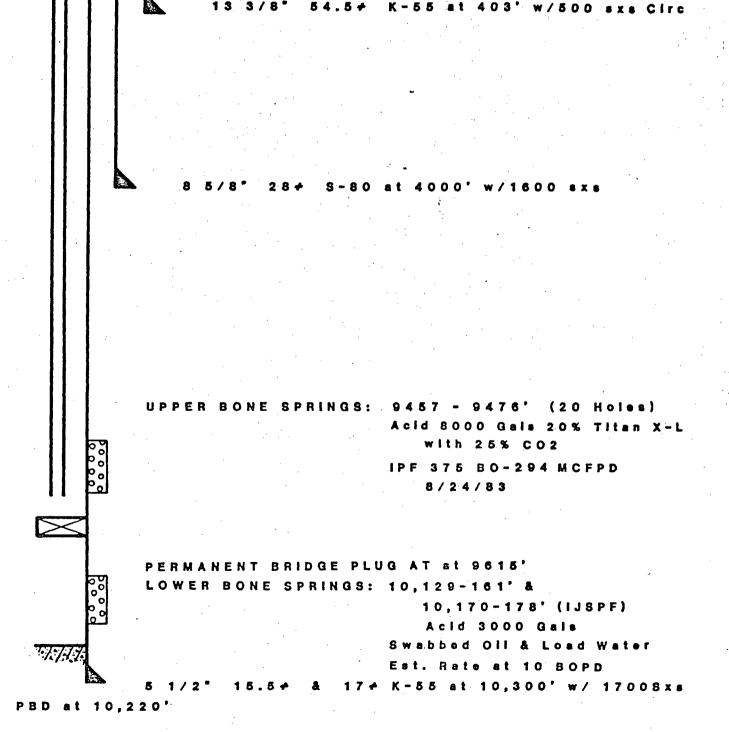
ATTACHMENT V

- 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.

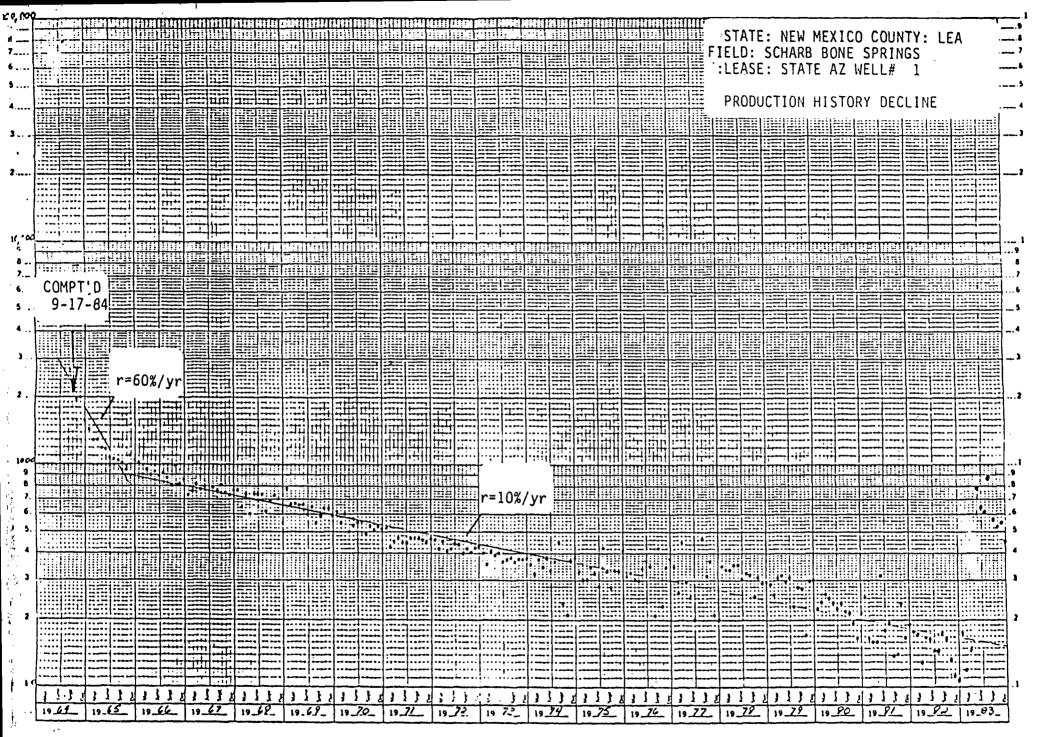


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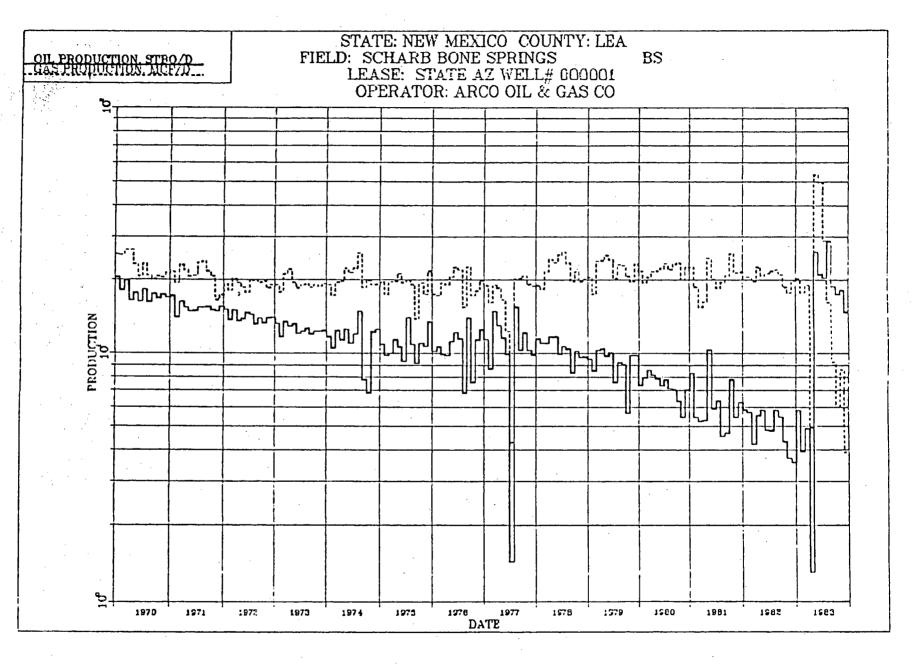
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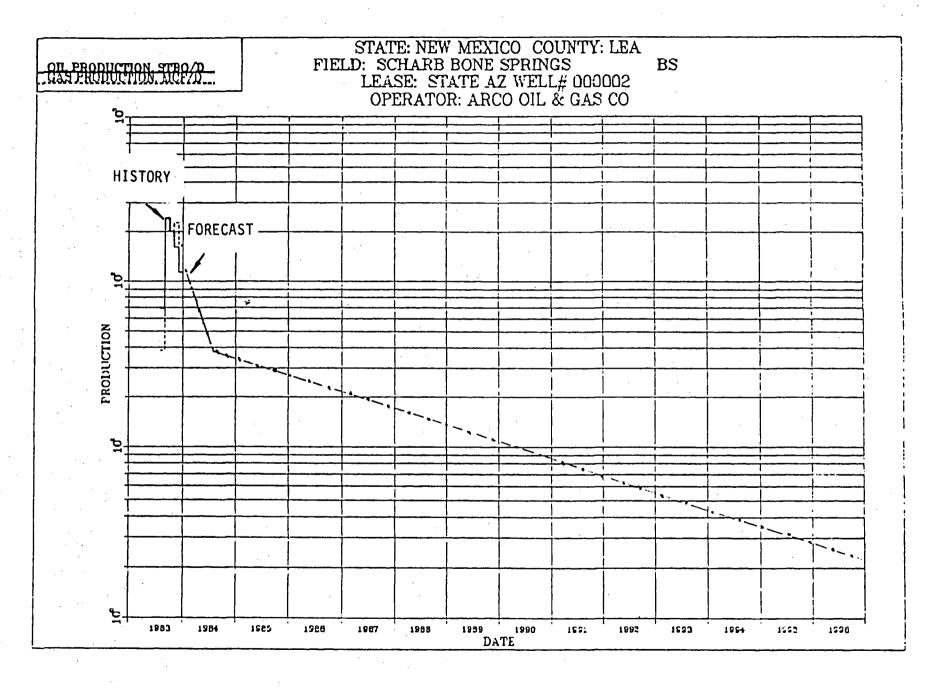
ATTACHMENT VI



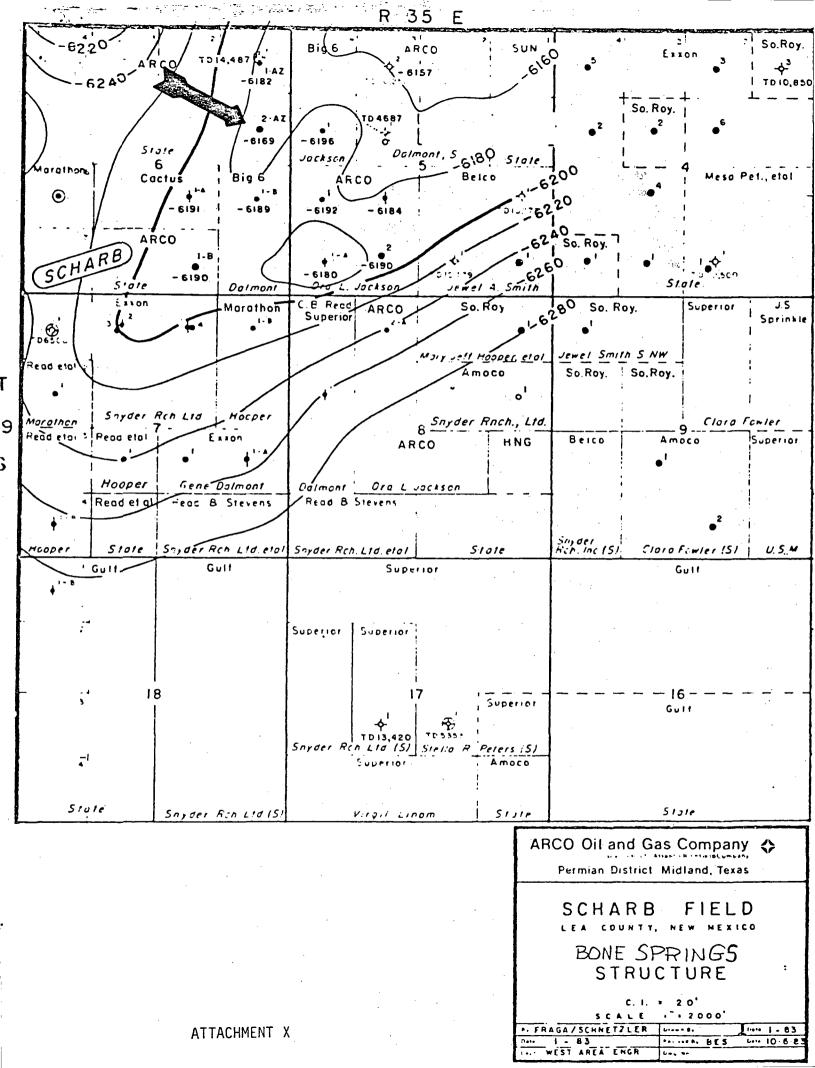
ATTACHMENT VII

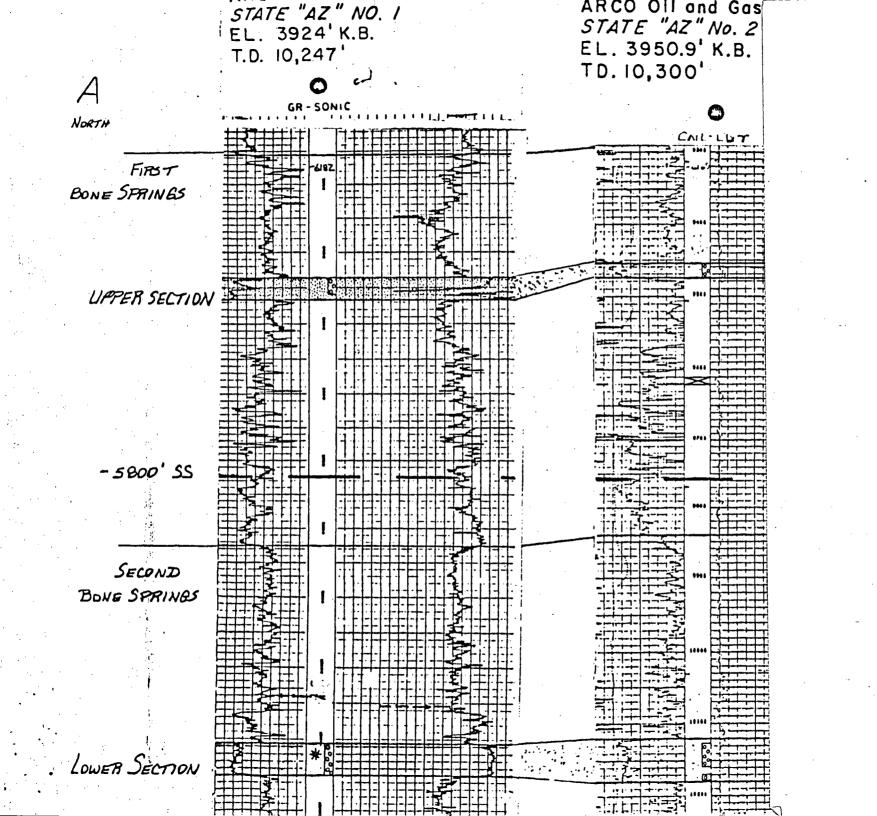


ATTACHMENT VIII



ATTACHMENT IX





STATE AZ WELL NO. 2 Leo County, New Mexico

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CUMULATIVES AS OF 9 - 83

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 · .

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AFFIDAVIT BEFORE

NEW MEXICO OIL CONSERVATION DIVISION

IN THE MATTER OF

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

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:

- 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

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,

AAU J. A. Fraga

Sr. Operations/Analytical Engineer

JAF:sc Atts. ARCO Oil and Gas Company State AZ No. 2 Page 2

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. ARCO Oil and Gas Companh State AZ No. 2 Page 3

MAY 4 1984

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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)
$$OOIP = \frac{7758 \text{ Ah}\emptyset(1 - \text{Sw})}{BO}$$

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

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:

N/A
 Production decline curves - see Attachments VII, VIII and IX.
 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.

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ATTACHMENT III

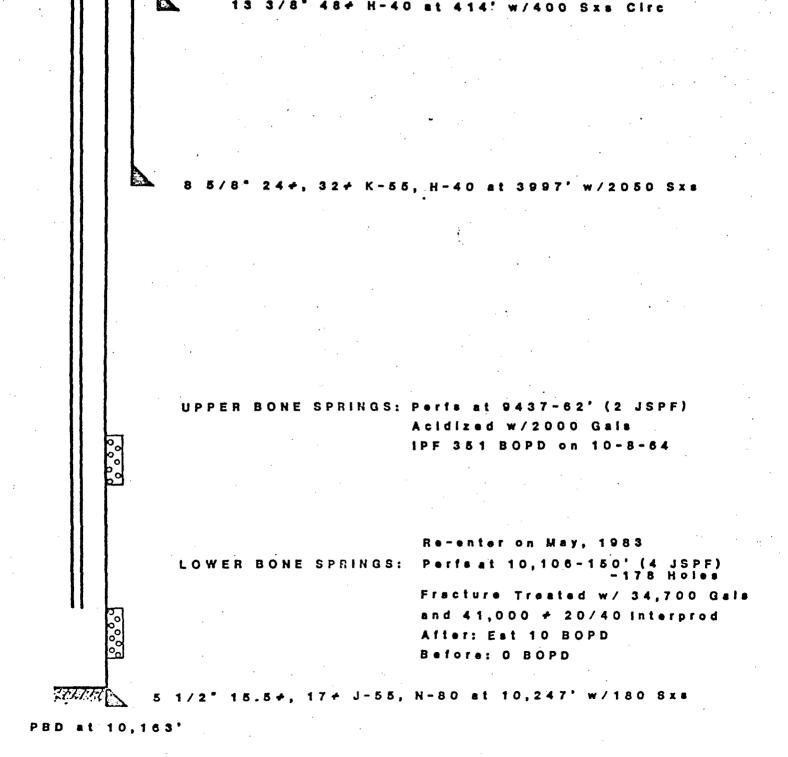
MAY_4 1984

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.
- The current performance of the State AZ No. 2 to date clearly supports q. 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

w/400

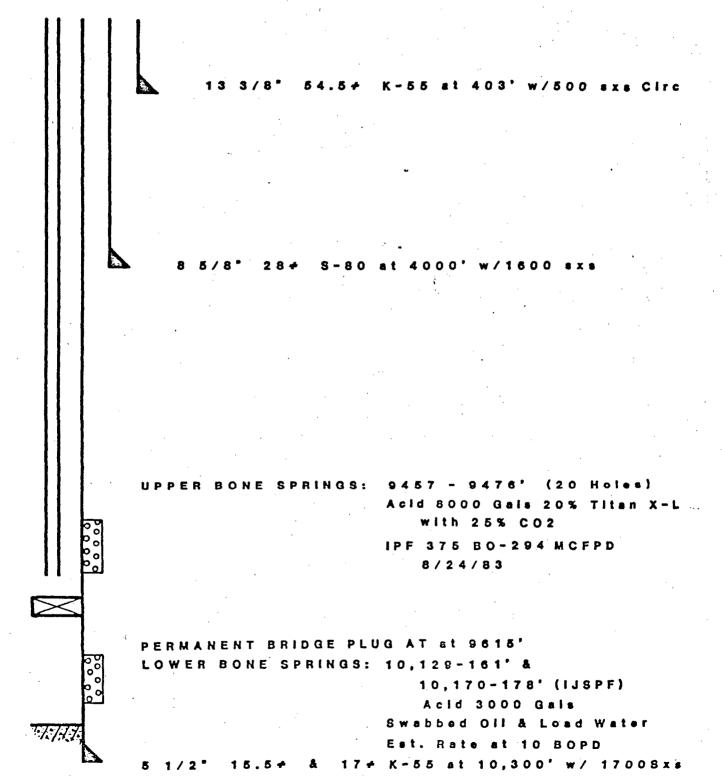


ATTACHMENT IV

ATTACHMENT V

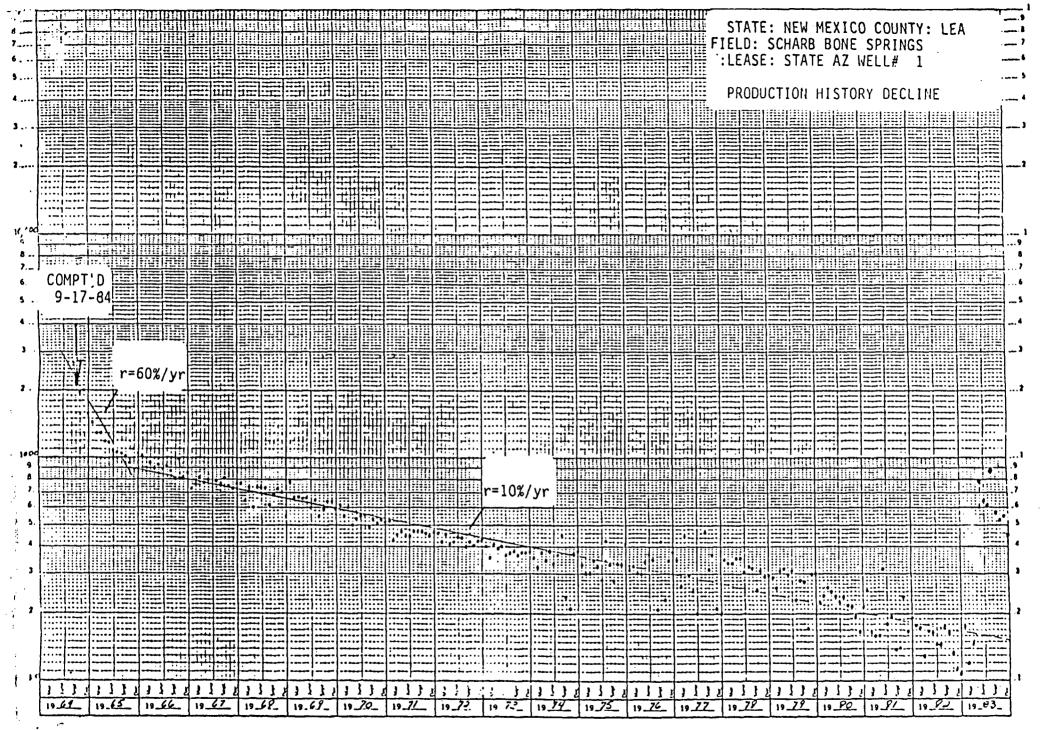
- a. State AZ No. 2
 1980' FNL & 660' FEL
 Section 6, T-19-S, R-35-E
 Lea County, New Mexico
- b. Spud Date: 6-16-83
- c. Completion Date: 8-24-83
- d. No mechanical problems experienced.
- e. Current rate of production, December, 1983: 135 BOPD + 193 MCFPD.
- f. Producing well, not plugged.
- g. See Attachment III.



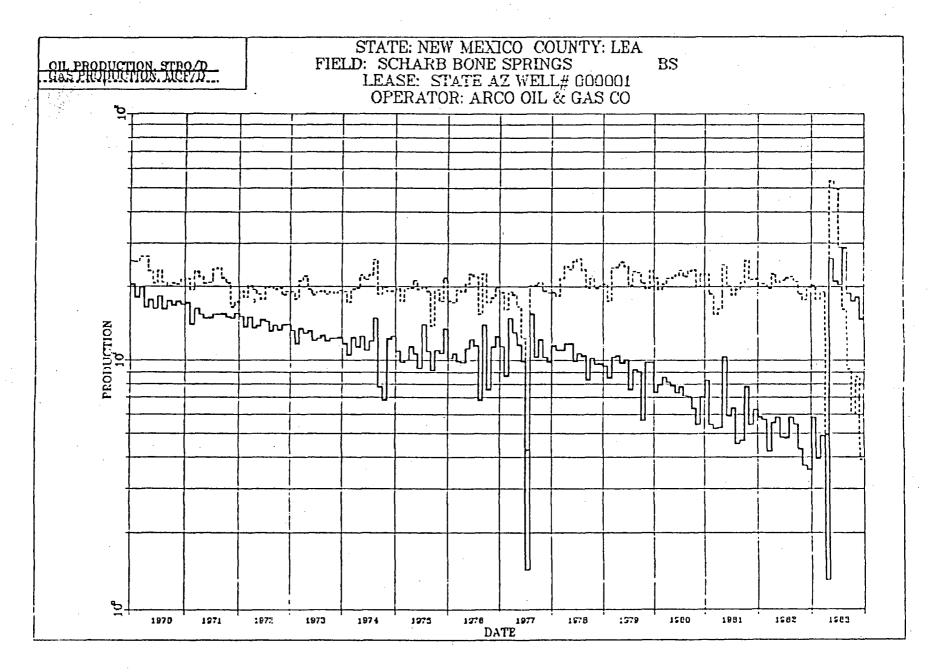


PBD at 10,220*

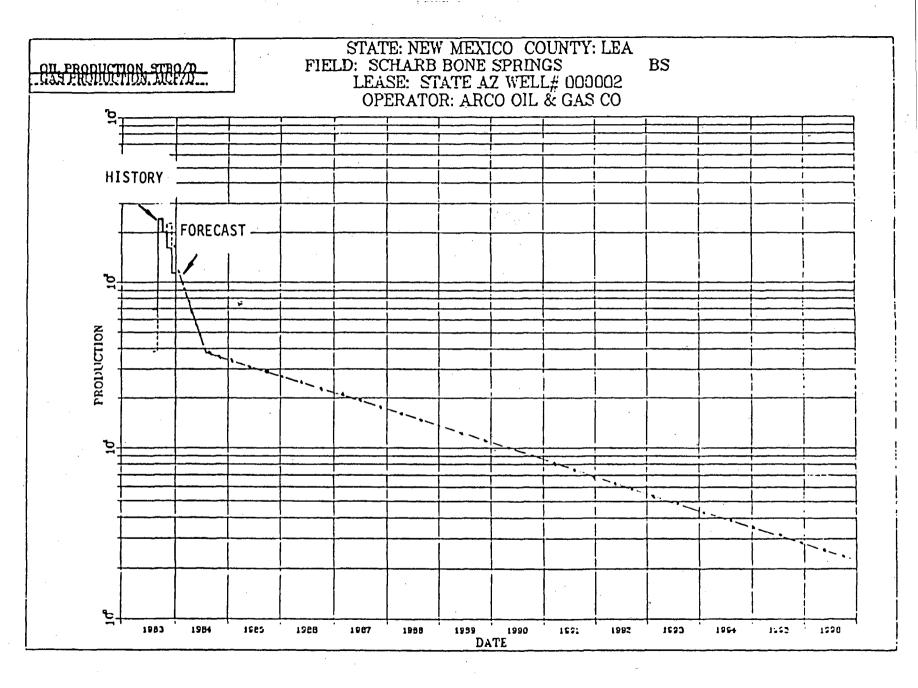
ATTACHMENT VI



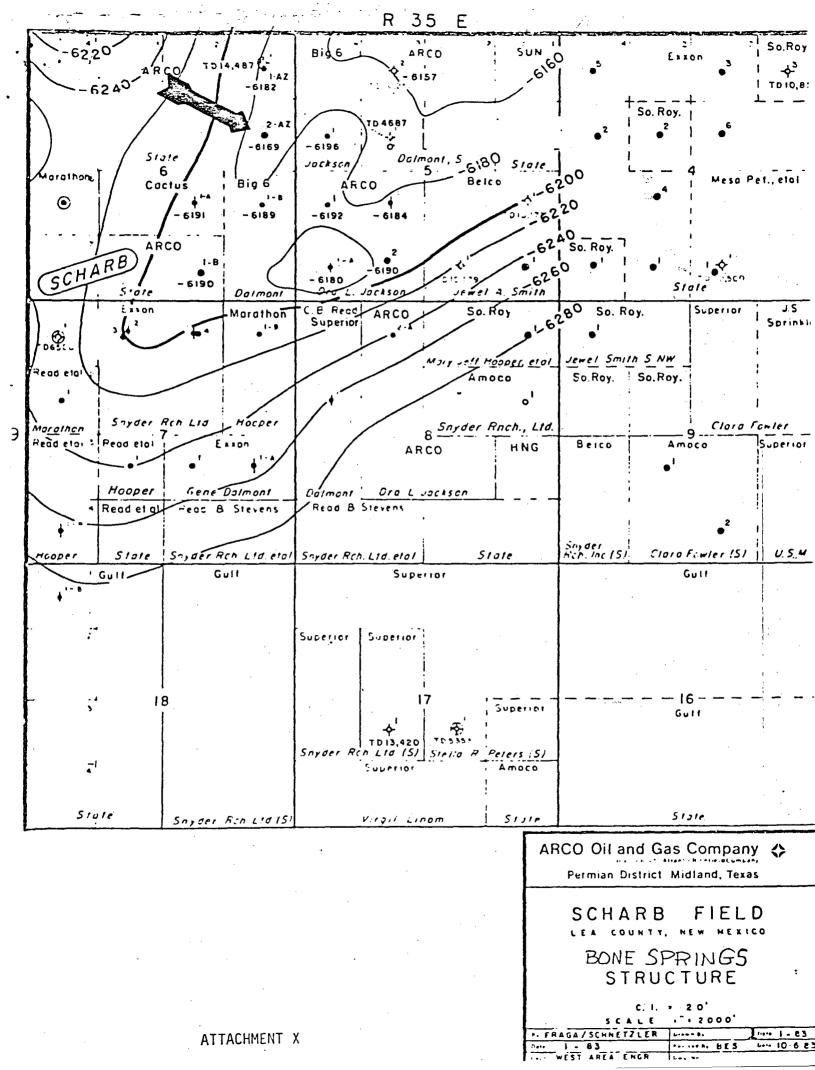
ATTACHMENT VII

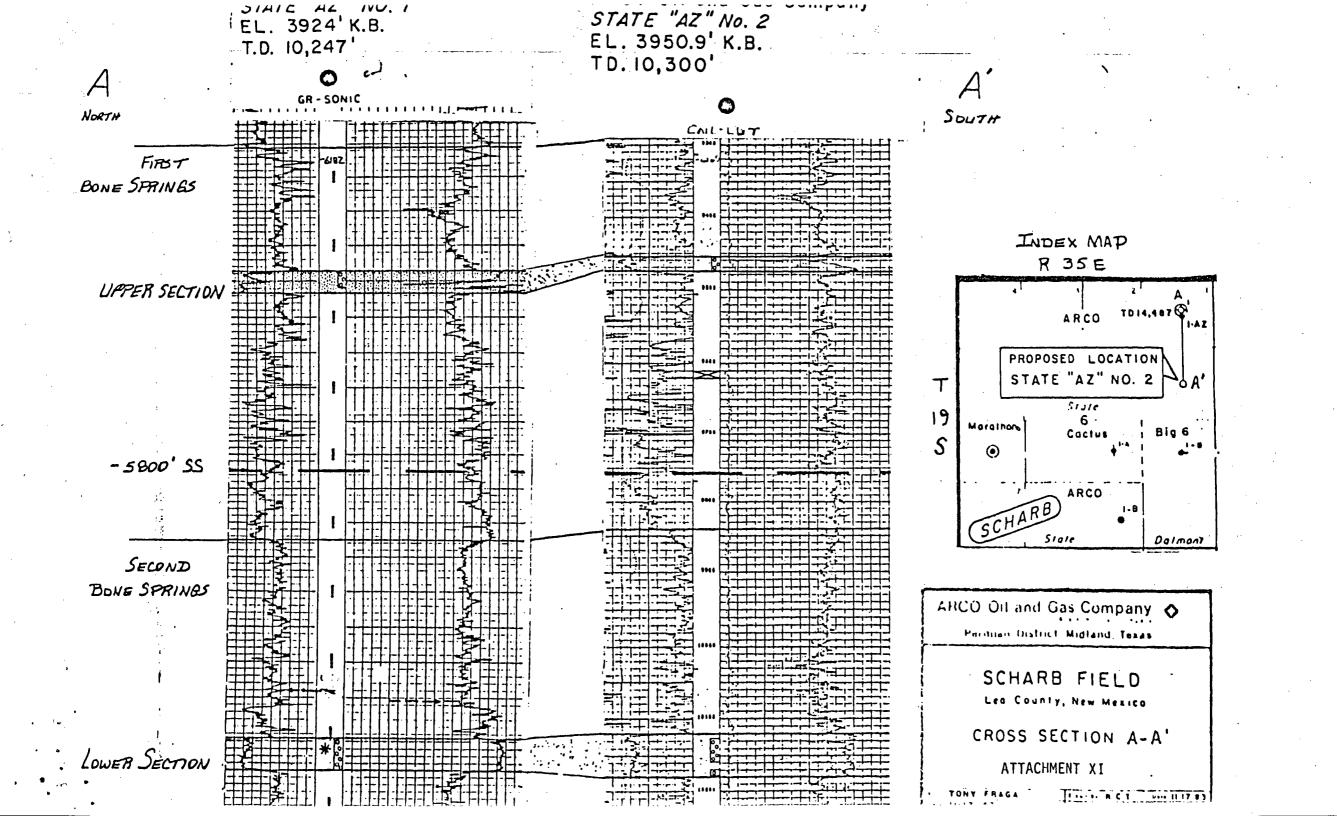


ATTACHMENT VIII



ATTACHMENT IX





STATE AZ WELL NO. 2 Lea County, New Mexico SCALE : 1" = 300'

UNIT LETTER H

SECTION 6 TOWNSHIP 19 S RANGE 35 E

WELL NO. 2 6 - 16 - 83 (TEST) 375 | 294 | 0 9.45 7.25 1.59

SCHARB (BONE SPRINGS) 0 6-16-83 SPUD DATE

	BOPD	MCFPD	BWPD	
	CUM MBO	CUM MMCF	CUM MBW	
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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

MERCY AND MINERALS DEPARTMENT 37501 NFL	STATE OF NEW MEXICO	OIL CONSERVATION DIVISION P. O. Box 2088 SANTA FE, NEW MEXICO	Application Received 4/23/84 ADMINISTRATIVE ORDER
SECTION 721.305(b) OF THE FEDERAL ENERGY RECULATORY COMMISSION REGULATIONS, NATURAL GAS POLICY ACT OF 1978 AND OIL CONSERVATION DIVISION ORDER NO. R-6013-A perator <u>ARCO O/ T bas Company</u> Well Name and No. <u>Staft "NI" Well Mo.2</u> coation: Unit <u>H</u> Sec. <u>6</u> Typ, <u>19 Sout</u> Rng. <u>35 East</u> Cty. <u>dea</u> I. <u>BE DIVISION FINDS</u> : 1) That Section 271.305(b) of the Federal Energy Regulatory Commission Regulations promulgated ursuant to the Natural Gas Policy Act of 1978 provides that, in order for an infill well to qualify a new onshore production well under Section 103 of said Act, the Division must find that the fill well is necessary to effectively and efficiently drain a portion of the reservoir covered y the proteion unit which cannot be so drained by any existing well within that unit. 2) That by Order No. R-6013-A, dated Pebruary 8, 1980, the Division established an administrative procedure whereby the Division Directors and the Division Examiners are empowered to act for the ivision and find that an infill well is necessary. 3) That the well for which a finding is sought is completed in the <u>School - Gene Springs</u> Pool, and the standard spacing unit in said pool, is <u>20</u> acres 4) That <u>80</u> acre protation unit comprising the <u>51/2</u> "Well 5) That this protation unit is (M standard () nonstandard; if nonstandard, said unit was previor proved by Order No. <u>M</u> 6) That said protation unit is not being effectively and efficiently drained by the existing 20] That the drilling and completion of the well for which a finding is sought should result in the production of an additional <u>(0,000</u> MCF of gas from the protation unit, which would not therefore the additional <u>(0,000</u> MCF of gas from the protation unit, the subject 71 That the drilling and completion unit which cannot be so drained by any existing well within the net. 71 That the applicant is hareby authorized to drill the well described in Section I above as an 71 that in order to permit effective and efficient drainage of said protation uni	SAUL AND MINERALS DEPARTMENT	87501	NFL <u>87</u>
<pre>perator</pre>	SECTION 271 COMMISSION REC		REGULATORY Act of 1978
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rocedure whereby the Division Director and the Division Examiners are empowered to act for the ivision and find that an infill well is necessary. 3) That the well for which a finding is sought is completed in the <u>Scherb Benc Springs</u> Pool, and the standard spacing unit in said pool is <u>10</u> acres 4) That a <u>30</u> -acre proration unit comprising the <u>$F/2$ WE/4</u> f Sec. <u>6</u> , Twp. <u>/fSord</u> , Rng. <u>35 Fast</u> , is currently dedicated to the <u>State "A2" WE/1</u> <u>Mo./</u> located in Unit <u>A</u> of said section. 5) That this proration unit is (M) standard () nonstandard; if nonstandard, said unit was previor pproved by Order No. <u>MA</u> 6) That said proration unit is not being effectively and efficiently drained by the existing ell(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 <u>10,000</u> MCF of gas from the proration unit which would not therwise be recovered. 8) That all the requirements of Order No. \hat{R} -6013-A have been complied with, and that the well cor which a finding is sought is necessary to effectively and efficiently drain a portion of the eservoir covered by said proration unit which cannot be so drained by any existing well within the nit. 9) That in order to permit effective and efficient drainage of said promation unit, the subject pplication should be approved. 7 IS THEREFORE ORDERED: 1) That the applicant is hereby authorized to drill the well described in Section I above as an fill well on the existing promation unit which cannot be effectively and efficiently drained by ny existing well thereon. 2) That jurisdiction of this cause is retained for the entry of such further orders as the ivision may deem necessary. (ONE at Santa Fe, New Mexico, on this <u>day of</u> <u>.</u> .	rsuant to the Natural Gas Policy a new onshore production well fill well is necessary to effect the proration unit which cannot	y Act of 1978 provides that, in under Section 103 of said Act, tively and efficiently drain a t be so drained by any existing	n order for an infill well to qualify the Division must find that the portion of the reservoir covered g well within that unit.
Pool, and the standard spacing unit in said pool is 30 acres 4) That a 30 -acre proration unit comprising the F_2 $4F_4$ f Sec. 6 , Twp. $fSouth$, Rng. $35F_{ast}$, is currently dedicated to the $State$ AZ^* MEH M_{ab} /	ocedure whereby the Division Division Division and find that an infill w	rector and the Division Examine well is necessary.	ers are empowered to act for the
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ARCO Oil and Gas Company Permian District Post Office Box 1610 Midland, Texas 79702 Telephone 915 684 0100

APR 23 1984 CONSERVATION DIVISION SANTA EE

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,

AAR

J. A. Fraga Sr. Operations/Analytical Engineer

JAF:sc Atts. ARCO Oil and Gas Company State AZ No. 2 Page 2

- 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. ARCO Oil and Gas Companh State AZ No. 2 Page 3

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.
 - \emptyset = average porosity = 11.56%
 - Sw = average water saturation = 20%
 - Bo = formation volume factor = 1.35 RVB/STB
- 2) 00IP = $\frac{7758 \text{ Ah}\emptyset(1 \text{Sw})}{\text{Bo}}$

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

3) Ult. Rec.

Well #1 = 114 MBO or 10.7% of OOIP

Ult. Réc. 🐂

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

Production decline curves - see Attachments VII, VIII and IX.
 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.

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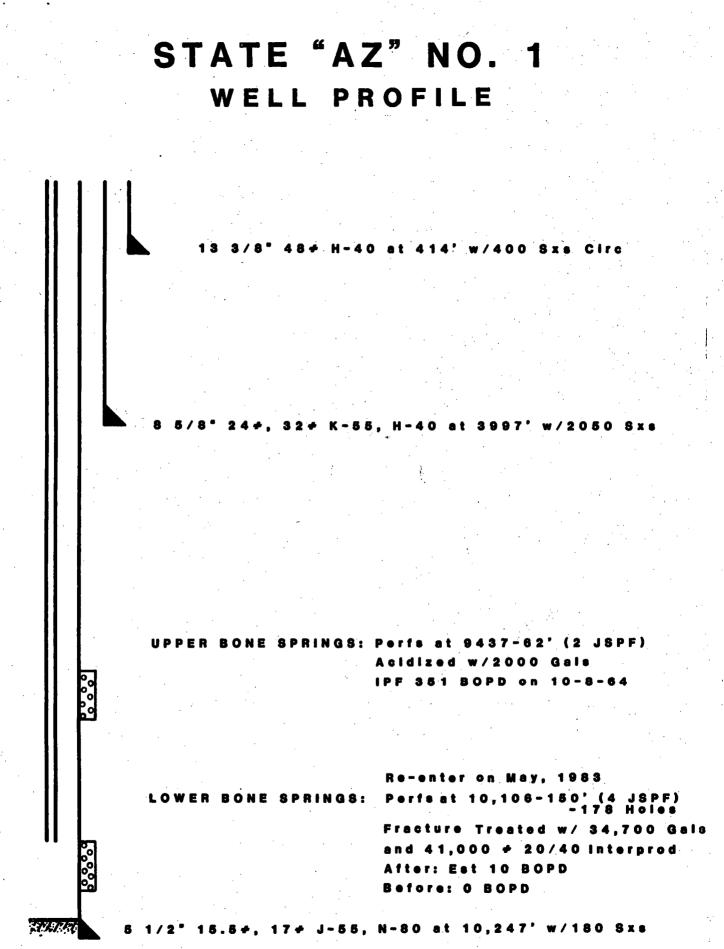
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ATTACHMENT III

- 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.
- The current performance of the State AZ No. 2 to date clearly supports g. 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.



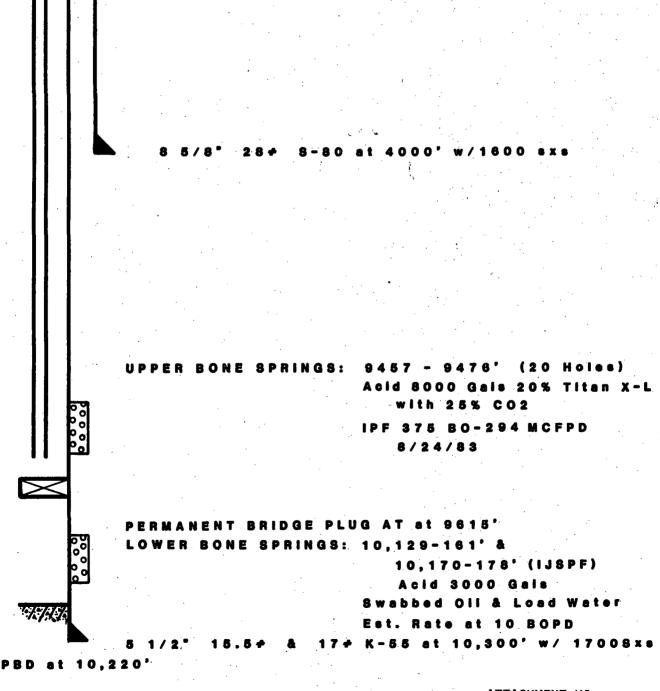
PBD at 10,163'

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.

ATTACHMENT VI

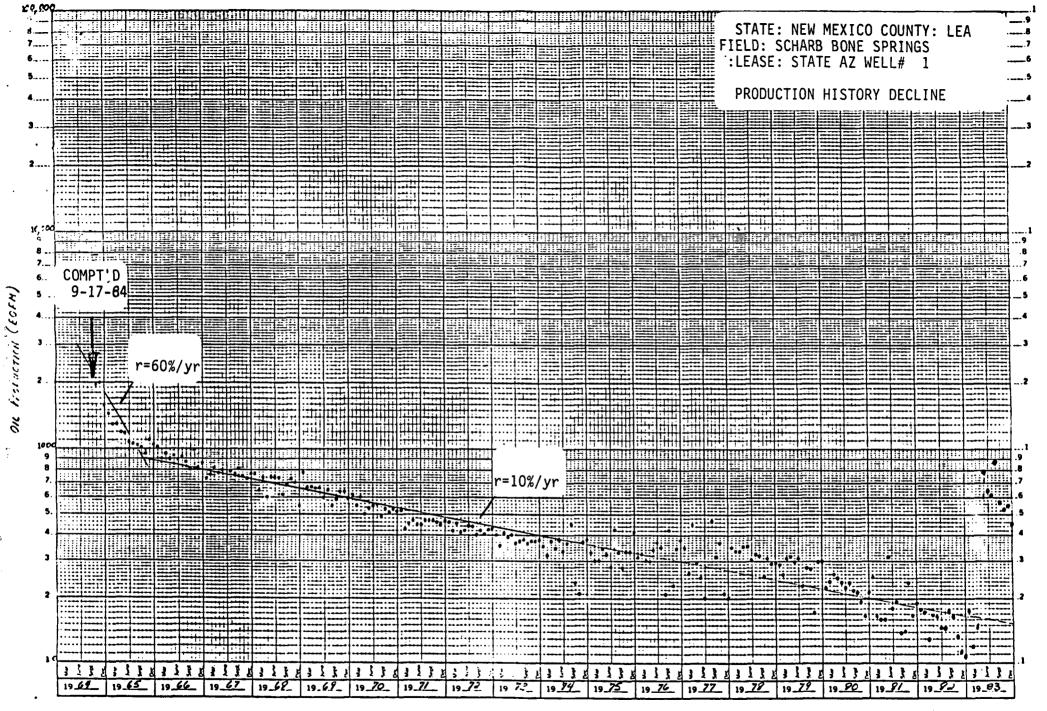


STATE "AZ" NO. 2 Well profile

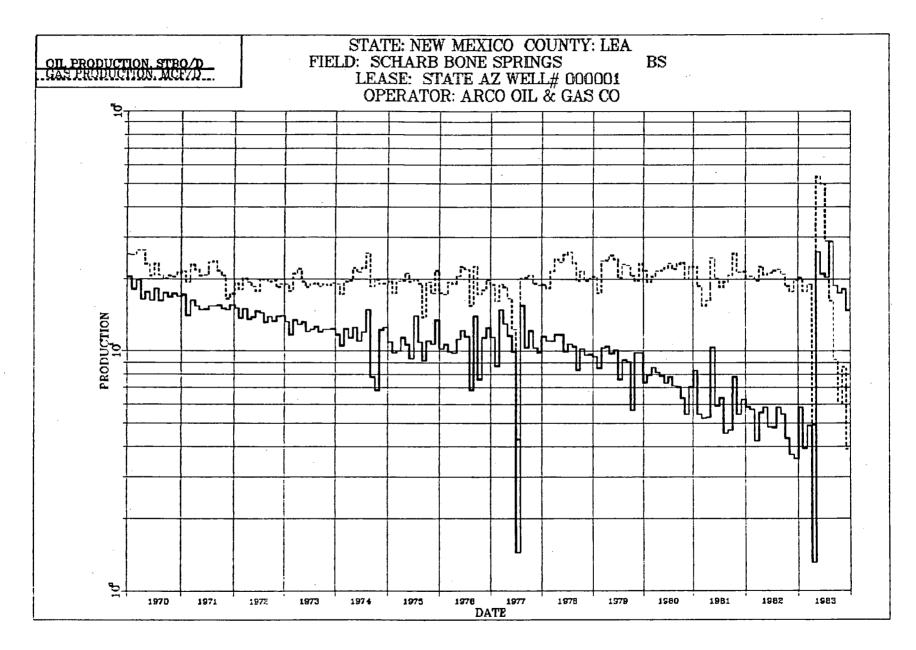
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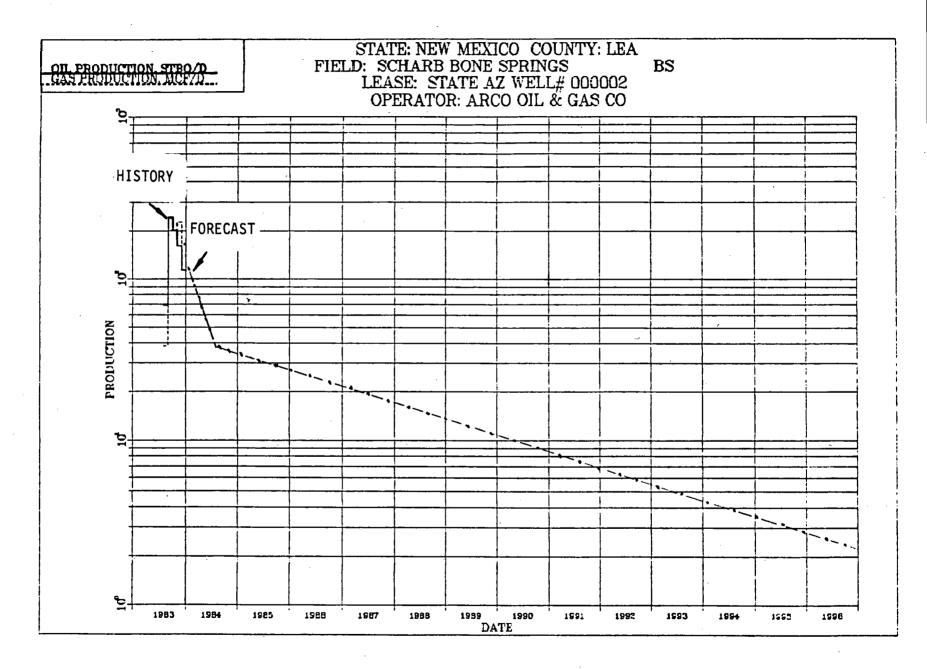
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ATTACHMENT VII

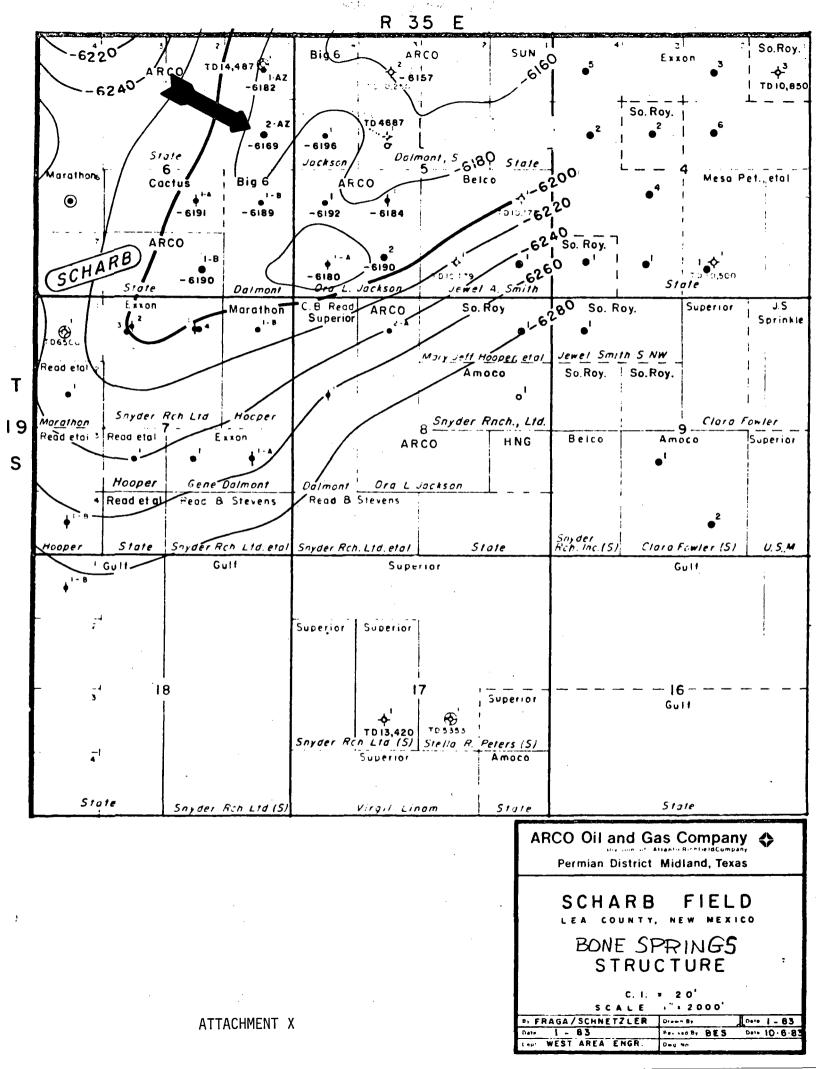


ATTACHMENT VIII

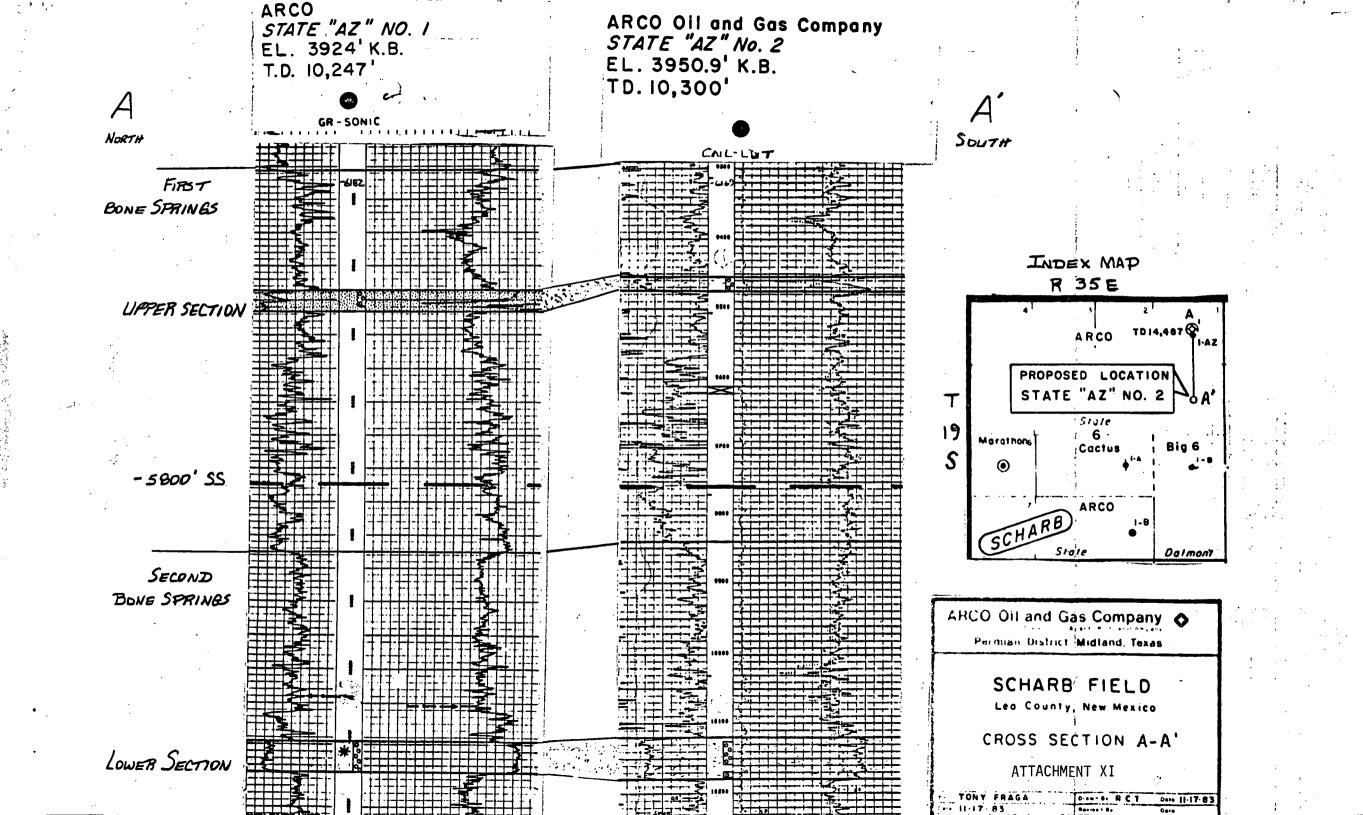


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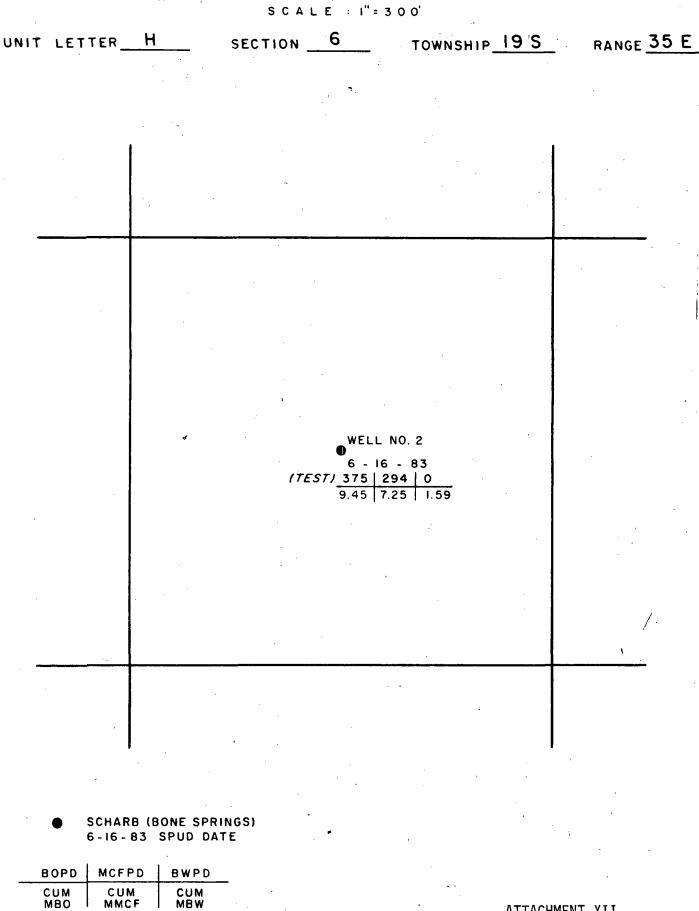
ATTACHMENT IX



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STATE AZ WELL NO. 2 Lea County, New Mexico



CUMULATIVES AS OF 9-83

11-12

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.

ARCO Oil and Gas Company State AZ No. 2 Page 2

- 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. ARCO Oil and Gas Companh State AZ No. 2 Page 3

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

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

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

Production decline curves - see Attachments VII, VIII and IX.
 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.

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ATTACHMENT II

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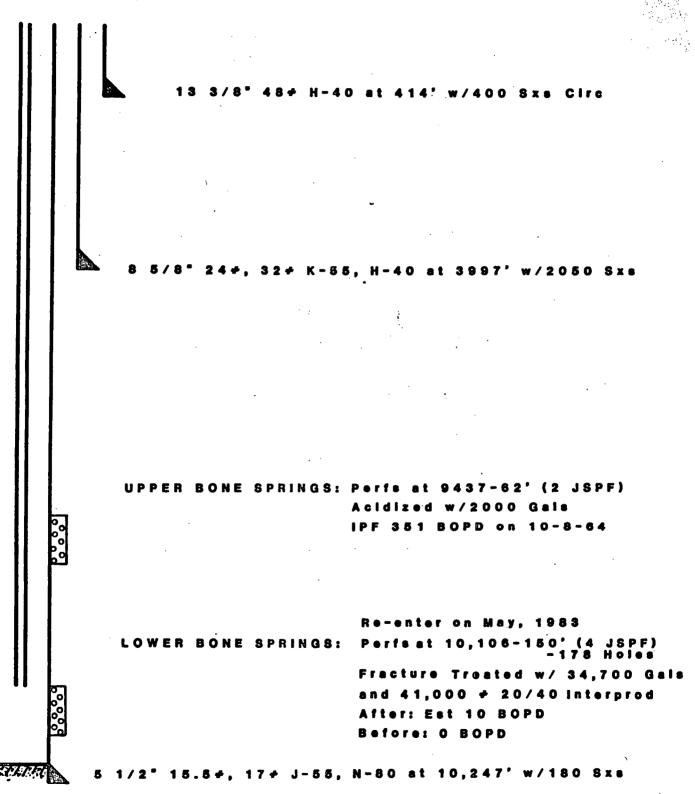
JOHN W. WEST 676

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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.
- The current performance of the State AZ No. 2 to date clearly supports g. 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



PBD at 10,163'

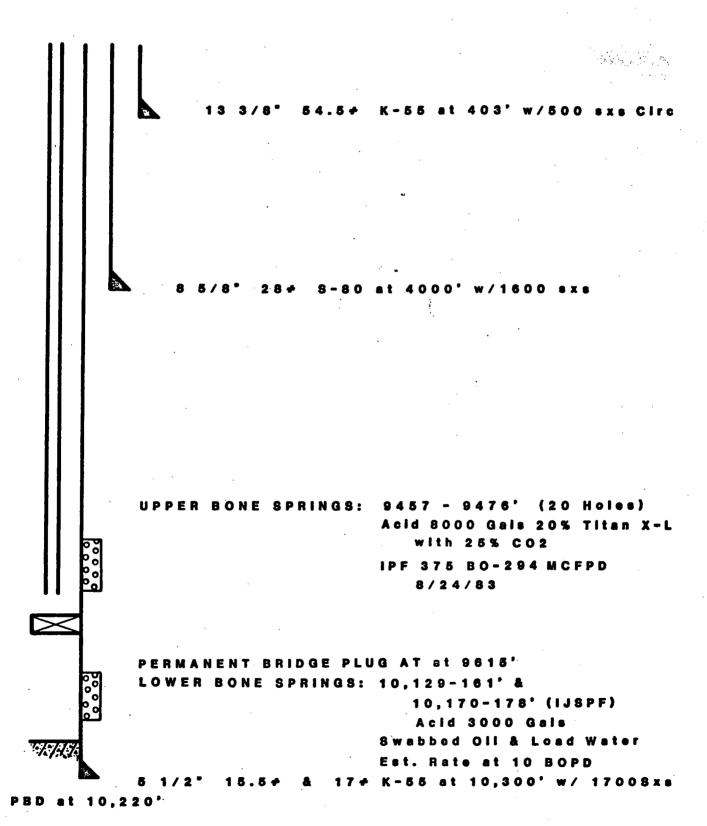
ATTACHMENT IV

ATTACHMENT V

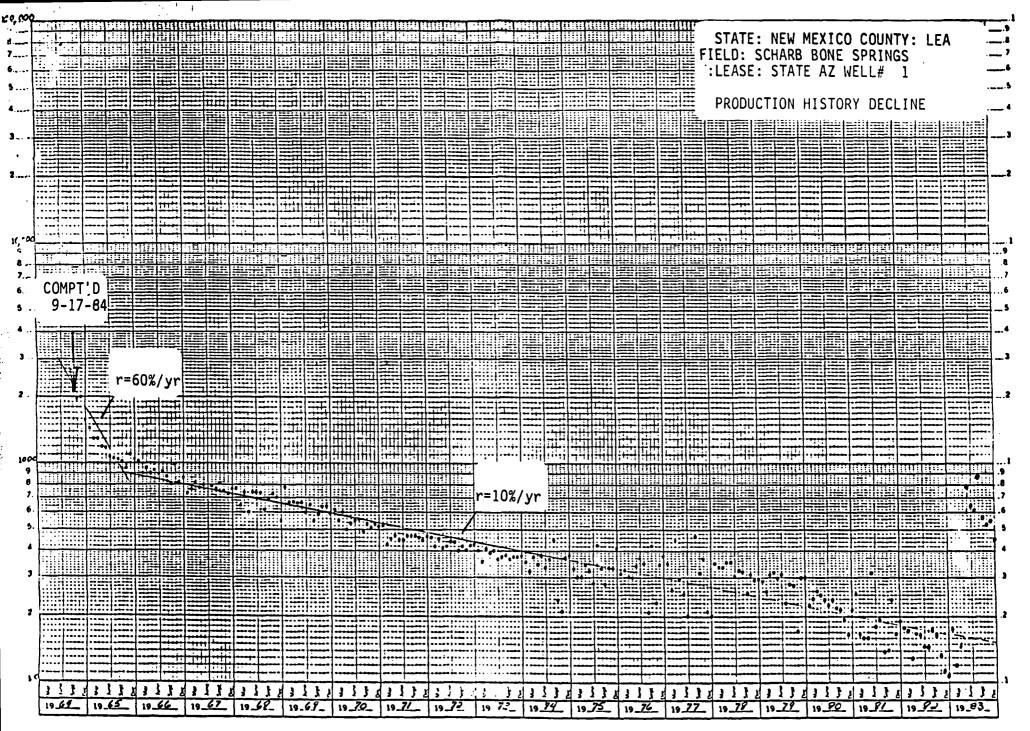
- a. State AZ No. 2 1980' FNL & 660' FEL Section 6, T-19-S, R-35-E Lea County, New Mexico
- b. Spud Date: 6-16-83
- c. Completion Date: 8-24-83
- d. No mechanical problems experienced.
- e. Current rate of production, December, 1983: 135 BOPD + 193 MCFPD.
- f. Producing well, not plugged.
- g. See Attachment III.

STATE "AZ" NO. 2

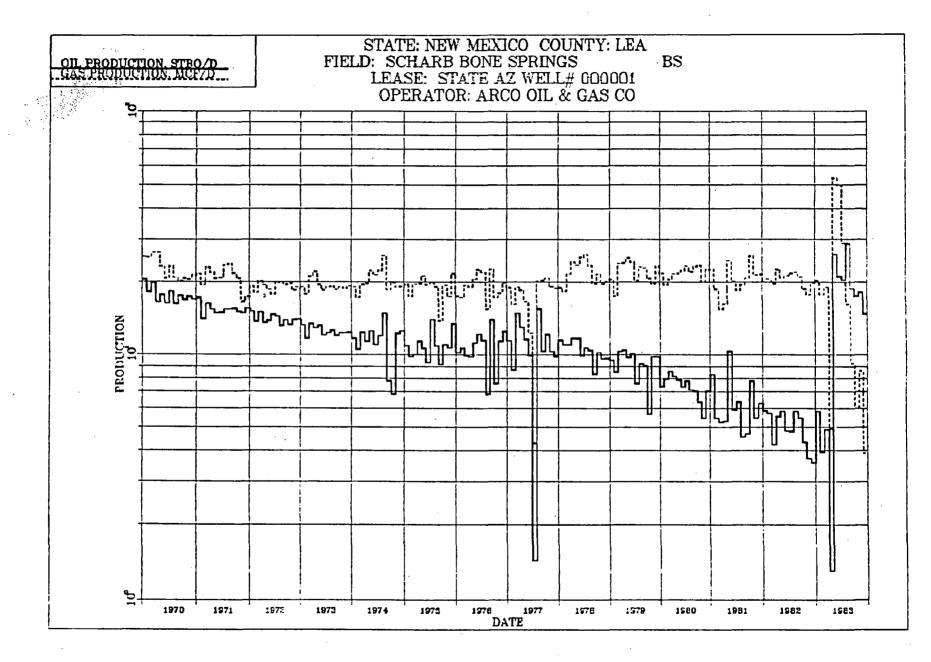
WELL PROFILE



ATTACHMENT VI



ATTACHMENT VII

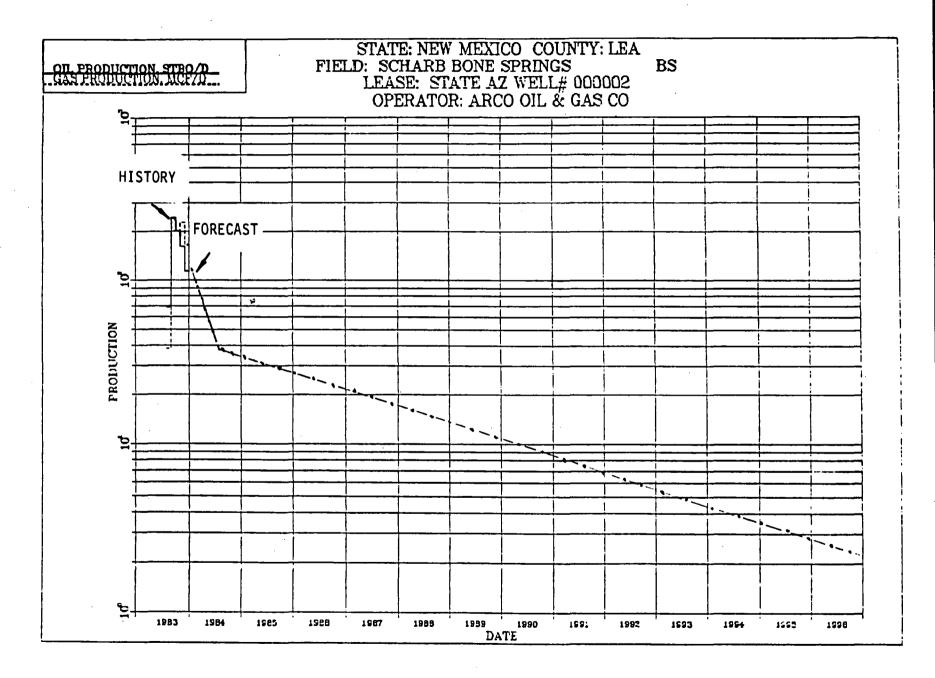


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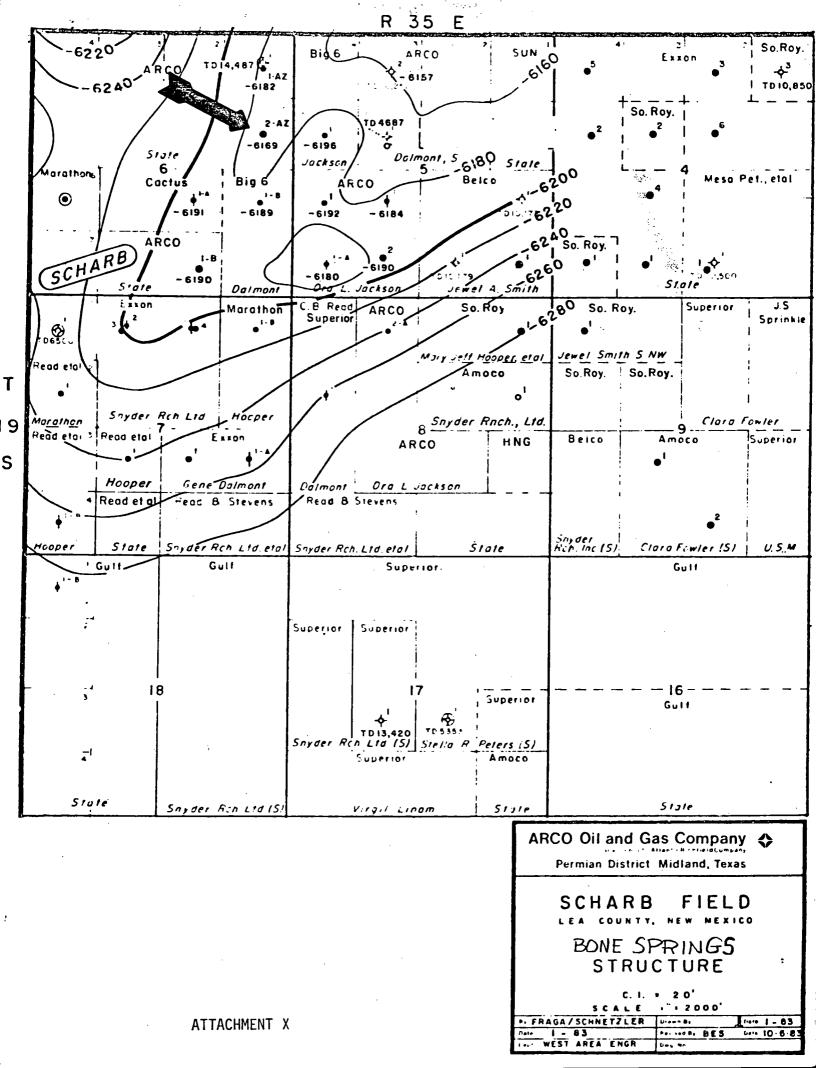
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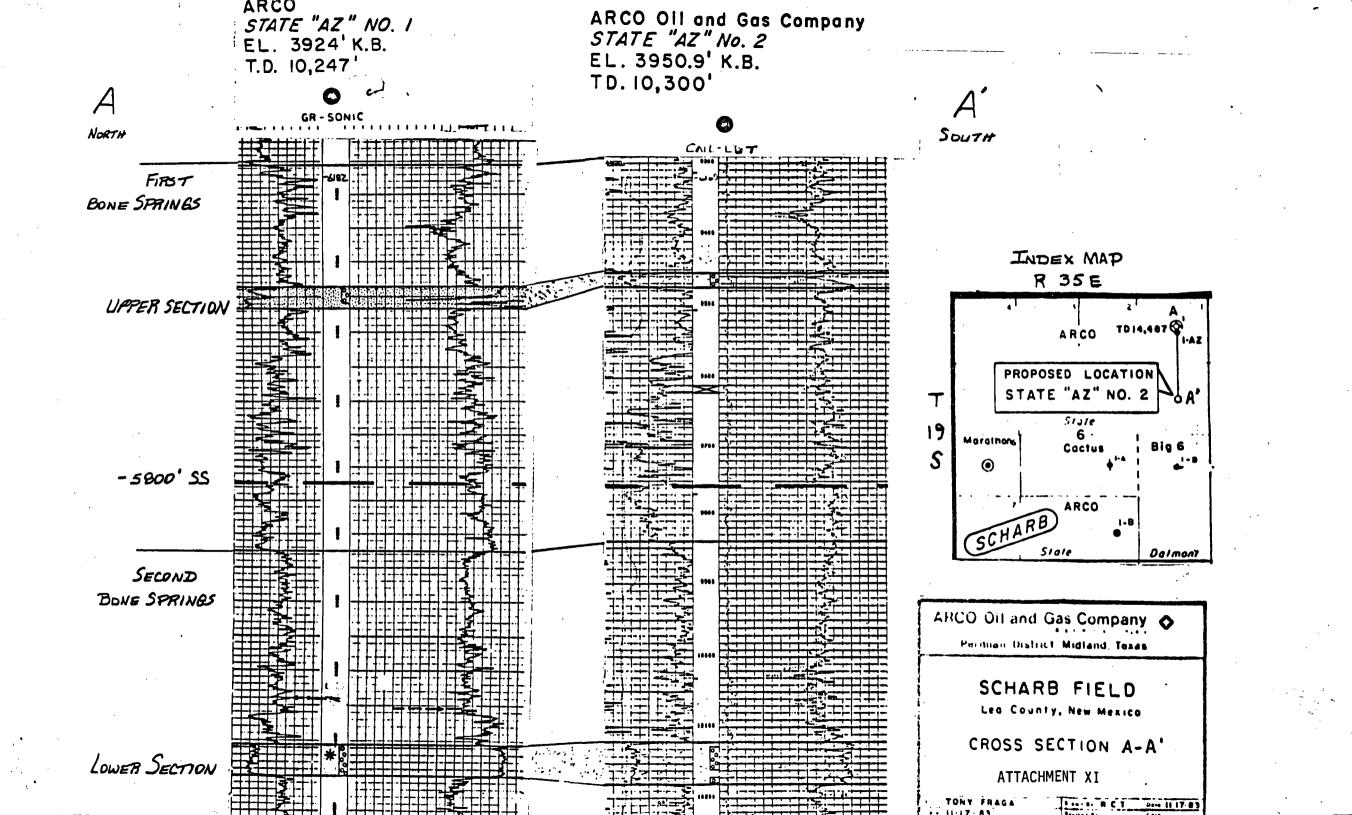
ATTACHMENT VIII

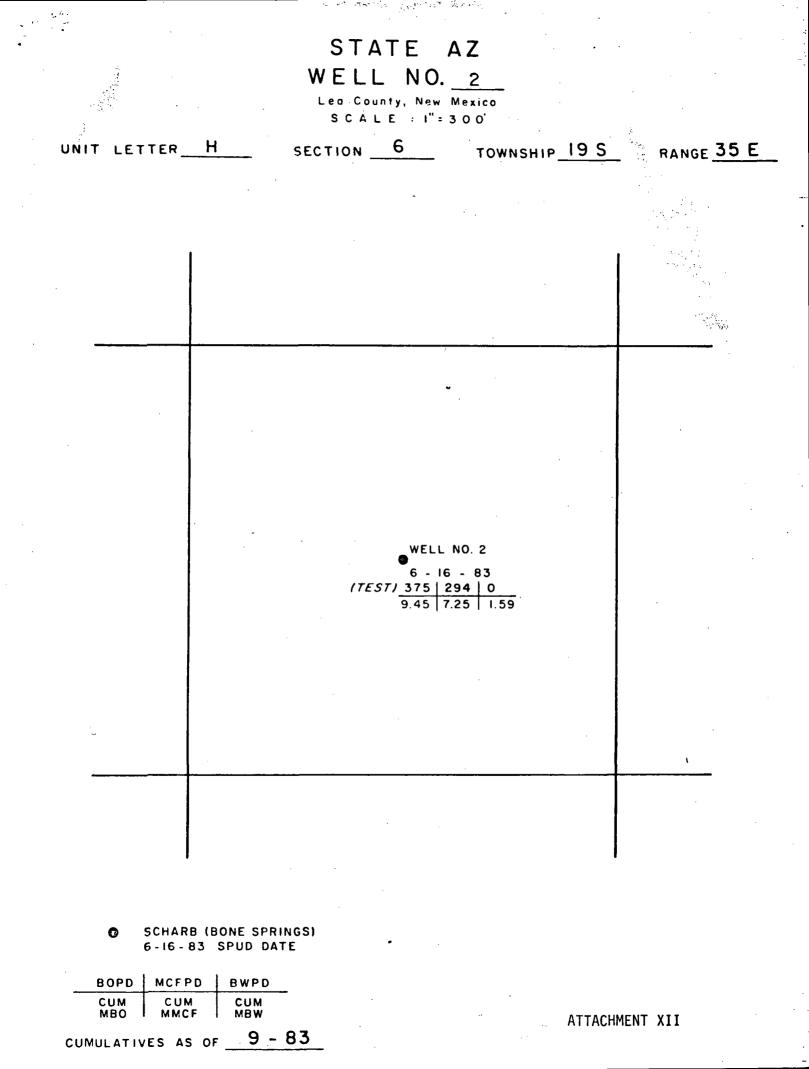


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ATTACHMENT IX







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