CASE 6930: AMOCO PRODUCTION COMPANY FOR AN UNORTHODOX WELL LOCATION, EDDY COUNTY NEW MEXICO

CASE NO.

6930

APPLICATION,

TRANSCRIPTS,

SMALL EXHIBITS,

ETC.

ms.

Amoco Production Company
Houston Region
501 WestLake Park Boulevard
Post Office Box 3092
Houston, Texas 77253

R. E. Ogden
Regional Engineering
Manager

Case File for
R-6415
Case 6930

April 16, 1985

File: JCA-986.51NM-3097

Re: Empire S. Deep Unit Well No. 2
660' FNL & 660 FEL, Section 36, T-17-S, R-23-E
South Empire Morrow, Gas Pool
Eddy County, N.M.

RECEIVED
APR 19 1985
OIL CONSERVATION DIVISION
SANTA FE

State of New Mexico
Energy and Mineral Department
Oil Conservation Division
State Land Office Building
Old Santa Fe Trail
Santa Fe, N.M. 87501

Attention: Mr. R. L. Stamets

Gentlemen:

The referenced well has ceased to flow against the sales line pressure of 420 psi due to normal pressure depletion. A compressor will be installed on the well to maintain production at a flowing tubing pressure similar to that of the competative offset well, the Hondo Oil and Gas Company St. "BV" No. 2. Both the Empire South Deep Unit No. 21 and St. "BV" No. 2 wells are currently completed in the same reservoir and are selling to a common gas purchaser. Upon completion of the compression installation the gas allowable for the Empire South Deep Unit No. 21 will be determined by application of NMOCC Order No. R-6415. The resulting gas allowable will be 50% of the well's subsequent deliverability or 1 MMCFD whichever is greater.

A copy of this letter has been forwarded to Hondo Oil & Gas Company, the offset operator of the St. "BV" No. 2 well.

R. E. Ogden

MLC/dch
/055

cc: Hondo Oil and Gas Co.
Box 1610
Midland, Tx. 79702

Husky

Husky Oil Company

600 South Cherry Street
Denver, Colorado 80222
(303) 320-4040

June 20, 1980

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JUN 2 1980
OIL CONSERVATION DIVISION
SANTA FE

Oil Conservation Commission
New Mexico Energy & Mineral Department
Land Office Building
Santa Fe, New Mexico 87503

RE: Case No. 6930

Gentlemen:

Husky Oil Company, under State of New Mexico Lease #647-368, which includes Sec.25-T17S-R28E, Eddy County, New Mexico, owns a 15.97222% working interest in said Sec.25-T17S-R28E. This 15.97222% working interest applies to the following interval: from 500' below the top of the San Andres Formation to any depth. Husky Oil Company also owns a 6.12338% beneficial interest, 6.31406% working interest in the Empire South Deep Unit, Eddy County, New Mexico.

Amoco Production Company, as operator of the Empire South Deep Unit, has applied for an unorthodox Morrow well to be located 660' FEL and 660' FNL, Sec.36-T17S-R28E, Eddy County, New Mexico. Since a Morrow dry hole (Unit Well #19) exists at a location 660' FEL and 2280' FNL, Sec.36-T17S-R28E, Husky Oil Company as an offset working interest owner objects to the proposed unorthodox location.

If the Commission deems it advisable to grant the unorthodox location, we strongly recommend that a severe allowable restriction be placed on the proposed unorthodox location. The previously mentioned Empire South Deep Unit Well #19 dry hole definitely demonstrates that the entire 320 acre spaced unit (E/2 Sec.36-T17S-R28E) is not productive from the Morrow Formation. Such an allowable restriction should protect the correlative rights and ownership of offset owners.

Respectfully submitted,

J. L. Corkill

HUSKY OIL COMPANY
J. L. Corkill
Manager, Joint Interest Production

JLC:dh

Husky

Husky Oil Company

600 South Cherry Street
Denver, Colorado 80222
(303) 320-4040

June 20, 1980

Oil Conservation Commission
New Mexico Energy & Mineral Department
Land Office Building
Santa Fe, New Mexico 87503

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Respectfully submitted,

J. L. Corkill

HUSKY OIL COMPANY
J. L. Corkill
Manager, Joint Interest Production

JLC:dh

Husky Oil Company

600 South Cherry Street
Denver, Colorado 80222
(303) 320-4040

June 20, 1980

Oil Conservation Commission
New Mexico Energy & Mineral Department
Land Office Building
Santa Fe, New Mexico 87503

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Respectfully submitted,

J. L. Corkill

HUSKY OIL COMPANY
J. L. Corkill
Manager, Joint Interest Production

JLC:dh

CABOT CORPORATION
STAR ROUTE A, BOX 335
HOBBS, NEW MEXICO 88240
PH. 505 397-3634

December 11, 1981

RECEIVED
DEC 14 1981
O. C. D.
ARTESIA, OFFICE

Case 6930

Mr. Bill Gressett
Energy & Mineral Dept.
Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

Re: Amoco Empire Well No. 21
Certification of Deliverability
Empire South Deep Unit #21-A 36-17-28

Dear Sir:

With reference to Rule 5, Commission Order R-6415, we show on October 4, 1981, that the Amoco Empire No. 21 well flowed for a 24-hour average of 14,600 MCFD for the day. This certifies the deliverability of the subject well at the above volume.

If we can be of further assistance, please let us know.

Very truly yours,

Jerry Clark
Operations Supt.

JC/cw
cc: Dave Blazer
Amoco Production
205 E. Bender
Hobbs, NM 88240

Mike Scott
Ed Morris

12/16
Harold -
This well's allowable for the period from January 1, 1982 through June 30, 1982, pursuant to the provisions of Order No. R-6415, shall be 50 percent of 14,600 MCF/day, or 7,300 MCF/day
Jerry

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

November 24, 1981

Mr. R. G. Smith
Amoco Production Company
Box 3092
Houston, Texas 77001

Dear Mr. Smith:

You are authorized to produce your Empire South Deep Unit Well No. 21 at a rate not to exceed 1,000 MCF per day until the well's overproduction is made up.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Amoco Production Company (USA)
500 Jefferson Building
P.O. Box 3092
Houston, Texas 77001

NOV 23 1981
OIL CONSERVATION DIVISION

November 19, 1981

File: JCA-986.511-0226

Re: Case No. 6930, Order No. R-6415
Application of Amoco Production Company
For An Unorthodox Gas Well Location for
Empire South Deep Unit Well No. 21
Eddy County, New Mexico

Mr. Joe D. Ramey, Director
State of New Mexico
Energy and Minerals Department
Oil Conservation Division
State Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

We are in receipt of your letter of November 13, 1981 addressed to Mr. James Allen in which you conclude that Amoco has over produced its allowable on the subject well.

While we believe that your Order of August 5, 1980 is clear and unambiguous in how the initial deliverability is to be calculated according to the Division "Manual for Back-Pressure Testing of Natural Gas Wells" which results in an underproduction of 2,765,486 cumulative MCF through September 30, 1981, we nevertheless, will abide by your decision.

Since the overproduction was incurred during a period when we honestly and sincerely believed we were underproduced while acting under an allowable issued by the New Mexico Oil Conservation Division and felt some obligation to our associates and royalty owners in the Unit to make up such apparent underage, we request that consideration be given to permit Amoco to produce such well at not more than the minimum allowable of 1,000 MCFD until the overage is made up. An extended shut-in period may result in wellbore damage to such an extent that future allowables based on deliverability will be unrealisticly low. We do not believe Amoco should be punished to this extent when we were operating under the assumption that we were following New Mexico Oil Conservation Division orders and acting under an allowable issued by the New Mexico Oil Conservation Division under such order.

Please feel free to contact Mr. Jim Allen (713) 652-5497 or Clyde Mote (713) 652-5528 if you have any questions concerning our request.

R. G. Smith

R. G. Smith
Regional Engineering Manager-West

JCA/lrd

cc: Mr. Jerry Tweed
ARCO Oil & Gas Company
P.O. Box 1610
Midland, Texas 79702

CABOT CORPORATION
STAR ROUTE A. BOX 335
HOBBS, NEW MEXICO 88240
PH. 505 397-3634

Dick Stamets

October 21, 1981

Case 6930

RECEIVED
OCT 22 1981
O. C. D.
ARTESIA, OFFICE

Mr. Bill Gressett
Energy & Mineral Dept.
Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

Re: Amoco Empire Well No. 21

Dear Sir:

In reference to Rule 5, Commission Order R-6415, we show on May 22, 1981, that the Amoco Empire No. 21 well flowed for a 24-hour average of 10,957 MCFD for the day. We confirmed that volume with Ray Cox of Amoco on or about June 11, 1981.

If we can be of further assistance, please let us know.

Very truly yours,

Jerry Clark
Operations Supt.

JC/cw
cc: Dave Blazer
Amoco Production
205 E. Bender
Hobbs, NM 88240

Mike Scott
Ed Morris

RECEIVED
OCT 26 1981
OIL CONSERVATION DIVISION
SANTA FE

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
25 June 1980

EXAMINER HEARING

IN THE MATTER OF:

Application of Amoco Production Company for an unorthodox well location, Eddy County, New Mexico.

CASE 6930

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant, Amoco Production Company: Guy Buell, Esq.
Amoco Production Company
Houston, Texas

For ARCO: Owen Lopez, Esq.
MONTGOMERY, ANDREWS Law Firm
Paseo de Peralta
Santa Fe, New Mexico 87501

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

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JERRY L. TWEED

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. STAMETS: We'll call at this time Case 6930.

MR. PADILLA: Application of Amoco Production Company for an unorthodox well location, Eddy County, New Mexico.

MR. BUELL: May it please the Examiner, my name is Guy Buell, representing Amoco Production Company.

MR. STAMETS: Are there other appearances in this case?

MR. LOPEZ: Mr. Examiner, my name is Owen Lopez, with the law firm of Montgomery and Andrews, P. A., Santa Fe, New Mexico, appearing on behalf of the Atlantic Richfield Company, and I have one witness to be sworn.

MR. STAMETS: Any other appearances? I'd like to have all those who are going to be witnesses in this case stand and be sworn at this time.

(Witnesses sworn.)

MR. BUELL: Mr. Examiner, I realize the hour is late and everyone here, that's still here, is tired, so I will make every effort to move right along.

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

HAROLD M. BROWN

being called as a witness and having been duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. BUELL:

Q. Mr. Brown, would you state your complete name, by whom you're employed, and in what capacity, and at what location, please?

A. My name is Harold Michael Brown. I'm presently employed by Amoco Production Company as a staff petroleum engineer, senior grade, in the Houston Regional Office.

Q. Did you ever go to school?

A. Yes.

Q. What is your educational background in the field of engineering?

A. I received a BS degree in mechanical engineering from the University of Houston in June of 1974.

Q. Since graduation have you been employed by Amoco in various petroleum engineering capacities?

A. Yes. Immediately upon graduation I reported for work for Amoco Production Company in Odessa as a petroleum engineer. Since that time I've handled various projects, primarily in the Permian Basin, in Michigan, Niagara.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
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Rt. 1 Box 193-B
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Phone (505) 455-7409

Q. In your area of responsibility in our Houston Office have you made a study of the Morrow formation in and around our requested unorthodox location application?

A. That's right.

MR. BUELL: Any questions, Mr. Examiner?

MR. STAMETS: No, the witness is considered qualified.

Q. Will you look, Mr. Brown, at what has been identified as Amoco's Exhibit One? What is that exhibit?

A. Exhibit Number One is a map of the Empire South Deep Unit area, which depicts those wells that have penetrated the Morrow formation.

If you'll note, our Empire South Deep Unit is bordered by the heavy dark line, highlighted by yellow pencil.

Our Empire South Deep Unit No. 21, the well in question is designated by a red dot with a red arrow.

Q. All right, sir, I notice you have at least three different well symbols on Exhibit One for different, I'm sure, different categories of well. Would you run through that legend for us, please?

A. Yes, sir. The open circle with the four tick marks designates those wells which penetrated the Morrow and were found noncommercial.

The standard gas symbol, which is high-

lighted by the orange dot, depicts those wells that were productive, currently productive in the Morrow formation.

The standard gas symbols that are not highlighted by yellow, by the orange, were productive and have since depleted in the Morrow formation.

Q. All right, Mr. Brown, so the Examiner can orient himself on our Exhibit One, what is our principal area of interest reflected on Exhibit One?

A. The principal area is our section -- well, the east half of Section 36, which is bordered on the north by ARCO's BV -- State BV Lease in Section 25, Section 30, Section 31 to the east, which are within the Empire South Deep Unit, and the west half of Section 36, which currently has no production, producing wells.

Q. And we're blessed here by a range dividing line putting Section 25 and 28 East, along with 36, and over on to the east to the righthand side, 30 and 31 and 29 East?

A. That's correct.

Q. All right, sir, I think we've got our sections identified clearly enough now in the record that we can just refer to 25, 30, 31, and 36.

All right, sir, what is our primary objective in this Morrow test which we're asking permission of the Oil Conservation Division to drill 660 feet from the north and 660 feet from the east line of Section 36?

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. Our main objective is a Lower Morrow Sand channel which is found present at the State BV Wells No. 1 and No. 2 in our Empire South Deep Unit Well No. 5.

Q. Okay. Let's just refer to it as the BV channel, okay?

A. All right.

Q. Is that okay with you?

A. Yes, sir.

Q. Are you ready now to go to Exhibit Two?

A. Yes, sir.

Q. What is Exhibit Two?

A. Exhibit Two is a cross section designated as A-A'.

Q. Wait just a moment and let everyone --

MR. STAMETS: Put that up on the wall, Guy.

MR. BUELL: Well, we've got another one about the same size. Let's do it that way.

MR. STAMETS: Put them all up on the wall.

Q. Mr. Brown, will you now go to the Exhibit Two on the board and finish your description of what Exhibit Two reflects?

A. Yes, Exhibit Two, Cross Section A-A', as noted by the map on the rightnand side, goes through the ARCO State BV No. 2, BV No. 1, the projection of the proposed

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

location No. 21, out to the Empire South Deep Unit No. 5.

Q. And as you were pointing that out you were referring to an inserted map on the righthand side of the Exhibit that shows a trace of this cross section.

A. Yes, sir, that is correct.

Q. And generally speaking, it's northwest-southeast trending, the offset.

All right, sir, what data have you shown on the cross section that is common to all three logs you're using? By that, I'm talking about your horizontal indications you have on there?

A. Okay. The three logs were hung on a subsea datum of -6700 feet. Shown on each of the logs are the Atoka, the Morrow, and the Barnett Shale formations.

Q. And you've shown that by a blue solid line that traverses the entire trajectory of the cross section.

A. Yes, sir.

Q. Is it fair to say that at the bottom of the Atoka is generall the top of the Morrow and the bottom of the Morrow is generally the top of the Barnett Shale?

A. Yes, that's generally.

Q. All right, sir, now go to the log on the extreme left. That's ARCO's State BV No. 2, and explain what is reflected on that log.

A. On this log we've shown by yellow coloring

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

those sand members that we consider to be fairly clean sand with less than 50 API units on the gamma ray log.

At the bottom you'll note a very thick sand member, which in this is considered -- we're considering the BV channel.

The well was completed, as shown here, by the standard perforated symbol and in December of 1979 it had an open flow potential of 40-million a day and cum to 3-1-80, which was two months production, of .22 Bcf.

From testimony given by ARCO in their hearing on June 5th, Case 6928, I understand the well is making 10-million a day at the present time.

Q. All right, sir. Now, while you have covered other members of the Morrow up the hole from what you've identified as the BV channel, that well is not open in any of those.

A. No, sir.

Q. Is the BV channel very easy to recognize on a well by its wiggly or un-wiggly characteristics?

A. Yes, sir, in this area it is. It's very clean, with very little shale breaks within the sand itself.

Q. It's the type of Morrow sand deposit that you seldom see in southeast New Mexico, is it not?

A. Yes, sir.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. All right, sir, let's move right on over now to the next well to the right on your cross section. I believe that's ARCO State BV No. 1.

A. Yes. And again, in the BV No. 1 we highlighted that sand which we consider to be clean sand. Again you'll note the very thick sand member at the bottom of the well and again the standard perforated interval, which shows this sand to be almost totally open in the BV-1.

This well was completed in June of 1978 with an open flow of 61-million a day and cum to March 1 of 1980 was 6-1/2 Bcf.

The well is presently making 10-million a day.

Q. All right. What do we see, moving next to the right? It's not a log. It's what I call a stick. What is that, the location of our proposed Well No. 21?

A. Yes, sir, we projected our proposed well, as a stick, into this particular cross section.

Q. And again, as you've testified in reference to the Exhibit One, our objective is the BV channel which you've identified on the two ARCO wells.

Now let's move over to the last well on the right, our Empire South Deep Unit No. 5.

A. Yes, sir. The Empire South Deep Unit, again we highlighted clean sand with yellow. Again we find

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

the thick sand member at the bottom, what we're calling the BV channel. We show our perforations in the top 10 feet or so of this sand member.

Our well was completed in November of 1974 with an open flow of just under 13-million a day and a cum to March 1 of 1.6 Bcf.

Q. All right, sir, looking at either the inset map on Exhibit Two or back to our Exhibit One, and knowing that the three wells in this area are producing from the BV channel, in your opinion does our requested location for our Well 21 offer the best opportunity to encounter the BV channel productive?

A. Yes, sir.

Q. All right, sir, let's move on now to Exhibit Three. It's another cross section, is it not?

A. Yes, it is.

Q. Same format as Exhibit Two.

A. Yes, sir.

Q. Only this is more nearly a north-south cross section.

A. That's correct.

Q. The same, the Atoka, the Morrow, Barnett Shale are identified, the same datum, so why don't you just start with the well on the extreme left, the Harvey Yates No. 18, and point out anything you'd like to about that well?

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. What we wanted to point out on the Harvey Yates 18, their completion interval is a fairly thick sand member near the bottom of the well, and also a Lower Morrow sand channel, which we believe runs parallel to the BV channel and to the north of the BV channel.

Q. Again, looking at that big blob of yellow, it's near the bottom of the well, again it has some of the same characteristics as the BV channel as shown on Exhibit Two, but is yet a little different.

A. Yes.

Q. It's still different from the Morrow pay you've identified up and down the holes?

A. That's correct.

Q. All right, sir, move on over now to Harvey Yates, moving south to his No. 13.

A. The Harvey Yates No. 13 , he did not encounter the thick sand member at the bottom, which we're calling either the BV or the same zone as found in his No. 18 Well.

He's completed up the hole in about a 20-foot sand stringer and is -- started flowing 5-million a day, and he's made 1.6 Bcf as of March 1.

We do find what could possibly be the remnants of the BV channel in the very bottom part of the hole. We feel that the Empire South Deep Unit No. 13 is the northeast

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

boundary of the BV channel.

Q. All right, sir, move right on over now and I believe we're coming to our stick again for Well No. 21, are we not?

A. Yes, sir. We've again projected our Well No. 21 into this cross section.

Q. And one more well to the south, what is that well?

A. This is our Empire South Deep Unit No. 19 in which we encountered very little that we considered clean sand. We perforated several thin sand stringers up the hole; produced about 500 Mcf a day of gas. We then opened up a lower member at the very bottom of the Morrow; testing all these zones we still received only 3 to 400 Mcf a day.

We then plugged the top three intervals, fracture stimulated the bottom zone, and could not recover any meritable hydrocarbons.

Q. All right, looking at the interval colored in yellow at the bottom of our Well No. 19, and also with the perforations opposite, and comparing it with the BV channel characteristics shown on No. 2, would it appear that we have a remnant of the BV channel in Well No. 19?

A. Yes, sir.

Q. But essentially due to lack of porosity and permeability development, it did not produce?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. That's correct.

Q. All right, sir. Looking at your insert map on Exhibit Three, on the extreme right, and the three wells, wells which are included on this section, and the location of our Well No. 21 in the east half of 36, and I'll ask you again with regard to encountering the BV channel productive in the east half of Section 31, to you feel that our recommended location of Well 21 is at the appropriate spot?

A. Yes, I do.

Q. All right, sir, do you have any other comments on either Exhibit Two or Three?

A. None.

MR. BUELL: Mr. Examiner, if you all would turn now to what has been identified as Exhibit Four. This is a portion of ARCO's Exhibit Number Eight that was introduced in Case Number 6928, which was heard before the full Commission on June the 5th. I say a portion, some of the contour lines, a very small bit of them on the east side, which are not critical to our area, had to be omitted due to lack of large duplicating facilities.

What I'm doing in an effort to -- I had hoped to eliminate controversy. It did not eliminate the controversy but I'm hoping in an effort to mitigate the controversy between Amoco and ARCO, that I hereby for the record accept ARCO's Exhibit Eight at that June 5th hearing as our

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
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Exhibit Number Four, and that Amoco will accept the commercial production as defined by ARCO in their testimony at that hearing.

And to make that a little more vivid to the Examiner, I'll cover it in testimony so it will be under oath.

MR. STAMETS: What was the --

MR. BUELL: ARCO testified that anything above the 40-foot contour interval on this gross Isopach would be commercial and that anything below the 40-foot contour interval would likely be noncommercial.

So to give you an idea of the area in the east half of 36 that is above the 40-foot contour interval, we have shaded it in green. That is our work. That was not ARCO's work. And to carry on across to Section 31 we have cross hatched Section 31's Empire South Deep Unit. We have cross hatched in green that area above the 40-foot contour interval in Section 31.

Now --

MR. LOPEZ: Mr. Examiner, I have no objection to Mr. Buell accepting ARCO's exhibit in the other case. I do object to the method in which he's characterized the testimony and I would request that before we're all misled I would like Mr. Buell to refer to the record wherein that ARCO did state that everything above the 40-foot contour was

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-3
Santa Fe, New Mexico 87501
Phone (505) 455-7409

commercially productive.

As I recall, this exhibit was introduced as a gross sand map, not a net pay map.

MR. BUELL: Mr. Lopez, so you can follow me, I'm going to start reading on page 122 where Mr. Johnston, an engineering witness for ARCO, goes under direct examination by one of your colleagues, a Mr. Draper. Are you there?

MR. LOPEZ: As much as I can be, Mr. Buell.

MR. BUELL: It's starting at the bottom of the page, Mr. Examiner.

(Reading) I'd like to refer back to Exhibit Eight. I had earlier -- I had referred earlier to pink and green shading. Using this objective mapping technique and trying to demonstrate from this where we believe would be the potential productive areas, we noted that with one exception wells encountering 40 feet of sand, as we have determined it, or less, were dry in Cycle Two. As such, we have shaded on that contour line and what we believe would be the productive limit in the southeast -- excuse me, correct that -- southwest portion of Section 24.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

That's up here immediately north of ARCO's State BV Lease in Section 25 on our Exhibit Four, their Exhibit Eight.

Then under cross examination by Mr. Kellahin, starting at page 136, and again at the bottom, starting with a question by Mr. Kellahin:

(Reading) If I understood you correctly that if the Morrow Sand present was less than 40 feet thick of gross interval it would not be commercial.

ANSWER: (On page 137) That is an observation based on looking at this map. There is one exception to that, otherwise it's consistent.

MR. LOPEZ: Mr. Examiner, I --

MR. BUELL: So we'll let the record speak for itself.

MR. LOPEZ: Exactly.

MR. STAMETS: I take it, though, that Mr. Buell and Mr. Lopez feel that the record says two different things.

MR. LOPEZ: I believe that's correct.

MR. BUELL: I think it completely backs up the way I characterized our Exhibit Four, their Exhibit Eight.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. STAMETS: I've heard what the record says and will give it the weight that it should in this case.

MR. BUELL: All right, sir.

Q. Now, Mr. Brown, --

MR. STAMETS: While we're there, I'd like to get this a little bit clarified.

In that case they were referring to Section 24, right?

MR. BUELL: Yes, sir.

MR. STAMETS: And no one said anything at all about Section 36, but this was a large map. Was this the southern part of their map?

MR. BUELL: That is the end of their map, Mr. Examiner. I intended to bring that file in so that both you and Mr. Lopez could look at the original Exhibit Eight. I have pieced together with Scotch tape their --

MR. STAMETS: Mr. Lopez has a copy of the map.

MR. BUELL: Well, that will sure take precedence over my Scotch tape.

MR. STAMETS: Mr. Lopez, I would appreciate it.

Okay. All right, if Mr. Lopez has a different interpretation of what was said, we'll allow him to tell us what that interpretation is when he has his turn.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-R
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. BUELL: Mr. Examiner, you've always been fair.

Q. Moving right along, Mr. Brown, would you look now at our Exhibit Four, and from now on I'm just going to refer to our Exhibit Four. I think the record is clear that it is ARCO's Exhibit Eight. And does this gross Isopach apparently reflect two Morrow channels, one to the north -- I believe you discussed that in the interval on the Harvey Yates 18 -- and one to the south, which I have been calling the BV or the ARCO channel?

A. Yes, I believe it does.

Q. And our primary interest and objective in our No. 21 Well is the BV channel.

A. That's correct.

Q. So if you would just direct your attention, then, to the south channel, the BV chan..., and you heard me say that the area that I colored in green in the east half of Section 36?

A. Yes.

Q. And you heard me say that the area that we've colored in cross hatched green in Section 31?

A. Yes.

Q. And you've heard me state my reason.

A. Yes.

Q. Do you have a different opinion?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. No.

Q. All right, sir.

MR. BUELL: We now have that in under oath, Mr. Examiner.

MR. STAMETS: Thank you.

Q. Have you planimetered the area in the east half of 36 that is above the 40-foot contour interval?

A. No.

Q. Let me ask you this. In connection with your exhibits Two and Three, you pointed out that based on the area of the BV channel, as reflected by those two exhibits, that in your opinion the location we're requesting for No. 21 is the proper location to encounter the BV channel, is that correct?

A. Yes.

Q. Is there anything reflected on our Exhibit Four that would change your opinion that that is the proper location for a well to be drilled in the east half of 36 with its primary objective being the BV channel?

A. No.

Q. All right, sir, let me ask this question now. In your opinion, if there are reserves of BV channel gas underneath the east half of 36, and a well is not drilled at a location that would make a commercial producer in the BV channel, is there any way that the owners of interest in

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

the east half of 36 can ever recover those reserves?

A. No, sir.

Q. If a well is not drilled at a location to be a commercial well, in your opinion, looking at ARCO's -- at our Exhibit Four, what wells would have the best opportunity to produce the BV channel reserves under the east half of Section 36?

A. The ARCO BV Wells to the north.

Q. Based on data that we know now and again looking at our Exhibit Number Four, do you see how any way in the world the Oil Conservation Division approving our location could cause migration of BV channel gas from Section 25 to the east half of 36?

A. No, sir.

Q. Do you have anything else you'd care to add at this time?

A. No, sir.

MR. BUELL: May it please the Examiner, that's all we have by way of direct at this time.

I would like to formally offer our Exhibits One through Four.

MR. STAMETS: These exhibits will be admitted.

Are there questions of Mr. Brown?

MR. LOPEZ: If you please, Mr. Examiner.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. STAMETS: Mr. Lopez.

CROSS EXAMINATION

BY MR. LOPEZ:

Q. Mr. Brown, I'd first like to have you establish for us the production history of your Amoco Empire South Deep Unit No. 19, is it, that you drilled in Section 36?

A. Yes. We perforated three sand stringers in the upper part of the Morrow. They -- we did potential them at 529 Mcf a day with 6 barrels of condensate. Then we later opened up the lower portion of the hole and acidized all perforations and on a test in June of 1979 the well had produced only 352 Mcf a day with 3 barrels of condensate.

At that time we cement squeezed the upper three sets of perforations, leaving open only the bottom set. We fracture stimulated that with approximately 100,000 gallons of gelled water and after the fracture stimulation did not -- did not recover any hydrocarbons.

Q. All right. I misspoke but that's fine. I was more interested in the well in Section 31, which is your Amoco Empire South Deep Unit No. 5.

Well, before we get on that subject, did you make any water in this last well you're just discussing?

A. According to the test we made a small amount of water in the upper three sand members, 5 barrels a

day.

Q. All right. Now turning to the Empire Deep Unit No. 5, located in Section 31, I believe.

A. Yes.

Q. Would you explain the location of the perforations and why it appears to be so limited compared to the ARCO State Nos. 1 and 2?

A. We opened up the top portion of that thick sand member. There is a gas/water contact encountered in this well below the perforations that we have open.

Q. Is that well still producing?

A. Yes, sir, it is.

Q. Is it making water?

A. Yes, it is.

Q. How much?

A. Don't know the exact amounts since we got it back on production and we did some work on it. It was making approximately 100 barrels of water, or so, back in 1979. I don't know the latest test in water, but I understand it is making water.

Q. Would you agree with me that a gross sand contour map differs materially in many respects from a net pay map?

A. Yes.

Q. And isn't your Exhibit Number Four a gross

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

sand map rather than a net pay map?

A. Yes.

Q. And what evidence do you have, besides the record, which speaks for itself, that any production above the 40-foot contour map would be commercial?

A. As far as ARCO's map is concerned, the only evidence I have is the testimony of the 40-foot contour line.

Q. And we'll let the record speak for itself as Mr. Buell and I agreed.

Excepting your Exhibit Number Four, which was ARCO's Exhibit Number Eight in the other case, I note that the area shaded in green does not include the entire half section. In that light would you agree with me that a penalty is in order, even based -- assuming, an assumption with which I disagree, that the area shaded in green is commercially productive?

A. No, sir.

Q. And what is your reasch for that? When you already have one well that is drilled to the Morrow and has condemned a great portion of the section?

A. The problem is equating gross pay to deliverability.

Q. That's a new concept; always glad to get.

A. Well --

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. BUELL: Mr. Examiner, maybe I could make a statement on behalf of Amoco that would clear this up and probably save a lot of cross examination and may save even some direct on the part of ARCO.

MR. STAMETS: Well, if you could, we'd be --

MR. BUELL: Mr. Examiner, looking at Exhibit Four, we understand with the -- a noncommercial well immediately south of our location in the east half of Section 36, that we do not contend that the entirety of the east half of Section 36 in productive.

Now this well did produce gas. It was a noncommercial quantity but we realize that asking for an off-pattern location a penalty will be in order to protect not only ARCO but all of the interest owners in the field, and that is the reason that we -- I accepted for Amoco the ARCO exhibit that showed that a portion of the east half of 36, under my interpretation of the record, could be considered noncommercial.

We realize that at some time a penalty could be appropriate to protect all the interest owners in the BV channel pool, as I call it. But at this time I think it's completely inappropriate until the Commission, if they approve our location and we drill it, the best evidence with regard to a penalty will be the data that will be revealed

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

by Well No. 21. It could end up -- we all know how Morrow is -- it could end up with a much thicker section in the BV channel than even ARCO's 1 and 2. It could be even a dry hole, Mr. Examiner.

So I'm not saying that Amoco is trying to avoid a penalty. The only thing we want is to have all the facts, all the data, and have a penalty that will be appropriate, not only to protect ARCO in Section 25, but all of the interest owners in the BV channel pool.

You know from the hearing on June 5th a well was going to be drilled to the north up in Section 24 in either the southwest quarter or the southeast quarter, which will reveal a lot of data to us.

So we're not trying to avoid a penalty, but we want the penalty to be appropriate and assessed at the proper time to protect everyone in this pool and not just ARCO.

MR. LOPEZ: Mr. Examiner, Mr. Buell never ceases to amaze me with his imagination. I think, however, we will have another proposal when we put on our direct case.

MR. BUELL: The purpose of my statement was not to amaze you, because I have observed that you're fairly easy -- easily amazed. My purpose was to clear the record up. We're not trying to avoid a penalty. We want an appropriate penalty, a proper penalty at the proper time.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. LOPEZ: I just feel, Mr. Buell, that your proposal does depart from normal Commission practices and procedures.

MR. BUELL: I don't see anything in my proposal contradictory to the normal Commission practice.

MR. STAMETS: I don't believe this discussion is getting us anywhere and I think it should end, and let's go ahead with the cross examination of the witness.

MR. LOPEZ: All right. That's all I have.

MR. STAMETS: All right.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Brown, looking at Exhibit Four.

A. Yes, sir.

Q. It would appear that you have two legal locations available to you in Section 36 if you make two lay-down proration units and locate the wells 1980 from the east line of the section.

A. Yes, sir.

Q. Why have you chosen not to do that?

A. Our primary reason for bringing it 660 is to get closer to what we feel the control is; that is, the line between the ARCO BV Wells and our Well No. 5.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 8750
Phone (505) 455-7409

We realize the BV channel as such is a narrow channel. We think it's bordered, probably, by our Well No. 19, and the Empire South Deep Unit Well No. 13. We'd like to stay as close to our control as possible.

We realize having a dry hole it could -- it's a risky location no matter where you drill it.

Q. If this were a lay-down proration unit you would only be crowding yourself and not ARCO, is that correct?

A. If this were a lay-down, I'm not sure --

MR. BUELL: He's talking about the north half of 36.

A. Yes, I understand that. If it's a --

Q. You would be 660 feet from the line which is standard as to the north line of the north half --

A. Yes.

Q. -- proration unit.

A. Right.

Q. So you would not be crowding ARCO under those circumstances but only crowding Amoco.

A. I guess I'm not following your question. Were we going to lay-down the unit, a standard location being 660 from the north line?

Q. No.

A. 1980 from the north line and 660 from the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

east line?

Q. If you have a lay-down proration unit consisting of the north half of 36, then the standard location becomes 660 from the north, 1980 from the east line.

A. Yes, sir.

Q. And so your 660/660 would not be crowding ARCO but would only be crowding Amoco. Is that correct?

A. It's bringing us closer into the unit, yes, sir.

Q. Okay.

MR. STAMETS: Any other questions of the witness? He may be excused.

Do you have anything further, Mr. Buell?

MR. BUELL: I have one question on re-direct for Mr. Brown, relating to your question.

REDIRECT EXAMINATION

BY MR. BUELL:

Q. But looking at Exhibit One, Mr. Brown, a unit consisting of the north half, such as Mr. Stamets was suggesting, half of that unit would be outside the Empire South Deep Unit?

A. Yes, sir.

MR. BUELL: That's all.

MR. STAMETS: Any other questions? This

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

witness may be excused.

JERRY L. TWEED

being called as a witness and having been duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. LOPEZ:

Q. Would you please state your name and where you reside?

A. Jerry L. Tweed, and I live in Midland, Texas.

Q. By whom are you employed and in what capacity?

A. ARCO Oil and Gas, which is a subsidiary of Atlantic Richfield Company.

I am employed as a District Petroleum Engineer and my area of responsibility is New Mexico.

Q. Have you previously testified before the Commission and had your qualifications accepted as a matter of record?

A. Yes, I have.

MR. LOPEZ: Are the witness' qualifications acceptable, Mr. Examiner?

MR. STAMETS: They are.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. What is it that -- well, first of all, let's just refer to your Exhibit Number One and I'd ask you to describe it.

A. Were you going to ask why is it that we are requesting --

Q. Yes.

A. We are requesting an allowable restriction on the proposed Amoco location in order to protect our correlative rights.

In reference to Exhibit Number One, this is somewhat similar, I believe, to Amoco's Exhibit Number Four, and it's similar to the one that we put in testimony at the previous hearing.

What it is, is a gross sand map on Cycle Two of the Morrow. ARCO Oil and Gas breaks the Morrow sequence into four depositional cycles. The cycles represent maximum periods of sand deposition, separated by shale deposition.

The gross sand thickness was picked off a gamma ray log and did not take into consideration the presence of hydrocarbons, permeability, or porosity, or -- or porosity of the sand involved.

Just generally, this gross sand development map does show the general northwest/southeast trending sand development in this area.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

I might -- I will point out later that in reference to Mr. Johnston's testimony, he referred to a 40-foot contour line in the south half of Section 24 and in the north half of Section 25, and his comments as to what constituted the economic limit, or what or where a commercial well could be obtained, I believe, was contained to those two half sections.

Shown in red on this map is the boundary of the Empire South Deep Unit. ARCO Oil and Gas owns some 3.1 percent of this unit. We are the operator of the two BV Wells, BV 1 and 2, Section 25, and own a 50 percent interest in this section. I believe the wells are listed as Hondo Oil and Gas as the operator. Hondo Oil and Gas is a wholly owned subsidiary of ARCO.

That's all I wish to show.

Q. Show on that exhibit, I guess the rest will speak for itself.

Now I refer you to Exhibit Number Two and ask you to explain and describe it.

A. Okay. May I go to the --

Q. Sure.

A. Our two cross sections are somewhat similar to those presented by Amoco.

The first one, Exhibit Two, is a northwest/southeast cross section through the area of interest. It

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

shows -- it starts at the Pennzoil -- Pennzoil Well in Section 24. I think you can see on this log, it shows a lack of commercial sand zone in the Pennzoil Well, which is a north -- I guess you'd consider it a northwest parameter of the channel.

It then goes to our State BV No. 2. It shows a good sand development in this well, along with the producing perforations.

And then to the State -- our State BV No. 1, which there again, shows a clean, thick sand zone, along with our perforations.

This -- these logs are gamma ray logs on the left side; a density log is the solid curve and a neutron log is the dotted curve. The neutron log is affected by the presence of gas and tends to read more dense in the zones that have gas in them.

You'll note the good separation in between the two curves on our State BV No. 2 and State BV No. 1.

Going to Amoco Empire South Deep Unit No. 5, they also encountered a thick sand member. As testified by their witness, they perforated the top of the interval. Let's see if I have those perforations. No, I don't have. It would be, I believe, 10,795 to 10,805.

The last information that I have, the well was temporarily abandoned. Apparently they have later

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

information that the well has been turned back on. It last -- according to our records, it last produced in January, 1980, and December of 1979 was the last information I had as to -- as to a full month's production, and that month the well produced 9,534 Mcf of gas, 3,720 barrels of water, 120 barrels of water per day, and 30 barrels of condensate.

The well was initially potentialed on 11-15-74 for 4.4 MMCF per day; had a calculated absolute open flow of 12 MMCF per day.

Cumulative at abandonment in January of 1980 was 1.6 Bcf.

I might add that looking back here, according to what we can analyze in our regulation as a working interest owner in this well, the reason that they perforated in the top of the zone was that the sand was wet in the lower part of it.

According to our log calculations, the well has a gas/water contact at 10,806 in this well, or -7148, which is just below where their perforations are.

I'd also point out that this gas/water contact is bourne out by the fact that they did subsequently produce substantial quantities of water.

The ARCO State BV No. 1 was completed 6-15-78 with a calculated open flow of 61-million per day.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

April, 1980's production was 301,281 Mcf of gas, 4,181 barrels of condensate, and 220 barrels of water. Cumulative production as of 5-1-80, rounding off, is 7.2 Bcf.

Referring to ARCO's State BV Com No. 2, this well was completed 12-5-79 for a COAF of 40 MMCF a day.

April, 1980 production, 215,351 Mcf of gas, 3,745 barrels of condensate, and no water. Cumulative production as of 5-1-80 is .7 Bcf.

The COAF's on these wells would indicate a very high permeable channel. Our calculations of the permeability in the Morrow section in the State BV No. 1 is 50 millidarcies.

Q. Okay, I was just going to ask you, what is the average permeability in your opinion of the average Morrow well?

A. Generally the average Morrow well will have a permeability in the neighborhood of .53 millidarcies. As you can see here, it would be -- we're dealing with a formation that's considerably higher in permeability than the average Morrow well.

Q. Now I'd refer you to Exhibit Number Three and ask you to describe it.

A. Okay. Exhibit Number Three is a southwest/northeast cross section, going from Amoco's Empire South Deep Unit No. 19 to their No. 5 and up to the HEYCO operated Empire

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

South Deep Unit No. 13.

Q. All right, Jerry, I think you're sort of blocking the Examiner and he's the one that has to see the story.

A. Here again, this shows -- I might add that our Exhibit Two was hung on a subsea datum at -6923.

Our Exhibit Three is hung on the top of Cycle Two and does not reflect any structure.

Here again it does show the sand development in the three wells. Again, the Empire South Deep Unit No. 19, they had a very tight sand in the bottom of Cycle Two. This well, as previously testified, or this particular interval, was perforated 10,828 to 46, and tested and was found to be nonproductive. I think it certainly establishes productive limits of this Morrow channel in this area.

There again, Empire South Deep Unit No. 5 had a very thick sand section; however, it was wet except in the very top.

And going to Empire South Deep Unit No. 13, the well operated by HEYCO, they did not encounter any Morrow sand in Cycle Two.

I think this cross section demonstrates the narrowness of the channel in the southwest/northeast direction in this particular area.

Q. Now I'd refer you to Exhibit Number Four

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

and ask you to describe it.

MR. BUELL: May it please the Examiner, I am going to object to Exhibit Four. Looking at a subsequent exhibit, it appears obvious that ARCO intends to use Exhibit Four as the basis for allocation of gas production in this pool.

I think it's grossly unfair at this time to go into a net pay map, one, before our well is drilled, and reveal what it actually, net pay is; two, all the interest owners in this pool have not been notified that we were in effect going to have, at this unorthodox location application, a hearing to adopt an allocation formula for this pool.

So for all these reasons, Mr. Examiner, this is premature. I would not object one bit if they would call an application for a hearing after our well is drilled, assuming the Oil Conservation Division approves. But at this time I think it is premature. All the interested parties have not had notice. We have an active development program going on in this pool, as your hearing of June 5 so vividly pointed out, so for all these reasons I object to the admission of the Exhibit Four or any testimony related thereto.

MR. STAMETS: Denied. proceed.

A. Exhibit Number Four represents a net sand Isopach on the Morrow Cycle Two sand. This shows a net sand development, as I said, in Cycle Two. The net was picked

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

from logs with -- with that part of the sand that had greater than 5 percent porosity; had gas effect on the density neutron clean sand based on the gamma ray, and less than 40 percent salt water saturation, based on log calculations.

This shows the preponderance of the reservoir being contained in Section 25. Only a small portion lies in the east half of Section 36. There is good well control in this area for the construction of the map. Note the Empire South Deep Unit No. 19 with no pay, and as previously testified to, this well was tested in the Cycle Two Morrow and was nonproductive.

Also, note the Empire South Deep Unit No. 5. Here again in Exhibit One we showed 78 feet of gross sand; however, all but 10 feet of that was below a gas/water contact and has only 10 feet of net sand that contains hydrocarbons.

Similarly, while I have this map out, if you'll indulge me, I might refer to Amoco's Exhibit Four. Based upon the gas/water contact as testified as being at a -7148, all of the southeast quarter of Section 36 would find Cycle Two below the gas/water contact.

Q. Do you want to say anything about the Empire South Deep No. 7 Well in Section 30 in connection with this exhibit?

A. Well, referring to the Empire South Deep Unit No. 13, I think, as shown on our cross section, that well

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

encountered no sand development in Cycle Two. Similarly, the Empire South Deep Unit No. 7 was dry in Cycle Two.

Q. All right.

A. The wells farther -- the well in the north half of Section 30, Empire South Deep Unit No. 18, we think encountered a different cycle trend and does produce in Cycle Two.

I would like to point out, while I have this map here, that if Amoco's location is allowed as proposed with no penalty, it would certainly encourage similar applications in Section 31 and in Section 30, and possibly also in the northern end of the channel.

Such wells would, in my conclusions, would flagrantly violate ARCO Oil and Gas Company's correlative rights.

Q. Now I'd refer you to what has been marked as Exhibit Number Five, and ask you to explain it.

A. Okay. I would like to keep this exhibit out while I talk about the others, if I may.

Exhibit Number Five lists the pressure, bottom hole pressures tests that were taken on the wells of interest.

On 11-25-74 a bottom hole pressure test was run on Empire South Deep Unit No. 5. At that time the well had a bottom hole pressure of 4,293 pounds. We would

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

consider that to be normal reservoir pressure for a Morrow well at this depth.

Q. This is the southernmost --

A. Yes.

Q. -- BV well, as Mr. Buell describes it?

A. Yes, Empire South Deep Unit No. 5 in Section 31.

Q. Okay.

A. On 6-19-78, when the State BV No. 1 was completed, a bottom hole pressure test was taken on that well. At that time the reservoir pressure was 4037 pounds. This indicated that the subsequent production from the Empire South Deep Unit No. 5 had reduced the reservoir pressure in this area. It had had some effect on the overall -- on the reservoir pressure in the vicinity of the State BV No. 1, approximately 250 pounds.

On 3-5-79 we took another bottom hole reservoir pressure on the State BV No. 1. At that time the reservoir pressure was 3603 pounds.

On 12-6-79 the State BV No. 2 was drilled and we took a bottom hole reservoir pressure. The pressure at that time was 3171 pounds, which indicated that it had -- its reservoir pressure had been affected by the subsequent production from the Empire South Deep Unit No. 5 and the State BV No. 1.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

To determine just in how good communication the State BV No. 1 and 2 were in, we then turned around and in 12-19-79, thirteen days later, we shut in the State BV No. 1 and took a reservoir pressure.

We found the reservoir pressure at that time to be 3154 pounds in the State BV No. 1. If my subtraction is correct, that's 17 pounds different than the bottom hole pressure found in the State BV No. 2 on 12-6-79. 12-6-79 no substantial production had been taken out of the State BV No. 2.

This pressure history indicates very good communication along this very permeable channel and it shows graphically just how much effect the production of one well, the State BV No. 1, some 2050 feet away, had on the State BV No. 2; however, they propose to drill a well 660 feet from our lease line, and based upon this pressure analysis and the high permeability in this reservoir, we would -- we think the preponderance of evidence indicates that it would certainly drain our acreage if not restricted on production.

Q. Now I'll refer you to what has been marked as Exhibit Number Six and ask you to explain it.

A. Exhibit Number Six is our calculation, or planimetered calculation, of the acre feet underlying the south half of Section 25 and the acre feet underlying the east half of Section 36.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Section 25 -- the south half of Section 25 has some 16,519 acre feet of pay.

The east half of Section 36 has some 1630 acre feet of pay.

The ratio of those two is .099, or 9.9 percent. In other words, the east half of Section 36 has 9.9 percent as much acre feet as does the south half of Section 25. We think that a fair allowable restriction would be to restrict their production to 9.9 percent of their deliverability. Deliverability tests should be taken every six months and witnessed.

One other possible procedure to restrict allowable is suggested. If the Commission considers this too complicated, a procedure that we would -- another procedure that we would suggest, would be a simpler one.

Our State BV No. 1 averaged 10,156 Mcf a day for February, March, and April of 1980. 9.9 percent of this rate would be 1005 Mcf per day. Therefore, I would propose a maximum allowable for the Amoco proposed well of 1005 Mcf per day.

This has a couple of advantages besides being simpler. One being, I believe, that their witness testified that sometimes deliverabilities may not be exactly proportional to amount of net pay, and this is true and I agree with it. This formula would circumvent that and would

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

similarly give them a productive rate that would -- that would not drain our acreage, in that it would be 9.9 percent of our productive rate.

Q. Is it also your opinion that the reservoir by continued production would continue to be depleted and this latter formula that you've suggested, as I understand it, would not also be subject to some sort of decline formula? Why do you think that would be fair?

A. Well, it is true that once the reservoir starts depleting, they would still have a limit of 1005 Mcf per day and they could get -- and they would, in all likelihood, get to the point to where their productive rate was more than 9.9 percent of our productive rate.

But I think it's the best formula based on simplicity and also that it does not encounter the deliverability problem.

Also, there has been some production taken out of -- obviously out of the reservoir prior to their drilling the well. Of course they were free to drill it at any time. But this would in some manner compensate previous production.

And that's why we were willing to agree to it, even though at this time that formula would result, probably, in slightly more than 9 -- than them recovering more than 9.9 percent.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. And as I understand your testimony, this formula and this restriction that you're proposing would only affect any production from the zone two that we've been discussing. If their well indeed was productive in zone three, what would your feelings be in that respect?

A. There again, we are just interested in protecting our correlative rights in Cycle Two, and as I've previously testified, the reasoning being it's a very highly permeable reservoir and the drilling of a well 660 feet from our -- south of our line, would certainly affect our acreage and cause drainage.

Now, Cycle Three is more in line, based on the open flow potentials and the productive history of wells in this area in Cycle Three, permeability in it is more like an average well, .5 to 3 millidarcies, and very little, if any, drainage would occur as a result of producing that well in Cycle Three. Therefor, if they produce only in Cycle Three, we would not recommend any -- any restriction.

However, since Cycle Two is the most permeable zone, if they produced in both zones, we would still recommend the restriction as previously outlined.

Just -- I would like to just briefly say that, again, I've pointed out several times that we have a reservoir here that has an average permeability of 50 millidarcies compared to .53 millidarcies in the average Morrow

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

well.

We're not normally opposed to non-standard locations, because when you have these low permeable reservoirs we don't feel that non-standard locations violate correlative rights, or don't generally violate correlative rights; however, this is not the case here. To allow a non-standard location in a high permeable area such as the BV channel in Section 25 as proposed by Amoco without an allowable restriction, would cause uncompensated drainage and violate our correlative rights.

Q. Am I to conclude that it is your opinion that the granting of Amoco's application in this case without a severe allowable restriction would be in the -- to contravene the prevention of waste and the protection of correlative rights?

A. That is correct.

Q. Were Exhibits One through Six prepared by you or under your supervision?

A. Yes, they were. I would like to make one other statement.

We did calculate the reserves under the east half of Section 36 in our Cycle Two channel, and the current reserves we estimate -- or current gas in place that we estimate, excuse me, is 1.4 Bcf.

Q. Okay. Anything further?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. No, except the exhibits were prepared by and under my supervision.

MR. LOPEZ: I would move the introduction of ARCO's Exhibits One through Six.

MR. STAMETS: These exhibits will be admitted.

MR. BUELL: Would you note my exception to the admission of Exhibit Four and Exhibit Six, please, Mr. Examiner?

MR. STAMETS: We will note this, Mr. Buell; however, the Examiner feels that we can't consider this case in a vacuum, and he needs all the information he can get.

A. May I make --

MR. BUELL: May I take Mr. Tweed now?

A. Can I make one other statement?

MR. STAMETS: I don't think that he's quite through yet.

MR. BUELL: Oh, I thought he rested, I'm sorry.

A. Well, just one brief one. I would point out, I'm not here to instruct Amoco on how to -- how to conduct themselves, but we -- this -- this Isopach map was constructed, we think, with good well data and we feel confident of the accuracy of it.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

In the event that Amoco drilled that well and found something substantially different than what we anticipate that they would find, I think either they or we would have recourse to ask for a re-hearing and open it back up based on new evidence. And we certainly don't -- don't see anything wrong with that, that so the partners -- Amoco owns, as I think I testified, some 32.8 percent of this unit, and as one of the working interest owners in this unit, we would request that the Commission establish on what premise that Amoco is going to get to produce this well so we could figure or not figure the economics of whether or not we want to join on it; to base our decision.

Q. And what was your interest, ARCO's interest in that?

A. Ours was very minor; just 3.1 percent; however, the other partners in Section 25 also have an interest in the Empire South Deep Unit.

Q. Okay.

MR. STAMETS: Does that conclude your direct testimony?

A. Yes, sir.

MR. STAMETS: Mr. Buell wishes to ask you some questions.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

CROSS EXAMINATION

BY MR. BUELL:

Q. Mr. Tweedy, to your knowledge has the Commission established a Morrow Cycle Two gas pool?

A. No, sir.

Q. To your knowledge has the Oil Conservation Division established a Morrow Cycle Three gas pool?

A. No, sir.

Q. There must be a Cycle One in your scheme of things somewhere --

A. And also a --

Q. -- and you're not starting off with Two.

A. Also a Cycle Four.

Q. But Cycle One doesn't appear anywhere on your exhibits here, does it?

A. No, sir. As pointed out by your witness, you intend to attempt to drill a well to encounter the BV channel, which we call Cycle Two, and our concern is protecting our correlative rights in this sand channel. And that's what we've presented evidence on.

Q. And I believe in your closing remarks, they weren't in response to a question from Mr. Lopez, but you said you realize that your net pay sand could be wrong and that our 21 Well could come in quite differently from what you're predicting.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. No, I wouldn't agree that that's what I said. I said --

Q. Well, what did you say?

A. I said that I feel that the net sand map is quite accurate and it's based on good well control; that should your well come in a lot differently, that I think we -- than what is anticipated at this time, that we would both have recourse to re-apply to the Commission for redress.

Q. Do you think that would be more fair a way than us drilling the well and then if you thought your correlative rights were being violated by the amount of net pay or the lack of net pay, for you to call a hearing?

A. There -- I don't completely understand your question, but --

Q. Well, I'll restate it --

A. Okay.

Q. -- so that you can.

What you're recommending is that we go ahead and drill this well under a penalty.

A. Uh-huh.

Q. And if we get more net pay than you predicted, about what have you predicted here? I don't want to refer to your Exhibit Four any more than I have to, but --

A. Okay, it's slightly over 30 foot of net pay.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. About 30 feet?

A. No, I would say in the neighborhood of 33, 34 feet.

Q. All right, what if it comes in with 100 feet?

A. If -- we're playing a what if game. There again, I think --

Q. You're playing a what if game with your Exhibit Four --

A. No, sir.

Q. -- where you're saying what our net pay will be, aren't --

A. There again --

Q. -- you?

A. There again I'd point out control points. Your Empire South Deep Unit No. 19, which had zero net pay. The Yates Empire South Deep No. 13 that had zero pay in the channel. The Empire South Deep No. 5 that had 10 feet, and our State BV No. 1, that had 104 feet. With that much control and in that much of an area, it is my conclusion that that map's not going to change substantialy. I just threw that out just in case it does, I think that's a redress.

Q. Yes, sir.

A. I don't think it's going to change sub-

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

stantially.

Q. I realize you just threw it out and anything you just throw out is subject to cross examination.

A. Yeah.

Q. So really what you're recommending is this well be drilled under a penalty.

A. Yes, sir.

Q. And that if we have more net pay than you predicted, then we could call a hearing and have an adjustment.

A. I think that would be a --

Q. Do you think that would be more fair than us drilling the well and if we have an amount of net pay that you think would violate your correlative rights in 25, you calling a hearing?

A. Yes, sir, I think it would be.

Q. Why would it be?

A. Well, there's a number of things that are left out. First of all, what would be your allowable in the interval? If you're allowed to produce that well at an unrestricted allowable, we would suffer drainage in the interim time in between the time that time that the well was drilled and completed until a new hearing was called and an order was issued by the Commission.

Q. All right, I'll --

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. That I would wish to avoid.

Q. I realize that could happen, but you know the Oil Conservation Division is pretty quick with setting a hearing and pretty quick on acting.

A. Sir --

Q. Let me ask you this. Let's assume -- I'm going to have to ask you a question about Exhibit Four.

A. Okay.

Q. Do you consider Exhibit Four, particularly in the area of the northeast portion of Section 36 is highly interpretive?

A. No, I don't consider it highly interpretive with the amount of control that we have in the area.

Q. Well --

A. No, I don't consider it.

Q. Well, do you even think it's interpretive?

A. All -- all net pay maps are to some degree interpretive.

Q. Yes, sir. Let's just march through your exhibits one by one.

Your Exhibit Number One, which is a copy of your Exhibit Eight, is that not correct?

A. It's similar to Exhibit Eight. It does not have the shaded areas of Exhibit Eight had on it.

MR. LOPEZ: For the record, Exhibit Eight

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

in the Hartman hearing.

Q. And Amoco's Exhibit Four. The only difference in this and Exhibit Eight as introduced at the June 5th hearing is that you didn't shade in green within the -- up structure of the 40-foot contour of the BV channel, right?

A. I think also -- I don't believe that we showed the boundary of the Empire South Deep Unit on the Exhibit Eight.

Q. Let me ask you this. Is it an accurate presentation of our Exhibit Four at this hearing and your Exhibit Eight at the June 5th hearing with regard to Section 36 and 25?

A. Yes, sir.

Q. What about Section 31?

A. Now you said is it an accurate --

Q. Yes, it's identical to our Exhibit Four and your Exhibit Eight.

A. Yeah, it's identical in those sections.

Q. All right, what about the southwest portion of Section 30?

A. Yes, sir.

MR. LOPEZ: Mr. Examiner, I thought Mr. Buell said it was late in the evening. We said this is the identical map as Exhibit Eight and Exhibit Four. I don't --

MR. BUELL: He said it was the identical

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

map and then he starts crawfishing away from that position and I just wanted to pin him down, Mr. Examiner, in our area of interest.

MR. STAMETS: I think you're -- you're doing fine. Let's get to the area of interest.

MR. BUELL: All right, sir. I wanted to pin that down.

Q. Now let's go to your Exhibit Two, your cross section. I believe you said it was no material difference from our cross section.

A. Except that it does include one lower well that your cross section didn't include.

Q. A dry hole.

A. Yes, sir.

Q. All right, sir, now your Exhibit Three, you said it was similar to our Exhibit Three, did you not?

A. Yes, sir. There again, I said it's similar. I don't recall what wells your Exhibit Three had in it. I do know that they had these two wells.

There again, ours had the Empire South Deep Unit No. 19, No. 5, and No. 13.

Q. All right, sir, nothing material on either of your cross sections that contradict or contravene our direct case?

A. And I'd say vice versa.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. All right. Go to your cross section and tell me how they in any way contravene or contradict anything we put on direct.

MR. LOPEZ: The comment, Mr. Buell, was vice versa. Yours support ours; ours support yours; they are the same.

MR. BUELL: That's what I'm trying to get him to say.

Q. All right, sir, now I'm going to jump -- so far we have no areas of contradiction or contravention.

A. I would mention one point. In your -- in your witness' direct testimony, in his direct testimony he did not point out the fact that the -- that the lower part of the sand in the Empire South Deep Unit No. 5 was wet, which I did in my direct testimony.

But the two exhibits were the -- were similar.

Q. I think that was covered, if not on direct, on cross.

A. It was.

Q. All right, sir, I'm going to jump now into your Exhibit Five, jumping Exhibit Four.

A. Okay.

Q. Let's talk about pressures for a minute.

A. We can do that.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. I believe you made a point of the fact that your initial pressure on your State BV No. 1 was some 250 pounds lower than the initial pressure on our Empire South Deep Unit 5.

A. Yes, sir.

Q. That bottom hole pressure you're reporting of 4037, what kind of a pressure was that, Mr. Tweed?

A. It was a build-up reservoir pressure. Due to the permeability in this reservoir, these pressures have built up in less than an hour and stabilized.

Q. Was that pressure taken through a drill stem?

A. This one was a drill stem test.

Q. Yes, your 4037 was a drill stem test?

A. Yes, it was a drill stem test.

Q. Do you as a reservoir engineer have a great deal of confidence in a drill stem test pressure?

A. I do in this one. There are drill stem test pressures that I don't. It depends upon whether you have problems or don't have problems in a drill stem test pressure.

I might add that this was confirmed by our reservoir pressure when we took a 4-point test of this well.

Q. Confirmed by what pressure?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 191-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. By our -- when we took a 4-point test on the well, calculated absolute open flow, we shut the well in and took a build-up reservoir pressure, and it was within 15 pounds of what this is.

Q. Had your well produced before you took your 4-point pressure?

A. A minor amount of gas. We blew it to a pit to clean it up, then shut the well in, hooked it into a gas line and then took our 4-point test.

Q. Why didn't you have that 4-point pressure on your Exhibit Number Five?

A. I'd be happy to furnish the Commission with it, if they so desire. I don't have any objection to furnishing it.

Q. Will you just do this for me and then we'll move on? Would you go over and look at your cross section and look at your log on your State BV No. 1, and look at the caliper log, and tell me whether or not in the pay interval you have a pretty good mud cake?

A. Yes, we do have -- I can't qualify your pretty good size, but we do have a mud cake build-up.

Q. Could that mud cake build-up result in your drill stem test pressure being some 250 pounds below the original pressure on our No. 5?

A. May I take my seat again?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. Yes, sir, please, I'm through with the cross section.

A. No, sir, it would not. When you lose fluids into a reservoir, such as mud filtrate, which causes your mud cake to build up, if it distorts your pressure at all, what it does is tend to give you a slightly higher pressure than you would normally anticipate; not a lower pressure.

Q. Could you explain that a little for me?

A. Okay. It's -- it's simple that when you put fluids into a formation, that you build the pressure of that formation. When you take them out of a formation you reduce the pressure.

When you drill a well, you subject the formation to mud. Some of the mud filters out into the formation and you get a mud cake build up. That's what causes your mud cake buildup. That liquid that filters in sometimes causes a slightly higher pressure right around your wellbore, and sometimes you will get a slightly higher pressure than actual reservoir pressure.

Q. Don't we have a log that tells us how much of the formation has been penetrated by filtrate?

A. Not -- I wouldn't say accurately. We have -- we have logs that do indicate zones that are -- whose resistivity are affected by mud filtrate.

So you can get an idea. It's not --

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. Mr. Tweedy, in your opinion, the mud cake of the magnitude that you saw on your log when you looked at it, would not in any way block or impede the flow of reservoir pressure into your bomb in your drill stem?

A. Here again I'm quoting from memory, and I can get the exact facts if it's of interest. But in this particular case, when we drill stem tested that well it flowed at a rate of 25-million cubic feet a day, and we had something like 70 pounds drawdown between buildup pressure and flow pressure at the bottom of the hole. The rest of the pressure was due to friction of the drill pipe. That is an extremely high flow rate and it indicates a very, extremely permeable formation, which is the reason that I don't think that the mud filtrate -- mud filtrate or the mud cake had any effect on the test or the pressures.

MR. BUELL: I'm going to state for the record that I'm doing this without prejudice to my objection. I don't know how much weight that is, but let me at least clear my own skirts by making that statement, and I realize the hour is late and I'm going to be as brief as possible.

Q. Mr. Tweedy, one general impression I got from your Exhibit Number Four --

MR. LOPEZ: It's Mr. Tweed, Mr. Buell.

MR. BUELL: What's the matter?

MR. LOPEZ: Mr. Tweed.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. BUELL: Believe me, that -- I apologize.

A. You're excused.

Q. Jerry, one general impression I got from your Exhibit Four, and I'd like for you to take -- I believe it's more readily discernable if you would look at our Exhibit Four at this hearing for this question I'm going to ask you. I might ask the Examiner to do the same thing.

I couldn't help but make the general observation that you very closely, with your zero net pay line, followed the 40-foot contour interval on our Exhibit Four in the area of Section 25.

But then when I looked down into the east half of 36, and the west half, for that matter, and I looked down into Section 31, I notice you had parted --

A. Yes, sir.

Q. -- from that, and there is a great variance between your zero Isopach line in the east half of 36 and 31.

A. Yes, sir.

Q. Could you explain that, please?

A. Yes, I'd be happy to.

As I previously testified, a net pay Isopach map is an Isopach map of the gas-bearing sand, and there again, in the Empire South Deep Unit No. 5 all but the top 10 feet of that sand was water-bearing.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

And as I previously testified, in the south half of 36 all of that sand is below -- if any exists in that channel -- is below the gas/water contact.

Q. All right, now we're going to have to take this bit by bit, I can see that. I was hoping we wouldn't have to.

I'm going to direct your attention to Section 25 on your Exhibit Four --

A. Okay.

Q. -- and Section 25 on our Exhibit Four.

A. Okay.

Q. Do your zero Isopach lines very closely follow the 40-foot contour line on our Exhibit Four?

A. They -- they closely do. They don't precisely follow it, but they're --

Q. All right, sir. Now let's go down to Section 31.

A. Okay.

Q. And I'm going to ask you to just look at the north half of Section 31.

A. Okay.

Q. The zero Isopach line on your Exhibit Four, and the 40-foot contour line on our Exhibit Four.

A. Yeah.

Q. Just in the north half, now, would that

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

not put me above any gas/water contact?

A. No, sir, there in the north half of that section, a great -- the preponderance of that sand is below the gas/water contact. There is some sand above the gas/water contact, as shown by the net pay map, but the preponderance of it is below the gas/water contact.

Q. All right. Jerry, let me ask you this. Are you making the gas/water contact follow the 40-foot contour interval on our Exhibit Four and the zero Isopach contour on your Exhibit Four?

Is that what you're doing?

A. No, not precisely. There again, I'd point out that there is no such thing as pay below the water table. There is no pay below the water table.

Q. Is there --

A. Any sand that exists below that water table is not shown on net pay, and that was taken into account in drawing this Isopach.

Q. If there's one thing this poor old lawyer knows, he knows that.

A. Okay.

Q. Now I'm asking you --

A. That seems to be the bone of contention.

Q. I'm asking you, how did you orient your gas/water contact in Cycle Two in Section 31?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. How do I orient the gas -- based on structure.

Q. Does --

A. -- and it's encounter of the sand bed.

Q. The structure -- you're familiar with the structure of this. I'll introduce an exhibit, if you'd like me to.

A. Oh, I've got one.

Q. Does structure of the Morrow sand bear any relationship to your Isopach of Cycle Two?

A. Structure was taken into account in drawing the Isopach in those --

Q. How?

A. In those parts where the sand was below the gas/water contact.

Q. I'm sorry, Mr. Examiner.

MR. STAMETS: That's all right. I had some questions along this same line. In Section 31 on the old ARCO Exhibit Eight --

A. Yeah.

MR. STAMETS: Amoco Exhibit Four, that --

A. 78 feet.

MR. STAMETS: That area between the contours is a wide band and yet -- and you sort of follow the contours in Section 25, in Section 31 you narrow that in

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

quite a bit. You don't follow the outer boundaries of that band. I know that I wonder why and I assume that you wonder why.

A. Okay. It's due to two reasons, the best I can explain it. One is that you do, when you go down structure you do have part of the sand below the gas/water contact and part of it above it, and therefor you wouldn't expect that we would follow the 40-foot gross sand because some of that 40-foot gross sand is below water.

Okay, the other reason being it at least attempts to follow a known -- known point, such as Empire South Deep Unit No. 19, which has a zero pay in it as net pay is indicated by their -- by their production tests.

MR. STAMETS: Well, that's another thing that concerned me. You've got zero pay there but you don't draw your zero contact line through that.

A. Well, okay. You -- I think that you realize -- I'd point, to explain that, to Empire South Deep Unit No. 13. You note that we got a zero point there and also on No. 7?

MR. STAMETS: Uh-huh.

A. You can have a wide area of zero line that you wouldn't -- and you wouldn't draw a zero point through all of them because that --

MR. STAMETS: I think that would be true

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

under normal circumstances but would you think that is the case with as wide a channel as you've drawn in Section 25?

A. There again I think this -- this was not only below the gas/water contact, the sand that was encountered in Empire South Deep Unit No. 19 was non-permeable. Based on that I would think that you would have to give some distance from that point before you would encounter permeable sand above the gas/water contact, any permeable sand at all. And that's all my contour map shows.

To draw it right next to the well would imply that you could go 10 or 15 feet away from this well and hit net pay, and I don't believe that that's the case.

MR. STAMETS: Is it possible?

A. It is possible and that is one point that is somewhat interpretive, but I believe that it would only change your volume very little if you adjusted those lines that way.

MR. BUELL: Would you identify this as Amoco's Exhibit Number Five in this case.

(The reporter marked Amoco's Exhibit Number Five for identification.)

MR. LOPEZ: Are we going to introduce that from our witness? What are we doing?

MR. STAMETS: We'll find out whether we

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

are or not. Nothing's happened yet.

MR. BUELL: Off the record.

(There followed a discussion off the record.)

MR. STAMETS: Mr. Buell, I believe you're ready to do something here.

MR. BUELL: Yes, sir.

Q. Jerry, I've handed you a copy of a structure map that's been identified as Amoco's Exhibit Number Five.

A. Uh-huh.

Q. And to cover identify it for you, I will tell you that it is an exact copy of the Exhibit Number One introduced by Hartman in Case 6927 on June 5th, '80, that was a companion case to your Case 6928, which we're referred to many times here today, and do you know a Mr. Lindquist with ARCO?

A. Yes, sir, I do.

Q. Is he a geologist?

A. Yes, sir, he is.

Q. In order to be completely fair, let me hand you a copy of the transcript of Case 6927 and Case 6928, where Mr. Lindquist's testimony starts. He is qualified

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

starting on page 101, and you can start reading there, if you want to. Then on to 102, and I will direct your attention to the upper portion of page 103, where Mr. Lindquist says that his structure map is essentially the same as Mr. Hartman's, and he's referring to Exhibit Number One.

MR. LOPEZ: Mr. Examiner, again I think the record speaks for itself and --

MR. BUELL: I want your witness to be satisfied that he's not doing Mr. Lindquist an injustice, Mr. Lopez. It won't take him a second to read it and that will eliminate all arguments, and if your witness has any questions but what Mr. Lindquist adopted that, he can so state.

A. He does say it's essentially the same as Mr. Hartman's.

Q. All right, sir, would you -- Mr. Lopez, would like for me to get the file on this case so that you can be satisfied?

MR. LOPEZ: No, no, Mr. Buell. I'll be glad to --

Q. All right, sir --

MR. LOPEZ: -- raise any objections I have to its introduction.

MR. BUELL: I haven't offered it yet. I've just identified it.

MR. LOPEZ: I assume that's why you were

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

marking it.

MR. BUELL: I'm going to introduce it.

MR. LOPEZ: Okay.

MR. BUELL: I always go through an exhibit so people can think of their objections to it.

MR. LOPEZ: I was waiving any in advance.

Q. Jerry, let's look at three exhibits now, Amoco's Exhibit Five --

A. In reference -- I would say one thing in reference to this contour map just -- just looking at it. The basic form of the contour there again is substantially the same as I would draw it. I have no way of knowing where he picked the top of the Cycle Two or where he picked the Middle Morrow, so I couldn't -- couldn't comment on the exactness of where the contour lines are.

Q. Do you have a copy of your structure map before you right now?

A. Yes, sir, I do.

Q. Is that a structure map of Cycle Two?

A. Yes, sir.

Q. May I substitute that for Amoco's Exhibit Five?

A. That would be fine. I don't have any objection.

MR. BUELL: I would submit this to the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Examiner and withdraw Hartman Exhibit One, and substitute a contour map, structure map, on the top of Cycle Two prepared by this witness, may I do that?

MR. STAMETS: Yes, Mr. Buell.

(The reporter marked Amoco Exhibit Five for identification.)

MR. BUELL: This will be Number Five. I'm substituting this witness' contour map -- structure map contoured on top of Cycle Two for the previously identified Hartman Exhibit Number One.

Q. All right, sir, let's look now at Amoco's substituted Exhibit Five, identified as Amoco's Exhibit Five, your Exhibit Four and our Exhibit Four at this hearing here today.

A. Okay.

Q. And I want you, while you're looking at this structure map contoured on top of Cycle Two, to tell me how you can eliminate in the north half of Section 31 the contour interval on our Exhibit Number Four, 40-foot contour --

A. I think I understand what you're getting at now.

If you look at the 40-foot contour line,

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

looking at your Exhibit -- what is it Four or Five -- if you look at the 40-foot contour line that goes through Section 31 and on into 36, do you see that?

Q. Yes, sir.

A. Okay. Essentially, if you connect that with the one that crosses the corner of Section 40, that would then correspond to my net Isopach map, do you follow that?

MR. LOPEZ: You mean Section 25?

A. Yeah, the 40-foot contour line that crosses the southwest corner of Section 25.

Q. Well, I think you're getting a little ahead of me, Jerry. What I'm trying to determine is how you have made the gas/water contact in the north half of 31 conform to your zero contour line on your Isopach on Exhibit Four?

A. Okay, I think I can explain that again. There again, if you connect those two then you essentially get a control, the type of control point that I used in the net Isopach map.

You'll note that on the gross sand in Section 36 that the line that splits Section 36 in half, running north/south, that the gross goes from 40 to 60 to 40 through there. It is my considered opinion, based on what evidence that I've seen, that there is no commercial net sand

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

in that interval.

Now, if Amoco or somebody else would wish to drill in that interval and prove me otherwise, we certainly wouldn't object to a location --

Q. Are you talking about the interval colored in green in the east half of Section 36, or the interval in the east half of 36 that looks like a nose coming in that's uncolored?

A. I'm -- I'm referring to the interval in the east half of 36 that's the, I guess you could best refer to it as the west half of the east half.

Q. Are you impeaching Mr. Johnston's exhibit introduced at the June 5th, 1980, hearing?

A. No, sir, I certainly am not.

Q. You just don't choose to follow it, then.

A. No, sir, I am following it. He picked 60 feet of gross sand in there, and his testimony was that up in the northwest part of this channel he thought that you had to have in excess of 40 feet of sand to get a commercial well.

As my testimony has shown, down in the southeastern part of the channel some of that gross sand is below water and you could -- you could encounter a gross sand thickness bigger than 40 feet and not encounter productive sand.

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Phone (505) 455-7409

Similarly, it is my interpretation that that area on the -- essentially the west half of the east half of Section 36 does not contain commercial sand. There again, we would not object to a location in that area. I'd say it looks like it would be at least 1320 feet from our lease line and I'd say 660 from the center line, in there some place. We wouldn't object to a location in there --

Q. Yes, sir, I think we've gone into that and let's get back to your gas/water contact.

A. Okay.

Q. I'm going to ask you to draw on my copy of your Exhibit Four at this hearing a line across Section 31 in the compass direction and at the -- whatever elevation you think you could make a completely water-free completion in the Cycle Two zone.

A. I might state -- state one problem with that and then we'll get on. I hate to be this picky, but I stated in my testimony that the original gas/oil -- or gas/water contact was at a -7148 in the sand. I also stated that that well is now making substantial amounts of water above that interval.

I can draw the initial gas/water contact in there but I could not tell you precisely at this time where the present gas/water contact is.

Q. All right, would you draw, again on my

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

copy of your Exhibit Four at this hearing the compass direction and the angle that you think the original gas/water contact traversed Section 31?

A. I'd like to point out that in Amoco's Empire South Deep Unit No. 5 the top of the sand is some 60 feet below the top of Cycle Two. The contour map is drawn on the top of Cycle Two.

Now, that interval will vary somewhat in between each well, so all I'm going to draw is just a general line, and this may take a minute or two.

Q. Take your time. I think it's extremely critical to your Isopach. I want you to be satisfied that you're doing it the way you want to do it.

A. Our -- let me understand your question again. Did you say that we could make a water-free completion in Cycle Two?

Q. Yes, sir. But you said you couldn't do that so I'm asking you now to do what you said you could do, and that is show the compass direction across Section 31 of the original gas/water contact which you've identified as --

A. Okay, you said the compass direction across there.

Q. Yeah.

A. Okay. There again, I'd like to point out that in this interval the gas/water contact traverses the

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

sand in some areas, so there's some sand above it and some below it. Whether you could get a water-free completion might depend on your completion method.

Q. Well, you've already said you couldn't do that, and I've accepted that you couldn't do it. Now let's get back to what you can do.

A. I have -- there again, I have two problems with this. I guess I'm going to have to check one other thing before I draw it.

Q. I don't think you will if you'll look at our Exhibit Five, your structure map.

A. I pointed out that there were 60 feet interval between the top of Cycle Two and the top of the sand in the Empire South 5 shown on the cross section. The Empire South Deep No. 19 there's 124 feet in between the top of Cycle Two and the top of the first sand interval. I think -- I believe the Commission can see my problem there. The interval in between those wells, in between the top of the sand and the top of Cycle Two is thickening, so to draw -- all I can do is just draw a very vague general direction, because you have both things occurring. The interval in between there is thickening and your -- and your structure of Cycle Two is occurring. If I'd known this was going to be a problem I guess I could have drawn one on the top of Cycle Two sand, which would have been a little more dependable, but with that

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

in mind, I would just draw the general direction. I guess that's along strike. The dip is this direction. This lower end --

MR. LOPEZ: Dip in what direction?

A. Down dip is being to the southeast and up dip to the northwest, or north/northwest, generally, and along strike being south/southeast -- or south/southwest, excuse me, -- west/southwest, excuse me, to east/northeast.

Q. Could we --

A. There again, it's just very general.

Q. And to make it a little more simple, looking at our Exhibit Number Five, your contour on top of the Cycle Two --

A. Yes, sir.

Q. -- your structure map, assuming that there is no change in dip, angle, or anything else if we go through on structure, from that 60 feet, the top of Cycle Two, to the top of the BV channel in our Well No. 5, assuming that to be the case, that structure on the top of the BV channel is the same as structure on top of Cycle Two, some 60 feet above it, normally you don't have many rapid structural changes over a 60-foot interval, do you?

A. Well, I just testified that between the Empire South Deep Unit No. 5 and the No. 19 that the interval went from 60 feet to 124 feet, so you've got that much of an

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Rt. 1 Box 193-B
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interval change in that distance.

Q. The fact that you have a difference between the top of the BV channel and the top of the Cycle Two doesn't necessarily mean you've got a lot of change in structure, does it?

A. Well, the contour -- well, you'd have that much -- it depends on what you're contouring. If you're contouring the top of the sand, you'd have that much change in structure on the sand body.

We -- this particular map is contoured on the top of Cycle Two interval.

Q. All right, I want to be completely fair to you, and I'm going to ask you to look at your contour map on top of Cycle Two structure.

A. Yeah.

Q. Our Exhibit Number Five, and assume for the purpose of this question that there is no change in structure contours during that 60 feet, and following your contour, your structural contour across Section 31, show me the attitude that the gas/water contact would take across the southwest portion of Section 31.

A. Well, that's a fair amount of assumption. If you make those assumptions, which I don't agree with are in the case here, the gas/water contact follows your contour line, and if -- had we contoured on the top of the sand, the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

gas/water contact would precisely follow the contour line.

Q. We don't have such a map so we've got to make do with the best we have.

A. Yes.

Q. And I'm asking you to assume, and I believe you stated you do not agree with the assumption, but it's perfectly permissible to ask an expert witness, such as you, to assume.

A. Yes, sir.

Q. Assume there is no structural change in that 60-foot interval from the top of Cycle Two to the top of the BV channel in our No. 5, and looking at our Exhibit Number Five show me the compass angle that the gas/water contact would be found across the southwest portion of Section 31.

A. If that were the case, it would fall at a contour line, it would go along the contour line, and the contour lines on this map run in a general northeast/southwest direction.

Q. All right, and at a very short angle, does it not?

A. Yeah.

Q. So would you approximate for me on my copy of Exhibit Four the -- is there such a thing as a compass angle? I guess there is. The angle that gas/water contact, original gas/water contact would be at through the southwest

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

quarter of Section 31.

A. Northeast/southwest direction.

Q. All right. Now that is the double-headed arrow you've drawn on my copy of Exhibit Four in the southwest quarter of Section 31?

A. Yes, sir, that's true.

Q. Does a gas/water contact, if one is present, does it follow structure or a net pay Isopach?

A. It follows structure.

Q. So your Exhibit Four -- your Exhibit Four doesn't necessarily -- the contours on your Exhibit Four, that doesn't necessarily show us in any way where a gas/water contact would fall either in Section 31 or Section 36 to the west.

A. That's true. And also in other parts of it, Section 26 we show zero sand, and all of that section is above where a gas/water contact would exist. There just doesn't happen to be a net pay section in parts of that section.

Q. And looking at your contour map, our Exhibit Five, on the top of Cycle Two, and it's Cycle Two we've been talking about, don't throughout Sections 31, 36, 25, 26, aren't your contours generally in a northeast/southwest direction?

A. Yes, sir, they are.

Q. And I'll hand you now --

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Rt. 1 Box 193-B
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A. I've got a copy of it, if that's what you want.

Q. I don't think I'm even going to identify this. I'm just going to ask you --

A. What -- could you for my edification tell me what his dotted lines on -- heavey dotted lines on there represent?

Q. That's where they swung the BV channel up into Section 24.

A. Is that where they're saying the limits of the BV channel are?

Q. That's what the record reflects they said.

A. Okay, I would also point out that they show a very limited -- if you extend that line in a logical direction, they'd show a very limited amount of sand in Section 36.

Q. Yes, sir, they sure do. They show a very narrow BV channel.

A. I might add that I have been quite a bit more generous in my net Isopach map than they are in this.

Q. Yes, sir, I'll agree with you. There's only one thing that worries me, you've been even more generous in Section 25.

A. Than they have.

Q. Yes, sir.

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A. According to my interpretation that sand's thicker there and it's thicker on your acreage.

Q. If you want to adopt the Hartman interpretation right here now, I'll adopt it with you gladly. If you'll take it in Section 25, I'll take it in 31 and 36.

A. I'll tell you what I will do --

Q. Let's make a deal.

A. I'll tell you what kind of deal I'm willing to make. You questioned whether or not my Isopach is correct. If you encounter sand, net pay sand, if you'll agree to use that formula and you encounter a net -- and take a penalty of 9.9 percent if you encounter 33 feet or less, we'll agree to that, and if you encounter more, we'll agree to adjust it by more. I've got that much confidence in my --

Q. Yes, sir, well, I know you're full of confidence. We're going to get to something along that order in just a minute. You're just rusing things a little with that.

A. All right.

Q. But I think there are others to consider, Jerry, in this Cycle Two pool other than Amoco and ARCO.

A. Yes, sir.

Q. Will you agree with me that Hartman Exhibit One introduced at the June 5th hearing, that his contours on top of the Lower Morrow are not the top of Cycle Two, top of the Lower Morrow, generally run in a northwest -- northeast/

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

southwest direction, like yours do on our Exhibit Five?

A. They generally run that way. They're a little steeper than ours, though, but they generally run --

Q. They look steeper.

A. Yes, they're steeper than ours.

Q. Okay, sir. Now I think we've agreed now that the gas/water contact would follow structure and not a net pay Isopach or a gross pay Isopach, and looking again at your arrow --

A. Uh-huh.

Q. -- and at your Exhibit Number Four, and let's assume the structure continues -- I'm asking you to assume again -- right on up into Section 36 at the same compass direction northeast/southwest, with that assumption would not more of Section 36 be above water than your zero contour Isopach on your Exhibit Four shows?

A. I think in trying to clarify this, I've stated again that the reason I drew that zero line in there is it is my conclusion that there is -- that there is no net pay southwest of that line. There again, if it's Amoco's conclusion that there is, based on their map, we would have no objection to them drilling, say, 1320 feet or more from our lease line along the west edge of their lease if it's their conclusion that there's net pay over there and that you can get a commercial well over there.

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Rt. 1 Box 193-B
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Q. That's at least the fifth time you've said that.

A. Yeah.

Q. I think it's well in the record and well in the Examiner's mind, and that wasn't the question I asked you.

A. All right. I would -- I would point out just two things to that question.

Q. Why don't you wait till I ask you a question.

A. All right. I thought you wanted an answer to that first one.

Q. I'm going to ask you upon what specific data you honored the 40-foot contour interval on our Exhibit Number Four to this hearing, and what specific data prevailed upon you to ignore the 40-foot contour in the area of 36 and 31. Now earlier you said this was due to the gas/water contact. I think we've blown that out of the tub. Now what other data do you have?

A. I would like -- I'd like to clarify what I said before. I also pointed out that when you get in the south half of 36 that gas/water contact does cut across there and you would cut out part of that due to the gas/water contact. You wouldn't cut it all out.

Q. All right, what --

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Rt. 1 Box 193-B
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A. And I --

Q. What data do you have that you can show the Examiner and this Oil Conservation Division, that the gas/water contact cuts across Section 36?

A. Okay. This takes time; I guess we've got it.

I would pick the top of the sand interval 10,828 in the Empire South Deep Unit No. 19.

But that gives me a top of the sand at a -7169. I testified, based on the log calculations and the well history of the No. 5, that the gas/water contact was -7148, so the Empire South Deep Unit No. 19, the top of the sand is some 21 feet below the gas/water contact.

Okay, you asked for a point in the north half of Section 36, I believe, where the gas/water contact was in the sand, and that's one.

Q. What did our completion test of the interval you're talking about in Well No. 19, that's the same interval that we showed as tested on our Exhibit Number Three, wasn't it?

A. According to your witness' testimony that no hydrocarbons were produced out of that interval, and he also testified that -- I looked in our records and as a working interest owner we got the records. Our records did not show any water volumes, whether they were -- they just

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
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omitted any.

He testified that the well did not make any water; therefor, that test would indicate that it's tight, and based on that test it doesn't give you any additional information as to where the gas/water contact was.

Q. It sure doesn't does it?

A. No, sir.

Q. It didn't give up anything.

A. Didn't give up anything; it just indicates that the zone is tight and that there's no pay at that particular point.

Q. That's right. Now I want you to tell me once again how Well No. 19 on a test of the BV channel zone, we're in agreement on that, aren't we?

A. Uh --

Q. Well, no, let me finish my question. Are we in agreement that we tested through perforations in the casing the BV channel zone that you've been referring to on your exhibit Three -- Jerry --

A. Yeah, I would conclude that based on my analysis, that the gross sand does -- is continuous from your No. 19 up to the BV channel. Now, that well tested noncommercial in all hydrocarbons; had zero net pay.

Q. And you agree with me that it gave up nothing?

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A. Yes, sir.

Q. And I'm asking you, how does that prove to you that the gas/water contact is through Section 36 in the area of the Empire South Deep Unit No. 19?

A. I -- in this permeable sand it would be my conclusion that the gas/water contact would be found at a constant elevation. I based the estimate of where the gas/water contact would be, based upon a log analysis and well history of the Empire South Deep Unit No. 5. I did not use the No. 19. I was merely pointing out, based upon my calculation of where the gas/water contact is, that that sand in No. 19 is below it.

Q. Let's look back at our Exhibit Five, your contact on top of the Cycle Two structure.

A. Okay.

Q. And let's look at the arrow you drew for me on my copy of Exhibit Four in the southwest quarter of Section 31, and I want you to explain to this Examiner how the gas/water contact in the area of our Empire South Deep Unit 19, how the gas/water contact could be above it?

A. I believe I explained that before; that this Exhibit Five was contoured on the top of Cycle Two, and the No. -- Empire South Deep Unit No. 5 is 60 feet from the top of the Cycle Two to the top of the sand. In the Empire South Deep Unit No. 19 it's 104 feet from the top of Cycle

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
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Two to the top of the sand.

Although this well, I believe, is structurally higher than the top of Cycle Two, it is structurally lower on the top of the sand.

And we just calculated the structural position of the top of the sand.

Q. All right, let's go back again. Assume for me for the purpose of my question with relation to Empire South Deep Unit No. 19, that the structure on our Exhibit Five, your contour of top of structure on Cycle Two, is accurately reflecting structure of the BV sand in the area of Well No. 19. Now I'm asking you to make that assumption.

Would not that put the gas/water contact way below the interval we tested in the BV channel zone on the No. 19 Well?

A. Well, I -- there again, I think your question, I wouldn't agree with the wording on it, but the reason that sand is below the gas/water contact is you gained interval. There is a portion of Cycle Two which is shale that is above the gas/water contact. Had you encountered sand in that portion, it would have been above the gas/water contact.

Q. Jerry, maybe we can get at this this way. I realize you're trying to be responsive and I'm not trying to be difficult. The hour is late.

A. The gas/water contact does cut through

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

the Cycle Two interval.

Q. Let me ask you this. Do you have any other evidence to present for the reason you did not honor the contour interval on our Exhibit Number Four in Section 36 and 31, as opposed to almost following it religiously in Section 25, other than the fact that you feel the gas/water contact in the BV channel zone is way high in Section 36 and apparently way high in Section 31?

A. Well, again, to answer that, in your Empire South Deep Unit No. 19 you encountered the sand in the lower part of the interval. Now, I anticipate that that's going to continue for awhile going back north and north and east, or due north. If it doesn't continue for awhile, then you'd have to assume that you have different sands, and it was -- the two weren't connected.

Also, as I said, it is my contention and my interpretation that in that interval between the two 40-foot contour lines in the center of Section 36, that no net pay exists. I'm referring to Amoco's Exhibit Four. There again this is based on channel trends. We see with our control that -- that the channels trend northwest/southeast and based upon Exhibit -- I believe that's Exhibit Three, cross section B-B', that the channel is quite narrow through that interval. We would not see it thickening out as much as would be necessary to encompass 40-foot contour lines across a

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
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boundary between Section -- or across, say, the upper half of Section 36. It is somewhat interpretive, I'll admit it, but it's my conclusion that -- that there is no net pay sand there, down in that area. I think it would violate the general depositional trends.

Q So to that extent you're disagreeing with my interpretation of Mr. Johnston's comments on his Exhibit Eight at the June 5th hearing?

A. Yes, sir.

Q So you're disagreeing with him, if I am interpreting what he said is correct?

A. That is correct.

Q All right, sir, will you -- I'm sure you will agree with this, because your Exhibit Six, I believe it was, certainly shows it.

Would you agree with me that the way you have run your zero Isopach across 36 and 31 greatly -- greatly come in, by in I mean shrink in from the 40-foot contour of Mr. Johnston on our Exhibit Four?

A. You could honor -- if you honored that 40-foot contour line everywhere, you would draw more net pay, if you so constructed your --

Q So to that extent when you have varied from this 40-foot contour interval, you have shrunk the net pay in 36 and 31.

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A. I have also varied to some extent in Section 25 where I've shrunk the --

Q. Yes, sir, I'm coming up to Section 25 now.

A. -- net pay.

Q. And looking at our Exhibit Four here today, and your Exhibit Four here today, it would appear that the shrinkage that occurred in Section 25 is only in the southwest quarter of Section 25 and to a very small degree, is that correct?

A. It's only in the southwest quarter. I'd categorize it a little more than a very small degree.

Q. Well, it's obvious to the naked eye and it won't do any good for you and I to belabor the point. The Examiner can look at it and make his own judgment.

And if followed it religiously, almost identically, in the northeast portion of Section 25.

A. Yes.

Q. With little variance at all.

A. That's correct.

Q. And by honoring it to the degree you have in Section 25, you have increased your net pay, just like by not honoring it in Sections 36 and 31 you have diminished our net pay.

A. That is correct. I would state that I drew this contour map prior to knowledge of Amoco's hearing.

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I'd also state that Amoco's witness testified that this was the only place he could get a commercial well, if I interpret him right. There again, if Amoco thinks they can get a commercial well down in the southeast part of that section, we would have no objection to them drilling there.

Q. Yes, sir. And now let's go to your Exhibit Six.

The only area covered by your Exhibit Four that is calculated or planimetered or whatever you did to it, and reflected on Exhibit Six, is the south half of Section 25 and the east half of Section 36, is that correct?

A. That's correct.

Q. Are there -- does your Exhibit Four show Cycle Two ownership in any other areas, other than the east half of 36 and the south half of Section 25?

A. Does it show ownership?

Q. Uh-huh.

A. I don't believe the map really shows ownership. It shows operators.

Q. All right, operators.

A. It shows the operators of the State BV No. 2 and the BV 1, and a number of other wells. I think it shows the operators of all the wells on the lease.

Q. And it also shows net pay up in the south-

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

west quarter of Section 24.

A. Yes, sir, that's correct.

Q. And on into the southeast quarter of Section 23?

A. Yes, we end the contour lines in that general direction but --

Q. You haven't closed them. You just left them open.

A. Yes.

Q. And in the northeast quarter of Section 26, that's ARCO ownership, isn't it?

A. The ownership in Section 26 is identical to the ownership in Section 25, both royalty owners and operators.

Q. And you also show net pay in Cycle Two in the southwest quarter of Section 30.

A. Yes, sir.

Q. You also show to a degree, net pay -- strike that to a degree. You also show some net pay in a small portion of Section 31.

A. Yes, sir.

Q. Then you introduce Exhibit Six and say if the Oil Conservation Division will follow your recommendation here and limit Well No. 21 to a million a day, that Well No. 21 will not confiscate any of ARCO's gas out of the south

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

half of Section 25.

A. Yes.

Q. Jerry, you talked a lot when you were talking about the pressure data on your Exhibit Five, of how dynamic a reservoir this was and how you almost had instant communication just like in a bathtub at home.

A. Yes, sir, I testified how good it was.

Q. So what goes on between the northeast quarter of Section 36 and the south half of Section 25 is not necessarily going to control and govern what migration trends are established and occur in this Cycle Two reservoir, is that not correct?

A. At the current time there are only two producing wells in that reservoir. If you drill your well, then certainly those three wells would control what happens in that channel.

Q. Do you think that all you'd have to look at is the relationship between our 21 and your No. 1 in the south half of 25?

A. Yes, sir, to protect our correlative rights between the two proration units.

Q. But what you want to do is protect equitably, protect correlative rights in this Cycle Two reservoir.

A. Yes, sir.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. Do you think that that alone will do it? That's what I'm asking you. Looking at all this vast area that you've shown as net pay in our Cycle Two reservoir, do you think just limiting our 21 to a million a day is going to protect everyone's correlative rights?

A. Well, there are other things to be considered, yes, sir. I don't -- and should be considered. I don't know how germane they are.

Our witness has testified that a drilling of a well 660 and 660 from our lease line up in Section 24 would violate our correlative rights.

I also think if -- if a well were drilled in Section 30, and Section 31, and not restricted that it would also affect the correlative rights.

Q. Really, you would like ideally for everyone just to produce their fair share of the reserves of the original gas in place, is that not true?

A. Well, I guess part of this gets into theory. I don't really know. We're not trying to get any more than our share.

There is two points here. One of them is the original gas in place and the other is current gas in place, and I have a difficult time, you know, like I said, Amoco has produced a well in that channel in Section 31 for a number of years before we drilled. So they have gotten some

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

production already.

Our intent is to protect the correlative rights and I guess the Commission would have to answer whether it's current gas in place or original gas in place.

We are certainly not -- our intent is not to take advantage of anybody over the current gas in place.

Q. All right, sir, let me ask you this. Will applying a penalty to our well in the northeast corner of Section 21 of a million a day, as you recommended, will that in any way preclude or prohibit the gas currently in place, current reserves in the southwest quarter of Section 30, from migrating in the direction of your No. 1 Well in the south half of Section 25?

A. There are recoverable reserves, some recoverable reserves, I don't know if they're economically recoverable reserves, in Section 30, and as that reservoir is produced they will migrate somewhat.

Q. Now in which direction would you think they would migrate, looking at your cumulative production from your No. 1 State BV Well?

A. Certainly -- certainly they are going to migrate. At one time, there again, the Empire South Deep Well No. 5 was producing. At that time I'm sure they tended to migrate towards that well.

Now that we have these wells there, the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

entire pressure in the reservoir is declining, and I would assume that the predominance of the gas that's leaving that area is going towards ours.

Q. So penalizing our well is not going to preclude gas migrating from the southwest quarter of 30 to your No. 1 Well.

A. No, sir, it's not.

Q. Will penalizing our well a million a day in any way keep gas from migrating out of Section 23 and Section 24 that you show as having net pay on your Exhibit Four in the direction of your well No. 2?

A. I'm sorry, I'd like to get that question again.

Q. All right, sir, looking at your Exhibit Four --

A. Yeah.

Q. -- and the net pay you show for the southwest quarter of 24, extending on up into the southeast quarter of 23, and looking at the northeast quarter of 26, even though you say it's the same ownership, is there any way a penalty on our well of million a day allowable permitted producing rate, will preclude gas from migrating in those areas in 24, 23, and 26, in the direction of your No. 2 Well?

A. Or also in the direction -- the gas will migrate towards the area of production, and also some of it

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

would migrate towards -- towards the Empire South Deep Unit with your 19 producing -- or with your rew well producing, it could migrate to your No. 5 producing.

I might add that according to our best analysis, the south -- the east half of Section 23 has substantial sand in it. I might also add that we have not hindered anybody from drilling a standard location on any of these tracts. It's up the operator to drill his wells and protect his correlative rights.

Q. Like we did our No. 5 that you referred to at least ten times in your testimony that we drilled it before you drilled your 1 and 2.

A. That's right. That is correct.

Q. Do you know what the cumulative was when our No. 5 Well, the discovery well that you referred to so often, was at the first of this year?

A. Yeah, 1.6 billion.

Q. And do you know what the cumulative was in your two wells?

A. I'd have to look that back up. It was .7 of a billion from our No. 2 Well and on the No. 1 Well, as I previously testified, some 7.2 billion.

Q. Quite a difference there.

A. Yes, there's quite a difference in net pay in those.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q. Oh, I realize those, according to your Exhibit Four.

A. And according to my best analysis.

Q. So can you look at the Examiner and tell him when we look at all of the offsetting areas to your Section 25 that are shown to be productive by your Exhibit Number Four that you stand by and almost guarantee as to accuracy, could you tell the Examiner that unless our 21 is limited to a million day rate from its inception, that Section 25, ARCO's property, is going to suffer net uncompensated drainage?

A. To the best of my knowledge that is the magnitude of the restriction that's necessary to prevent us from suffering uncompensated drainage.

Q. Have you made a study to determine the amount of gas that is currently migrating from Section 31, from Section 30, from Section 24, from Section 23, from Section 26 into Section 25?

A. No, sir, I have not.

Q. Then how can you say that 25 will suffer net uncompensated drainage unless our 21 Well is limited to a million a day from the offset?

A. Sir, if your well is drilled without a substantial allowable penalty, then it would set a precedent which would allow somebody to drill at a similar location in Section 31, Section 30, Section 24, 26, and 23, and such

SALLY W. BOYD, C.S.R.
R. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

wells would certainly result in flagrant violation of our correlative rights.

Q. That did not answer my question.

A. Well, I understand what you're getting at and I don't want to be -- if this was the only well involved I -- yes, and if Amoco is proposing that this is the only well they drill in their unit in this BV channel, we could certainly calculate what based on this Isopach map, what a reasonable productive rate would be to protect the correlative rights with that being the only well.

But I have not seen Amoco propose that that be the only well. They have -- they have produced another well in the channel and I assume that they would have recourse to recommend other wells in the channel, and to do so without a severe restriction would crassly violate our correlative rights.

Q. What --

A. Now --

Q. Excuse me, go ahead.

A. And so assuming -- I did make the assumption that there is a possibility that these other wells will be proposed, and I tried to propose a formula which would be equitable towards all locations.

Q. What well is the Oil Conservation Division and this Examiner considering at this hearing today?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. They're considering that one right there, but if we consider just that proration unit and just ours which offsets it to the north, the formula which I proposed protects equity.

Q. Yes, sir, I realize that, but I'm going to the facts of this case and not some wells that you're proposing and have no authority to propose or not propose.

MR. LOPEZ: Mr. Examiner, if I may interrupt Mr. Buell, it seems to me that he wants his cake and eat it, too.

Once he wants to talk about the offsetting correlative rights between the north half of 36 and the south half of 25, and then in computing what -- how our correlative rights are going to be damaged, he wants us to consider what benefit we might be getting from draining all the other offsetting sections.

It seems to me we can't go both ways; it's either one way or the other.

MR. BUELL: May it please the Examiner, I can answer that very simply.

The classic and legal definition of violation of correlative rights is for a property to suffer net uncompensated drainage.

The classical statutory and legal definition of net uncompensated drainage is drainage to one property

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

from a property that isn't compensated by drainage to another.

You have to have net uncompensated drainage to have violation of correlative rights or confiscation of property.

MR. LOPEZ: If I may respond to that, Mr. Examiner, it seems to me that the rules of the Commission and the statutes of New Mexico provide the opportunity for all offset operators to drill whatever wells they want to within the rules and regulations of the Commission.

MR. STAMETS: I agree with everybody so far and I don't understand what the argument is.

A. Well sir, I might add that it would be my conclusion if this well were produced without a restrictive allowable regardless of any other drainage in the area, that our correlative rights would be violated.

Q. Upon what study do you base that conclusion? You've already admitted you haven't made a study to determine the gas that's migrating to 25 from the southwest of 30; you have not made a study to determine the volume of gas --

MR. STAMETS: MR. Buell, I thought a second ago you told the witness you wanted him only to consider this one well.

MR. BUELL: Yes, sir.

MR. STAMETS: And I believe that

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

his answer is perfectly obvious when you consider this one well only, and you're not talking about -- now if you want to talk about this whole area, we're going to talk about the whole area. If we're going to talk about this one well, we're going to talk about this one well.

Now you decide which one way you're going to go.

MR. BUELL: Mr. Examiner, you misunderstood, and perhaps it's my fault for not being clear, but what he was saying, that this well by itself and no other, producing at its potential ability would probably not violate ARCO's correlative rights in Section 25.

What he was concerned about was a well being drilled in the northwest quarter of 31, the southwest quarter of 30, and that's when I said the only well we're looking at being drilled now is our 21 in the northeast of Section 36.

MR. LOPEZ: Mr. Buell, I think either the witness misspoke or was misunderstood.

Let's hear his answer to that question.

A. Well, there again it is my contention an unrestricted well in Section 36, as proposed by Amoco, would violate our correlative rights and would cause uncompensated drainage, regardless of what occurs in the surrounding area.

MR. BUELL: And that's when I asked him

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

how he could -- upon what data he based that conclusion as he had already testified he had not made a study to determine the incoming migration to Section 25 from the other areas outside 25 that he shows on Exhibit Four to have net pay.

MR. LOPEZ: And, Mr. Examiner, I would respond to Mr. Buell's comment in the fact that there's no point in considering the drainage from the other offsetting sections, because again we're going into all the other offsetting sections and the other offsetting operators rights to drill or not to drill, and that's not the issue before this Division today.

MR. STAMETS: I agree with you, Mr. Lopez. We've got to look at this thing as it is, plus whatever well you're proposing here, and not go beyond that boundary.

MR. BUELL: Mr. Stamets, I think I've made my points in the record for the purpose of which I wanted to, so I am now through with this witness.

MR. STAMETS: Very good.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Tweed.

A. Yes, sir.

Q. Looking at all this, I believe you've drawn this to show that there are only three wells completed

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 435-7409

there in the BV channel, is that right?

A. Yes, sir, that is correct.

Q. Okay. Also looking at the lines, at the amount of acreage within the zero contour line, as you've drawn it on your Exhibit Number Four, and acreage which is within the Empire South Deep Unit, just eyeballing it, I'd say that there's maybe 320 acres in there.

A. Yeah, you mean in between the two of them?

Q. Between the three of them. I'm talking about Section 30, 31, of 17, 29, and 36 of --

A. Oh, okay, yeah, I follow you.

Q. -- 17, 28.

A. That would be a reasonable estimate.

Q. If Amoco had one well completed in that acreage and only one well, would you object to the well at the present location?

A. Before I -- they have recovered some gas. I would just have to calculate it, Mr. Stamets, to know whether we would object. Due to the fact that we have a thicker sand interval under our location than they have got under theirs, and the fact that have produced some gas out of that channel, I think we would probably still ask for a restriction. It certainly would not be as severe, but we would ask for a restriction on the same basis as we ask for one this time. In other words, we'd compare -- we'd then be comparing

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

our net pay in the south half of 25 to their total net pay in the three sections, and I --

Q. What you would be asking for is a proration formula based on amount of net pay in a pool and that formula would have to be rejiggered every time a new well was completed in that pool.

A. Unfortunately I don't -- I didn't see a way around doing something similar to this in order to protect correlative rights.

Q. Is that practical or technically possible?

A. It is certainly difficult.

Q. Well, that's not what I asked.

A. Okay.

Q. Is it technically possible? Are we going to be able to draw these contours -- for example, in Section 25, I don't see a way in the world of drawing the final contour lines to the west because there are no wells upon which to base a contour line.

A. Are you talking about Section 26 or --

Q. Section 25.

A. Oh, the west end of Section 25?

Q. As you move to the west and southwest of where you've drawn your contour lines.

A. Okay. Well, I think in Section 25, 36, generally in the south half of the channel, I think that the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

control at this time is adequate enough to draw a reasonable net pay map.

If people drill additional wells we'll have additional data, which I think will certainly be adequate enough to draw; it would certainly improve it.

Q. What would you have, a pool committee which would consider this material and redraw the lines every time a well was completed and re-establish the allowable for all the individual wells you'd have regardless of the date of first production?

A. I don't know. I hadn't really thought through it to that degree.

It is a cumbersome procedure. My main concern was between the north half of Section 36 and the south half of 25, at this hearing.

MR. LOPEZ: Mr. Examiner, if I might interject, I think the Examiner is asking the witness to come up with a response that perhaps the Commission can respond to, and the problem I have is that with every one drilled at the standard location in accordance with the rules and regulations of the Commission, we wouldn't be here today. What we're talking about is crowding production, and that's when we get into complexities and how to resolve those complexities, I don't know if any of us is here to answer. We've come up with one proposal which we think is fair and equitable.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. STAMETS: I'm afrain that ARCO has proposed a process here which is totally unmanageable and could be very wasteful of human fiscal effort.

A. Sir, I understand your concern and it's a real concern.

As I testified to, I think in the normal Morrow producing area, the permeability is such that you don't get the kind of drainage that you do in this BV channel. I think this particular sand channel is an exception and that you won't have this kind of case in every pool or I can't think of another -- of another Morrow reservoir where you would have this problem, because most of them don't have this high a permeability where they are -- where they do affect the offset wells to the degree that you do on this channel.

MR. STAMETS: A couple of years ago the Division adopted a formula for the allocation of production to wells and the allowable restricted because of locations in nonprorated pools. I don't know if you're familiar with that or not. I believe --

A. No, sir.

MR. STAMETS: -- it was based upon the degree of unorthodox location, the amount of pay which was expected, and this came up with a percentage which was applied against the well's deliverability which was calculated every six months, and set a minimum allowable of 1 million

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

a day.

Would you find that an acceptable formula to be applied to the well in this circumstance?

A. It -- I'm not familiar with the formula, but it sounds reasonable.

Q. Now, we've only been talking about one pay zone. Suppose that Amoco finds a different pay in their well. Will these maps that have been drawn here provide us any direction at all should that be the case, or are you concerned about any other pay zones?

A. Okay. I believe previously I've testified that if the well was completed in Cycle Two by itself, or either in conjunction with other zones, I would recommend the kind of penalty that we propose.

If it were -- if it were completed outside of Cycle Two, due to the normal low permeability in zones outside of Cycle Two, we would not recommend any penalty at all.

Q. Okay, so no penalty, and we're not talking -- are we talking Cycle Two or are we talking BV channel?

A. I'm talking Cycle Two. That BV channel could be located any place in that cycle, and still be connected with our main channel stringer.

Q. How do these cycles that you've got compare with the nomenclature for the cross sections adopted by the nomenclature committee that the Commission formed a number

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

of years ago to establish formation tops in the Pennsylvanian in southeast New Mexico?

A. I'm sorry I didn't review that before I came to the hearing.

Q. Are they pretty well -- are they easily seen in this area?

A. Yes, sir. Cycle Two and Cycle Three, the tops and the bottoms are easily seen. Cycle One and Cycle Four are not quite that -- that definitive.

Q. Is it conceivable that Amoco could get a well in Cycle Two which would not be connected to the BV channel?

A. It is quite remote but it certainly could happen. I would say it would be remote.

I believe they testified that their sand that they encountered in their No. 19 well was part of the -- part of the Cycle Two -- or part of the BV channel. Certainly if that was part of the BV channel and they move north, it would just be moving thoward a thicker part of the channel.

Q. Does anyone know why whoever drew this exhibit of ARCO's, which Amoco has introduced as their Exhibit Number Four, why this thicker sand was drawn through the center of Section 36? Was that another projected channel? Was that a divergence of the BV channel?

A. These -- it was -- it was drawn, I believe,

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

on the gross pay map. It would appear to be a divergence. On our gross sand map, not gross pay, excuse me. It would appear to be a divergence. I certainly have some question as to whether there's any net pay in that divergence stream.

Q. That was going to be my next question. You've said that you felt there was no pay between those two --

A. Yes, sir, yes, sir.

Q. On what basis?

A. I'll readily admit that the information is quite skimpy there and there's a possibility there could be some but in my estimation there isn't.

Generally, based on a northwest/southeast trend of the sand development. To have that divergence you would go essentially south and would diverge some -- divert somewhat from the normal Morrow depositional trend, and for that reason I felt like that the odds favored it not being there. There is some possibility that there could be some there, and that's a portion of the map where we have very little control, or no control, I should say.

Q. I wouldn't appear to me that the drilling of the Amoco well in question would add a whole lot of information relative to that part of the section.

A. No, sir, it would not.

Q. All right.

MR. STAMETS: Any other questions of this

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

witness? Mr. Buell?

MR. BUELL: Mr. Examiner, I have one that I intended to ask him.

RECROSS EXAMINATION

BY MR. BUELL:

Q. we've been talking about Cycle Two, Mr. Tweed, all the way through here. Did you give credit to any well pay in Cycle Two that was outside of what we've all recognized as the BV channel?

A. You mean on my net Isopach map?

Q. Yes, on your Exhibit Four?

A. Yes, sir. If you refer to Exhibit Four, I do show two channel systems, one running through the north-east part of Section 24, Section 19, and Section 30, and I have concluded based on pressure analysis and depositional analysis that these are separate channels.

Q. You didn't understand my question.

A. Okay.

Q. We're not worried about that channel to the north because we agree with you --

A. Yes, okay.

Q. -- it's a separate channel.

I'm saying in your BV channel, the south channel on your Exhibit Four, did you give any well, your

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

No. 2 Well, your No. 1 Well, or the No. 5 Well, credit for any pay that was not in what we have identified and have been calling the BV channel on all our cross sections?

A. No, sir, to the best of my ability; I'm pretty sure.

Q. I only noticed for the first time down in the southwest quarter of Section 31 immediately below our -- south and west of our No. 5, isn't that colored green, the same colore as No. 5?

A. Yes, sir.

Q. Is it in the BV channel?

A. Not to my -- it's my conclusion that it is not in the BV channel.

Q. But it's in the Cycle Two; it has Cycle Two pay.

A. Yes, sir, it does.

Q. And you have added that pay to your Wells Nos. 1 and 2, have you not?

A. Well, it's the same problem we've got up in Section 19. I think the two channels, that the -- that the depositional channels are separated. I don't think that Well No. 3 is connected to the BV channel, in my -- my analysis.

Q. Well, do you think that the pay you gave credit to your No. 1 Well and your No. 2 Well is connected

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

to the BV channel?

A. Yes, sir.

Q. Come over here and show me just how it's connected.

A. I don't follow your line of reasoning. There is the sand body for the State BV No. 2 and there's the sand body for the State BV No. 1.

Q. We've all been calling that the BV channel.

A. Yes, sir.

Q. Did you give in your No. 1 Well any credit for the pay of this well above the BV channel? That was my question.

A. No, sir.

Q. So all really what you have done, you have Isopached what we've all admitted is the BV channel on your Exhibit Four.

A. But I didn't see any pay above the top of what we're calling the BV sands.

MR. BUELL: I should have cleared that up earlier, Mr. Examiner, but in the heat I got -- overlooked it.

Q. So what really then on Exhibit Four with regard to the south channel --

A. Yes, sir.

Q. -- all you have Isopached is the BV chan-

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

nel itself.

A. That is correct.

MR. BUELL: Thank you, that's all I have, Mr. Examiner.

MR. STAMETS: Are there any other questions of this witness? He may be excused.

Does anyone have anything they wish to add further?

MR. BUELL: Mr. Examiner, I would like to formally offer Amoco's Exhibit Five, a contour map on top of the Cycle Two structure, which Mr. Tweed was generous enough to furnish us for an exhibit.

MR. STAMETS: Exhibit Five will be admitted.

I'm also going to leave in for the record this Doyle Hartman exhibit which was discussed but not admitted.

MR. BUELL: Would you like me to offer it as our Exhibit Six, Mr. Examiner?

MR. STAMETS: I think that would be a good idea.

MR. BUELL: Could I have this marked?

MR. STAMETS: And it will be admitted.

If there is nothing further, the case will be taken under advisement.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

C E R T I F I C A T E

, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 6936 heard by me on 6-25, 1980.

Richard L. Stamets, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

KELLAHIN and KELLAHIN
Attorneys at Law
500 Don Gaspar Avenue
Post Office Box 1769
Santa Fe, New Mexico 87501

Jason Kellahin
W. Thomas Kellahin
Karen Aubrey

Telephone 982-4285
Area Code 505

July 7, 1980

Mr. Doug Keen
Tenneco Oil Company
6800 Park Ten Blvd.
Suite 200 North
San Antonio, Texas 78213

re: Amoco Case 6930 (June 25, 1980)
Hartman Arco Cases 6927 & 6928
(June 5, 1980)

Dear Mr. Keen:

In accordance with your request I have borrowed from the New Mexico Oil Conservation Division a set of the exhibits used in each of the above referenced cases.

The transcripts for the 6930 case is not yet available. Enclosed is the transcript for the 6927-6928 case.

These are originals and I must return them to the Oil Division when you have reviewed them.

Very truly yours,

W. Thomas Kellahin

WTK:nb

ARCO Oil and Gas Company
Permian [illegible]
Post Office Box 1610
Midland, Texas 79702
Telephone 915 684 0130

Curt Krehbiel
District Landman

December 13, 1979

Pennzoil Company
ATTENTION: Mr. Ken Medlock
Box 1828
Midland, Texas 79702

Subject: Farmout Request
Eddy County, New Mexico

Gentlemen:

Pennzoil as operator drilled a Morrow test in the S/2 of Section 24, T-17-S, R-28-E, Eddy County, New Mexico, which was completed as a dry hole. We understand that 40 acres of this 320 acre spacing unit has since expired. ARCO Oil and Gas Company is willing to drill another Morrow test on this spacing unit if Pennzoil and the other non-operating parties will agree to permit ARCO to earn all of their leasehold interest subject to the retention of the difference between existing burdens and 20% in order for ARCO to have an 80% net revenue interest during payout of such well. At payout Pennzoil and each other party would have the option to convert its overriding royalty interest to a 50% working interest.

We will appreciate your causing this proposal to be considered by the present owners of the remaining 280 acres in the S/2 of Section 24. Your early attention to this proposal is requested as we could conceivably commence this well as early as February 1980.

Yours very truly,

Curt Krehbiel

CK:bk

BEFORE THE
OIL CONSERVATION COMMISSION
Case 6928 6927
Exhibit 3
Submitted by ARCO
Hearing Date 6-5-80

PENNZOIL COMPANY
POST OFFICE DRAWER 1828 • MIDLAND, TEXAS 79702 • (915) 682-7316

January 7, 1980

RECEIVED
JAN 8
ATLANTIC RICHFIELD COMPANY
LAND DEPT.

TO: ALL CO-OWNERS
(Address List Attached)

Re: ARCO Farmout Request
Aid Field
Eddy County, New Mexico
S/2 Section 24, T-17-S,
R-28-E

Gentlemen:

Enclosed is a copy of farmout request dated December 13, 1979, from ARCO, whereby they propose to farmout our interest in the S/2 Section 24, T-17-S, R-28-E on a net 70% revenue interest basis to a 50% back-in, towards the drilling of a Morrow test on the same proration unit on which we drilled our Aid "24" State Comm #1.

Our combined interest in the proposed unit is based on our operating agreement dated November 9, 1970, covering the Aid State #1, which we calculate to be the interest shown opposite your name.

The NW/4 SW/4 Section 24 has expired and will be up on the next New Mexico State Sale.

We are evaluating this request and will advise you of our decision and would appreciate it if you would advise us of your position in this regard as soon as possible.

Very truly yours,

K. Medlock

Kenneth Medlock
Landman

KM/mlm
Encl.

cc: ARCO Oil & Gas Co.
P. O. Box 1610
Midland, Texas 79702
Attention: Mr. Curt Krehbiel

BEFORE THE
OIL CONSERVATION COMMISSION
Case 6928 6927 4
Submitted by ARCO
Hearing Date 6-5-80

DOYLE HARTMAN
Oil Operator
SUITE 508
C A K PETROLEUM BUILDING
MIDLAND, TEXAS 79701

(915) 684-4011

February 13, 1980

All Owners
(Address List Attached)

Re: S/2 Section 24,
T-19-S, R-28-E
(Pennzoil Aid-State No. 1)

Gentlemen:

Please refer to recent correspondence from Arco Oil and Gas Company proposing a farmout covering the above noted Morrow tract.

We are the owners of the S/2 SW/4 of Section 24 which constitutes 25% of the above noted 320-acre tract and believe from various conversations with some of the interested parties in this matter that the location for any future Morrow well on this tract would be in W/2 SW/4 Section 24.

We have also checked with our lawyer in Santa Fe who handles all our New Mexico Oil Conservation Division work who advises as follows:

1. A well in W/2 SW/4 of Section 24 would be situated at a non-standard location under NMOCD rules.

2. Approval for this location could be obtained by receiving written waivers from the offset operators or at a NMOCD hearing.

If Arco (operator of the offset acreage to the south) refused to grant a waiver and/or opposed this non-standard location at the hearing, approval from the NMOCD would provide for a severe penalty in the form of a highly restricted allowable for the new well. The allowable would be based on a pipeline deliverability test to be performed after completion of the well with the actual allowable to be 25% to 50% of the actual test results.

This presents a serious problem for us as owners of the S/2 SW/4 of Section 24 (which appears to constitute a significant portion of the recoverable gas reserves in the S/2 of Section 24) since the offsetting Arco BV State No. 1 and 2 in Section 25, T-19-S, R-28-E, are non-prorated wells.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6928 6927 Exhibit No. 5
Submitted by ARCO
Hearing Date 6-5-80

As you can see, the non-prorated wells will severely drain a prorated well drilled at the above noted non-standard location. Based on the foregoing, it appears to us that a decision by the working interest owners in the S/2 Section 24 regarding drilling or farming out is subject to considerations other than simply purely geologic merit.

It is our opinion that it is critical, in order to eliminate any possible opposition to a location in the W/2 SW/4 of Section 24, that Arco receive enough additional interest (by way of a farmout) so that it will agree to drill the well and be the operator.

We urge all parties to reach a decision in this matter as soon as at all possible due to the possible extreme drainage that could be occurring from the producing wells to the south.

Very truly yours,

Doyle Hartman

DH/mh
Enclosure

DOYLE HARTMAN
Oil Operator
SUITE 508
C & K PETROLEUM BUILDING
MIDLAND, TEXAS 79701
(915) 684-4011

April 18, 1980

RECEIVED
APR 21 1980
AMOCO OIL AND GAS CO.
NORTH & WEST LAND DEPT.

To: All Working Interest Owners
(Address List Attached)

Re: Doyle Hartman No. 1
South Empire State,
S/2 Section 24, T-17-S, R-28-E
Eddy County, New Mexico

Gentlemen:

Reference is made to various correspondence over the past several months regarding the drilling of a 11,000 foot Morrow well on the above described tract.

From various conversations with the larger owners in the subject tract this week, it has become apparent that the drilling of this well is being delayed, which appears to be contrary to the best interests of all concerned.

We own 100 net acres in the S/2 of Section 24 and have paid a considerable amount of money for these leases. Furthermore, we have also participated in an expensive dry hole which has been very valuable in further defining this prospect.

In our opinion, we are dealing with a narrow, but prolific Morrow channel sand crossing a portion of the W/2 of Section 24 and the E/2 of Section 23. Therefore, in order to maximize the potential of our leasehold interests as well as protect the interests of our royalty owners, we propose the following:

(1) We are currently staking an 11,000-foot Morrow well to be drilled at a location of 660' FSL and 660' FWL Section 24 and will file the necessary New Mexico Oil Conservation Division forms as soon as the surveyors plats are available.

(2) We respectfully request that all working interest owners agree to one of the following alternatives:

(a) Participate in the proposed well under a Model Form Operating Agreement naming the undersigned as operator. AFE and Operating Agreement will be furnished as soon

BEFORE THE
OIL CONSERVATION COMMISSION
Case No. 6928 Exhibit No. 6
Submitted by: Amoco
Hearing Date: 6-5-80

cc: Tannehill
Salmon
Daugherty
Hartman
Keasler

as possible; or,

(b) Farmout your interest while retaining a gross 30% of 8/8 override absorbing all present royalty out of the override so operator would be assigned a 70% net revenue interest.

At payout, each party to have the option of converting its net part of the override to a 50% working interest. All interests subject to proportionate reduction.

Rights earned limited to 100' below total depth drilled.

Due to the considerable amount of time that has already elapsed in getting this well started, please advise as soon as at all possible regarding your decision to participate or farmout as well as your comments concerning our proposed plan of development including proration unit and location.

Very truly yours,

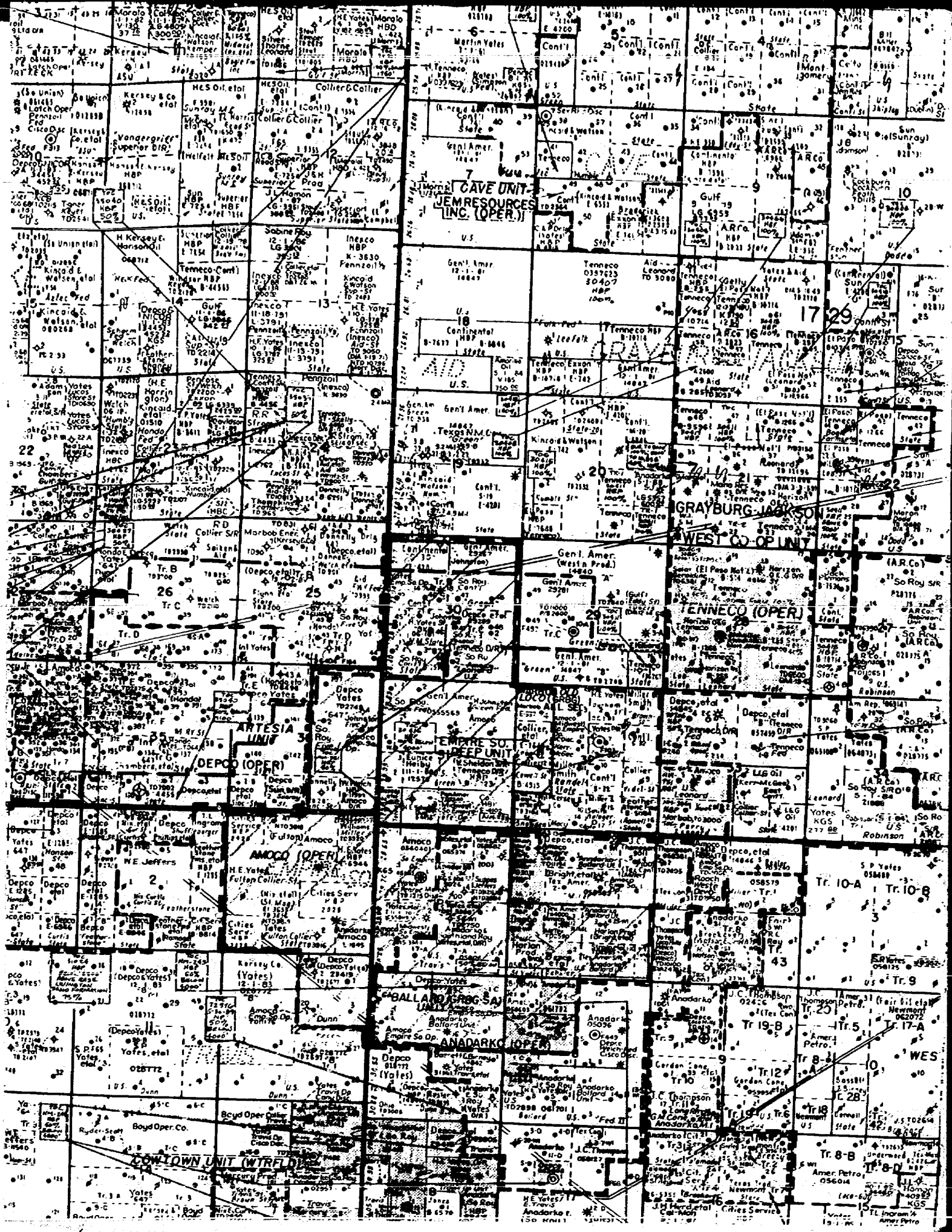
Doyle Hartman

DH/mh

Address list attached

TOC owns a 3.569535 %
WI and a variable
RI (approx 2.949898%)
in the South Empire dep
unit (below 4200' below
top of San Andres) in
all the area in orange
except Sec 30 where
we own 1.189845 WI
and .983299% RI after
payout of HEPCO #13
well.

STEVE KING
my best guess.


CAVE UNIT
JEM RESOURCES INC. (OPER.)
GRAYBURG-JACKSON
WEST CO-OP UNIT
TENNECO (OPER)
ARTESIA UNIT
DEPCO (OPER)
AMOCO (OPER)
EMPIRE SO. DEEP UNIT
BALLARD GRBG SA UNIT
ANADARKO (OPER)
COWTOWN UNIT (WTRFLD)

EDDY COUNTY NEW MEXICO WILDCAT

Well: DEPCO, INC. 1 Welch "A"
Loc'n: 7 mi SW/Loco Hills, 480' FNL 500' FWL Sec 9-18S-29E.

Result: D&A WF

Spud: 12-21-77; Comp: 2-4-78; Elev: 3516' grd; TD: 10,100' Strawn;
Casing: 12 3/4" 402'/475 sx, 8 5/8" 2910'/1300 sx
Comp Info: DST (Bone Sprg) 6140-6267', op 1 hr, rec 272' OCW, (Sampler rec 1,709 CFG & 500 cc's wtr @ 75#), 1 hr ISIP 1956#, FP 87-87#, 3 hr FSIP 2569#, HP 2744-2744#, BHT 108 deg; DST (Bone Sprg) 6862-7129', op 1 hr 30 min, rec 75' FW, (Sampler rec 2000 cc's SW @ 50#), 1 hr 30 min ISIP 2039#, FP 186-186#, 3 hr FSIP 3095#, HP 3135-3082#, BHT 111 deg; DST (Bone Sprg) 7178-7458', op 2 hrs, rec 65' DF, (Sampler rec 1900 cc's DF), 1 hr ISIP 302#, FP 194-215#, 2 hr FSIP 258#, HP 3294-3294#, BHT 118 deg; DST (Bone Sprg) 7574-7676', op 1 hr 30 min, rec 110' oil & 130' GOCDF & 410' GCW, (Sampler rec 1.47 CFG @ 300#), 1 hr ISIP 439#, FP 231-277#, 2 hr FSIP 300#, HP 3412-3412#, BHT 118 deg; Crd (Cisco) 9000-9158', rec 155', no desc; ran CNL, FDC & DILL logs; C/Moranco #2.
Tops: (EL) Bone Sprg 6006', Wolfc 8024', Cisco 9134', Cany 9378', Strawn 10,036'
API No.: 30-015-22369

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Date: 5-10-78 Card No.: 7 rm

EDDY COUNTY NEW MEXICO WILDCAT

Well: DEPCO INC, 1 Loco Hills Deep
Loc'n: 7 mi SW/Loco Hills; Sec 9-18S-29E; 1980' FNL, 1980' FWL Sec

Result: D & A WF

Spud: 11-30-76; Comp: 2-5-77; Elev: 3515' Grd, 3527' KB; TD: 11,210' Miss
Casing: 12-3/4" 409'/475 sx; 8-5/8" 3350'/1050 sx
Comp Info: DST(Bone Springs) 6335-6530', op 1 hr 30 mins, GTS 15 mins @ TSTM, rec 846' OCW, (sampler rec 1800 cc's oil @ 25), ISIP 2725#/1 hr, FP 211-342# FSIP 2762#/3 hrs, HP 2854-2840#, BHT 108 deg; DST (Abo Reef) 7223-7365', op 1 hr rec 30' DF (sampler rec 1600 cc's DF), ISIP 122#/1 hr 30 mins, FP 91-104#, FSIP 157#/3 hrs, HP 3426#, BHT 118 deg; DST (Wolfc) 7530-7752', op 1 hr 30 mins, rec 20' oil & 100' DF, ISIP 524#/1 hr 30 mins, FP 140-140#, FSIP 629#/3 hrs, HP 3707-3707#, BH T 120 deg; DST (Morrow) 10,770-835', op 1 hr 2 mins, GTS 10 mins @ 92,432 CFGPD & dec to 53,200 CFGPD 1/4" ch, rec 218' GCM, ISIP 4389#/1 hr, FP-123-149#, FSIP 4569#/4 hrs, HP 5389-5414#; DST (Morrow) 10,920-11,078', op hr, rec 120' DF, ISIP 1796#/1 hr, FP 251-277#, FSIP 3223#/2 hrs, HP 5654-5654# BHT 165 deg; DST (Morrow) 10,976-11,210', op 1 hr 45 mins, rec 465' DM, (sampler rec 10.29 CFG + 700 cc's DF @ 450#), ISIP 6396#/1 hr, FP 300-300#, FSIP 6260#/1 hr, HP 6805-6714#, BHT 150 deg; C/WEK; ran GRNL, FDC, CNL and DILL logs
Tops EL: Yates 960', Seven Riv 1348', Queen 1980', SanAnd 2800', Abo Reef 6410' Wolfc 7520', Penn Li 9360', Strawn 10,000', Atoka 10,300', Morrow Li 10,570' Morrow Sd 10,785'
API No: 30-015-21941

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A Subsidiary of A.C. Nielsen Company
Date: 4-20-77 Card No.: 7 dh

EDDY COUNTY NEW MEXICO EMPIRE, S. FIELD

Well: AMOCO PROD. CO. 16 Empire South Deep Unit
Loc'n: 7 1/2 mi SW/Loco Hills, 1980' FNEL's Sec 7-18S-29E.

Result: GAS DG

Spud: 9-22-77; Comp: 11-18-77; Elev: 3589' grd; TD: 11,085' Barnett;
Casing: 13 3/8" 390'/450 sx, 8 5/8" 2955'/1200 sx, 5 1/2" 11,085'/2100 sx
Prod Zones: (Morrow) T/Pay 10,918', prod thru perfs 10,918-936'
IPF: 3500 MCFGPD, 20/64" ch, COR 27, 344-1, Grav NR, CP pkr, TP 1550#
Comp Info: DST (Morrow) 10,932-11,000', op 1 hr 5 min, GTS 4 min @ 17,691-22,847 MCFGPD, 3/4" ch, rec 435' Cond, (Sampler rec .78 CFG & 50 cc's cond @ 200#), 1 hr ISIP 4-35#, FP 2003-3311#, 2 hr FSIP 4241#, HP 5805-5775#; Perf (Morrow) 10,918-936' w/4 SPF; F/3350 MCFGPD/1 hr; F/3500 MCFGPD & 16 BC/6 hrs, 20/64" ch, TP 1700#; ran CNL & DENL logs; C/Moranco.
Tops: (EL) Wolfc 7993', Cisco 8998', Cany 9516', Strawn 9828', Atoka 10,274', Morrow 10,702', L/Morrow 11,030', Barnett 11,056'
API No.: 30-015-22241

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Petroleum Information CORPORATION
Date: 1-18-78 Card No.: 1 mm

EDDY COUNTY | NEW MEXICO | WILDCAT

Well: DEPCO, INC. 1 Welch-Federal | Result OIL | WFD

Loc'n: 7 1/2 mi SW/Loco Hills, 1980' FNGEL's Sec 8-18S-29E.

Spud: 10-7-77; Comp: 1-31-78; Elev: 3515' grd; TD: 11,150' Miss; PB 9156'
Casing: 13 3/8" 400'/430 sx, 8 5/8" 2900'/1300 sx, 5 1/2" 9909'/500 sx
Prod Zone: (Cisco) T/Pay 9120', prod thru perfs 9120-35'
IPF: 449 BOPD, 14/64" ch, GOR 1989-1, Grav 45, CP pkr, TP 1550#
Comp Info: DST (Big Spring) 6259-6517', op 1 hr 30 min, rec 10' mud, ISIP 247#/1 hr, FP 141-159#; FSIP NR/2 hrs, HP 2988-2935#; DST (Wolfc) 8014-8124', op 1 hr 30 min, rec 1830' sulf wtr, 1 hr ISIP 2960#, FP 111-686#, FSIP 3982#/2 hrs, HP 3803-3803#; BHT 130 deg; DST (Cisco) 9119-36', op 1 hr 30 min, rec 25' oil (Sampler rec 600 cc's oil & 3.57 CFG @ 600#), 1hr ISIP 3602#, FP 264-1056#, 3 hr FSIP 3615#, HP 4476-4436#, BHT 135 deg; DST (Cisco) 9110-86', op 1 hr 30 min, rec 2000' GCO & 2600' OGGC sulf wtr & 200 sulf wtr, (Sampler rec 800 cc's oil & 200 cc's sulf wtr & 4.92 CFG @ 2100#), 1 hr ISIP 3617#, FP 577-2170#, 2 hr FSIP 3617#, HP 4505-4505#, BHT 140 deg; DST (Cany) 9965-10,036', op 1 hr 30 min, rec 100' DF, 1 hr ISIP 123#, FP 88-106#, 3 hr FSIP 382#, HP 3198-3198#; DST (Morrow) 10,702-817', op 1 hr 30 min, rec 90' DF, 1 hr ISIP 217#, FP 174-174#; 3 hr FSIP 1350#, HP 5260-5260#; DST (Morrow) 10,779-915', op 1 hr 30 min, rec 100' DM, 1 hr ISIP 935#, FP 152-109#, 3 hr FSIP 2416#, HP 5288-5288#; Perf (Cisco) 9302-24' w/2 SPF; sqzd 73 BW, no time; sqzd w/325 sx; Perf (Cisco) 9210-20' w/2 SPF; S/dry; PB to 9156'; Perf (Cisco 9120-35' w/2 SPF; A/500 gals; ran DILL, CNL, FDC, BHC & HDT logs; C/Moranco.

(Cont'd on Card 6-A).

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Date: 3-1-78 Card No.: 6 rm

EDDY COUNTY | NEW MEXICO | WILDCAT

Well: DEPCO, INC. 1 Welch-Federal | Result OIL | WFD

Loc'n: 7 1/2 mi SW/Loco Hills, 1980' FNGEL's Sec 8-18S-29E.

(Cont-d from Card 6).

Tops: (EL) San And 2698', 2nd Bone Spring 5965', 3rd Bone Spring 7840', Wolfc 8050', Cisco 9122', Cany 9345', Strawn 9950', L/Strawn 10,160', Atoka 10,255', Morrow 10,720', Chester 10,995'
API No.: 30-015-22300

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Date: 3-1-78 Card No.: 6-A rm

14 entries

EDDY COUNTY NEW MEXICO EMPIRE S/FIELD

Well: HARVEY E. YATES CO. INC, 1 Travis Bassett -Birney Result GAS DG

Loc'n: 8 mi SW/Loco Hills; Sec 7-18S-29E; 1980' FSL, 1980' FEL Sec

Spud:12-15-77; Comp:2-18-78; Elev: 3574' Grd; TD:12,210' Miss; PB:11,161'
Casing: 12-3/4" 399'/425 sx; 8-5/8" 2900'/500 sx; 5-1/2" 11,193'/875 sx
Prod Zone: (Morrow), T/Pay 10,901', Prod thru Perfs 10,901-914'
IP CAOF: 3196 MCFGPD, Grav 49.8, GOR NR, SIWHP 2904#, SIBHP 3999#
Comp Info: ran DILL, CNL logs; DST (Bone Spring) 6249-80', op 1 hr, rec 30' wtr press NR; DST (Cisco) 9389-9554', op 1 hr 30 mins, rec 5186' sulf wtr (sampler rec .169 CFG & 1700 cc's SW @ 900#), ISIP 3206#/1 hr, FP 913-1652#, FSIP 3750#/2 hrs, HP 4496-4496#, BH T 138 deg; DST (Canyon) 9755-9900', op 1 hr 30 mins, rec 20' DM (sampler rec 1800 cc's mud @ 100#), ISIP 208#/1 hr, FP 139-92#, FSIP 231#/2 hrs, HP 4618-4641#, BHT 140 deg; DST (Strawn sd) 10,100-180', op 1 hr 30 mins, GTS 30mins @ 63 MCFGPD 1/4"ch, rec 490' GCM (sampler rec .70 CFG @ 125#), ISIP 1428#/1 hr, FP 92-139#, FSIP 1464#/2 hrs, BHT 190 deg Perf (Morrow) 10,901-914', F/3100 MCFGPD natural; (Morrow) 4 point test: F/847 MCFGPD/60 mins 1.250" orifice, TP 2446#, F/1071 MCFGPD/60 mins 1.250" orifice, TP 2300#, F/1687 MCFGPD/60 mins 1.250" orifice, TP 1916#, F/2319 MCFGPD/60 mins1.250" orifice, TP 1403#; C/Moranco
Tops EL: Yates 950', Seven Rivers 1265', Bowers 1686', Queen 1924', Penrose 2086' Grayb 2282', San And 2664', 1st Bone Springs sd 6070', 2nd Bone Spring sd 7014 3rd Bone Spring sd 7786', Wolfc 8044', Cisco 9266', Canyon li 9805', Strawn 9955' Atoka 10,263', Morrow 10,622', L/Morrow 10,861' API No: 30-015-22370

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Date: 4-5-78 Card No.: 6 dh

EDDY COUNTY | NEW MEXICO | WILDCAT

Well: MIDWEST OIL CORP. 1 South Empire Deep Unit Result: NEW GAS DISC.

Loc'n: NE/part county, 8 mi SW/Loco Hills; 1830' FNL 1639' FWL sec 6-18S-29E; WDD
Surrounded by shallow prodn in Loco Hills Fld.

(Cont'd from Card 2)

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Comp Info (Cont'd):
Chamber rec 0.4 CFG), ISIP 791#, FP 73#, FFP & FSIP not taken; DST 10,630-780', 11 min pre-flow, SI/1 hr, re-op 1 hr, SI/2 hrs, re-op 2 hrs for 2nd flow period, GTS 3 min, SI/1 hr, op 1 hr, GV 30,000,000 CFPD/10 min, 38,000,000 CFGPD/20 min, max rate 45,000,0000 CFGPD after 30 min, decr to 40,000,000 CFPD after 50 min, stab last 10 min, SI/2 hrs, re-op 2 hrs on 1" ch, GV 40,000,000 CFGPD/14 min, Flow stab in 46 min, changed to 3/4" ch for 1 hr, max GV 29,000,000 CFPD/10 min, decr to 26,000,000 CFPD after 25 min, & stab, SI/3 hrs, rev out 2 bbls dist, Grav 55.9, (Spl chamber rec 24.5 CFG & 100 cc dist @ 2900#), ISIP 4118#/1 hr, 1 hr IFP 3185#, 2 hr FFP 3837#, FSIP 4118#/3 hrs; DST (Dev) 11,900-12,100', op 1 hr, no blo, 1st 15 min, then wk blo for 45 min, rec 270' DM & 90' WCM, (Spl chamber rec 150 cc MCW ISIP 5070#/1 hr, FP 169-334#, FSIP 3871#; Perf 10,752-764', rec 100,000 CFGPD, dec to TSTM in 25 min, A/500 gals; F/10,500,000 CFGPD, 5/8" ch, A/1000 gals; F/est 12,000,000 CFGPD, 5/8" ch; Perf 10,716-738', F/8,000,000 CFGPD & 203 BD, 3 BW 19 hrs, 24/64" ch, TP 2600#; 4-Point Test: F/3,000,000 CFGPD/1 hr, TP 2809#; F/5,415,000 CFGPD/1 hr, TP 2731#; F/8,033,000 CFGPD/1 hr, TP 3593#; F/10,973,000 CFGPD/1 hr, TP 2386#, no choke sizes reported.

Tops: (EL) Yates 950', San And 2730', Atoka 10,234', Morrow 10,380', Miss 11,260', Wdfd 11,781', Dev 11,825'. API No.: 30-015-20492

Petroleum Information CORPORATION
A Subsidiary of A.C. Nielsen Company

Date: 1-12-72 Card No.: 2-A rm

EDDY COUNTY | NEW MEXICO | EMPIRE, S. FIELD

Well: AMOCO PROD. CO. 14 Empire South Deep Unit Result: GAS DG

Loc'n: 7 mi SW/Loco Hills, 1650' FNL 2010' FEL Sec 5-18S-29E.

Spud: 4-8-77; Comp: 8-23-77; Elev: 3564' grd; TD: 11,180' Miss; PB: 11,136'
Casing: 13 3/8" 386'/450 sx, 9 5/8" 2893'/1714 sx, 5 1/2" 11,180'/450 sx
Prod Zone: (Morrow) T/Pay 10,735', prod thru perfs 10,735-804'
IPF: 420 MCFGPD, 48/64" ch, GOR 420,000-1, Grav (gas) NR. (Cond) NR, CP pkr, FTP 460#
Comp Info: DST (Morrow) 10,640-839', op 1 hr, GTS 4 min @ 4250 MCFGPD, 38/64" ch, no rec, 1 hr 10 min ISIP 1888#, FP 638-1159#, 2 hr FSIP 1819#, HP 5465-5459#; Perf (Morrow) 10,735-746', 10,765-777', 10,791-804' w/2 SPF; F/215 MCFGPD, 48/64" ch, TP 275#; Ran CNL, FDC, HDT & DILL logs; C/Marcum Drlg.
Tops: (EL) Abo 7086', Wolfc 7705', Cisco 8930', Cany 9527', Strawn 9750', Atoka 10,205', M/Morrow 10,660', L/Morrow 10,948', Chester 11,126'
API No.: 30-015-22073

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A Subsidiary of A.C. Nielsen Company

Date: 9-28-77 Card No.: 4 rm

14.1

EDDY COUNTY | NEW MEXICO | EMPIRE, S. FIELD

Well: AMOCO PROD. CO. 9 Empire South Deep Unit Result D&A D

Loc'n: 7 1/2 mi SW/Loco Hills, 660' FNL 990' FWL Sec 5-18S-29E.

Spud: 6-4-76; Comp: 7-22-76; Elev: 3573' grd, 3597' KB; TD: 11, 194' Miss;
Casing: 13 3/8" 401'/400 sx, 9 5/8" 2900'/700 sx
Comp Info: Lost circ @ 8700'; DST (Morrow) 10,756-11,194', op 1 hr 15 min, GTS 45 min @ TSTM, rec 303' DM, 1 hr ISIP 723#, FP 266-266#, 3 hr FSIP 4203#, HP 5416-5416#, BHT 162 deg; BHT 162 deg; Ran CNDL, DILL & FDC logs; C/ Sharp Drlg.
Tops: (EL) San And 2738', Abo 6830', Wolfc 7718', Cisco 8832', Cany 9452', Strawn 9732', Atoka 10,232', M/Morrow 10,642', L/Morrow 10,953', Chester 11,164'
API No.: 30-015-21793

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A Subsidiary of A.C. Nielsen Company

Date: 9-1-76 Card No.: 5 rm

EDDY COUNTY NEW MEXICO EMPIRE, S. FIELD

Well: AMOCO PROD. CO. 17 Empire South Deep Unit Result D&A D

Loc'n: 6 mi SW/Loco Hills, 660' FNL 1980' FWL Sec 4-18S-29E.

Spud: 11-10-77; Comp: 12-29-77; Elev: 3534' grd, 3550' KB; TD: 11,050' Morrow;
Casing: 13 3/8" 407'/400 sx, 8 5/8" 2910'/1200 sx
Comp Info: Ran CNL & FDC logs; C/Rial #6.
Tops: NR
API No.: 30-015-22336

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Date: 2-15-78 Card No.: 12 rm

14/

EDDY COUNTY NEW MEXICO EMPIRE, S. FIELD

Well: AMOCO PROD. CO. 12 Empire South Deep Unit Result GAS DG

Loc'n: 6 1/2 mi SW/Loco Hills, 1980' FSL 2120' FWL Sec 5-18S-29E.

Spud: 11-6-76; Comp: 2-1-77; Elev: 3567' grd; TD: 11,165' Morrow; PB: 11,130'
Casing: 13 3/8" 425'/400 sx, 9 5/8" 2900'/2275 sx, 5 1/2" 11,165'/475 sx
Prod Zone: (Morrow) T/Pay 10,642', prod thru perfs 10,642-900'
IP CAOF: 31,150,000 CFGPD, GOR 93,333-1, Grav (gas) .648, (cond) 64.5, SITP 3175#
Comp Info: DST (Wolfc) 7864-8040', op 2 hrs, rec 10' GCMCO & 1554' sli MCSW, 1 hr ISIP 3030#, FP 235-837#, 4 hr FSIP 3004#; HP 3638-3638#; BHT 123 deg; DST(Cany) 9080-9284', op 1 hr 5 min, rec 5' cond & 510' HGCDF, 1 hr ISIP 3836#, FP 213-318#, 2 hr FSIP 3309#, HP 4240-4231#; DST (Atoka) 10,169-400', op 2 hrs, GTS 2 1/2 min, @ 157 MCFGPD; incr to 942 MCFGPD, rec 9534' GIDP & 600' GCM, 1 hr ISIP 4450#, FP 249-1277#, 4 hr FSIP 4348, HP 4983-4995#; Perf (Morrow) 10,642-656', 10,730-750', 10,888-900' w/2 SPF; CAOF 31,150 MCFGPD; (Morrow) Four Point Gauges: F/ 2579 MCFGPD, 13/64" ch, 60 min, TP 3039#; F/4345 MCFGPD, 16/64" ch, 60 min, TP 2890#; F/5454 MCFGPD, 18/64" ch, 60 min, TP 2763#; F/6709 MCFGPD, 20/64" ch, 60 min, TP 2618#; Ran DILL, CNL & FDC logs; C/Sharp.
Tops: (EL) San And 2730', Abo 7090', Wolfc 7860', Cisco 8900', Cany 9508', Strawn 9740', Atoka 10,198', Morrow 10,640', L/Morrow 10,950', Barnett 10,980', Chester 11,130'
API No.: 30-015-21947

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Petroleum Information®
CORPORATION
A Subsidiary of A.C. Nielsen Company

Date: 2-23-77 Card No.: 3 rm

Mike

Tenneco Oil
Exploration and Production
A Tenneco Company

Southwestern Division

6800 Park Ten Blvd. • Suite 200 North
San Antonio, Texas 78213
(512) 734-8161

February 25, 1981

Mr. Dan Fox
Exploration Services, Inc.
P. O. Drawer 90
Midland, TX 79701

RE: Brunson 14 No. 1

Dear Dan:

Listed below are additional well data and instructions for mudlogging our Brunson 14 No. 1 Well in Loving County, Texas. This information should be used in conjunction with the Geological Engineering Prognosis that I gave you in the office. Please keep all well data on a need-to-know basis.

1. Location: 1,000' FSL and 1,000' FEL, Section 14, Block C-26, PSL Survey
   Elevation: 3235' G.L.; 3261' KB
   Proposed TD: 17,400'

2. Mudlogging: Begin at 5000'+ below the 13-3/8" surface casing, in the Delaware Group. Catch 3 sets of dried samples at 10' intervals; at 5' intervals as necessary through shows. Plot the mudlog at a 1" = 100' scale from 5,000' to TD, and a 5" = 100' scale from 10,000' to TD. Show drilling time in minutes per foot.

3. Notations: Log lithology on percentage basis, giving detailed lithologic descriptions. Be sure to include on the mudlog the date and daily mud properties, plus any other pertinent data such as flare lengths, lost circulation zones and bbls. lost, LCM additions, etc. Include a packet of LCM with the samples whenever it is added to the mud. Note any early arrivals of trip gas and estimated depth of the source.

4. Daily Reports: Phone in reports to the geological engineer in charge between 8:00 a.m. and 9:00 a.m. on weekdays, and weekends if requested. The office number is (512) 734-8161.
   Home numbers are: Mike Clemenson, or (512) 496-1282
   Jack Olivier, or (512) 681-1646
   Doug Keen (512) 492-4626

   A full description of the last 24 hours of drilling activity including drilling time, lithology, and gas measurements should be available for telecoping.

5. Daily Copies: Two (2) copies of all mudlogs are to be mailed daily to the Tenneco office: 6800 Park Ten Blvd.
Suite 200 N
San Antonio, TX 78213
ATTN: J. M. Olivier

6. Correlations: Expected formation tops are given in the well prognosis. Nearest correlation wells are the TOC Reed 24 No. 1 (3 miles SW of 14-1 location) and HNG Ludeman 6 No. 1 (1.6 miles NE). Copies of mudlogs and e-logs are enclosed.

7. DST's: The Delaware and Wolfcamp formations might be drill-stem tested if good shows are encountered. Discuss all potential DST zones with the Drilling Engineer and Geological Engineer.

8. Set-up: Consult with the Drilling Engineer concerning location & installation of pit volume sensors and intercom units.

Close coordination between the mudloggers, Drilling Engineers, and Geological Engineers is absolutely necessary. I am looking forward to working with Exploration Services on this well.

Sincerely,

TENNECO OIL COMPANY

Jack M. Olivier

J. M. Olivier
Senior Geological Engineer

JMO:rd

Enc.

cc: Mike Clemenson
David Dillaha
Randy Scott
Dick Waddell

WELL I.D. ST. CTY. LATITUDE LONGITUDE
2099400 NMEX EDDY 32.93420 104.03030
LOCATION/FOOTAGE SPOT
A 1980 FS 1980 FW
WELL LOCATION
TWP S 16 RGE E 29 SEC 12
SURVEY ABS. FIELD/POOL/AREA/WILDCAT
LSE NO WILDCAT

FIELD ELEV SRC/DIST DTD LTD FM/TD
3735 GR 02 10592 350MSSP
OPERATOR WELL NO. LEASE
GEN AMER OIL CO OF T 28 BREWER
SPUD COMPL. IC STATUS
12/21/1973 04/11/1974 WF TA-OG

* * * CASING DATA * * *
CSG 12 3/4 500 W/ 400 8 5/8 2699 W/ 700
CSG 5 1/2 10838 W/ 500

* * * PI FORMATION TOP DATA * * *
LOG 453YTES 1082 453QUEN 1838 453SADR 2598
LOG 453GLRT 4095 452ABO 6076 451WFMP 7386
LOG 404STRN 9511 403ATOK 9987 402MRRW 10189
LOG 350MSSP 10518

* * * FORMATION TESTS * * *
*DST 01 8295- 8372
REC 5190FT MUD
FINAL OP 1H15M IFP 1832 FFP 1818
ISIP 2151 1H FSIP 2111 2H IHP 3783 FHP 3770
*DST 02 8439- 8593
REC 220FT MUD
FINAL OP 1H10M IFP 1600 FFP 1510
ISIP 324 1H FSIP 512 3H IHP 3822 FHP 3809
*DST 03 8679- 8727 S
REC 2325FT GASCMUD 3054FT GAS
FINAL OP 1H10M IFP 559 FFP 806
ISIP 731 1H FSIP 1624 3H IHP 4071 FHP 4029
*DST 04 STRD 9970-10270 MISRUN

* * * PRODUCTION TESTS * * *
*PTUG 1UG
PERF W/ 2/FT 10545-10566
PERF 10545-10566C
*PTFG 5MCFD
PERF W/ 2/FT 10545-10566

* * * TREATMENTS * * *
ACID 10454-10566 2000GALSA
TP 15
TSG 1UG
PERF W/ 22/IT 10249-10374

WELL I.D.	ST.	CTY.	LATITUDE	LONGITUDE
2099400	NMEX	EDDY	32.93420	104.03030

PERF 10249-10374C
*PTUG 1UG
403ATOK PERF W/ 2/FT 10148-10154
PERF 10148-10154C
*PTFG 1UG
403ATOK PERF 10148-10566
PERF 10148-10566C
* * * TREATMENTS * * *
ACID 10148-10566 4000GALSA
*PTSW 1BO 2BW
403ATOK PERF 10148-10566
WTR
*PTFG 6MCFD
403ATOK PERF 10148-10566

TENNECO OIL COMPANY
A SUBSIDIARY OF TENNECO INC.

DAILY DRILLING REPORT

DATE 3/12/81 ENGINEER HERMAN PHARR DAYS FROM SPUD ____

LEASE & WELL FED 33 #2 COMPLETION DAYS ____

DEPTH 9200 PBTD ~~9205~~ 7990 FOOTAGE LAST 24 HRS. ____

ACTIVITY AT REPORT TIME ____

OTHER ACTIVITY (6am-6am) ____

P.U. PKR, Otis Perma Latch, 5½" G.I.N. TO 6885. SET PKR. Remove B.O.P. N.U. Well head Swab well to 4000'. Set up F. Vann to Perf. 7700-7705 4SPF 20 Shots. Perf well well went on Slight VACUUM. R.I.H. W/ Swab. F.L.@ 5000' Made 2 Run to 6800'. No Gas or oil Shows. S.I. for 1 HR. Had no Show After Next Run.

S.D.O.N.

DAILY AND CUMULATIVE TIME DISTRIBUTION - HOURS

	DAILY	CUM.
RIG UP, TEAR DOWN, TOWING, ETC.		
DRILLING, ROTATING		
DRILL CMT & FLOAT EQUIP		
TRIPS		
DEVIATION SURVEYS		
SERVICE RIG - STRING UP CUT DRILL LINE		
REAMING & WASHING		
CIRC & COND W/MUD-AIR		
RIG REPAIRS		
RU & RUN CASING, LINERS		
CEMENTING		
INSTALL, REMOVE, & TEST BOP, CSG, WELLHEAD, ETC.		
FISHING		
WIRE LINE - LOGGING, CORES, TESTING, PERF, RUN, PKRS		
CORING		
DRILL STEM TEST		
CONTROLLING PRESSURE		
LOSS CIRCULATION		
WAIT ON ORDERS, EQUIPMENT, CEMENT, WEATHER, TOOLS, ETC.		
PICK UP - LAY DOWN DRILL PIPE, COLLARS, CHANGE BHA		
PLUG & ABANDON		
OTHER		
DRILLING		
EVALUATION		
COMPLETION		
MECH. TROUBLE		
CUMULATIVE TOTALS		

MUD PROPERTIES AT SUCTION PIT - MUD REPORT TIME ____ DRILLING DEPTH ____ SAMPLE TEMP ____

MUD WT	VIS	PV	YP	YP 115°F	GELS	PH	API WL	HT HP WL	PF / MF	CL PPM	CA PPM	SAND	SOLIDS	OIL	M BLUE	SH DEN	LCM PPB

BIT NO	SIZE	MFG	TYPE	SERIAL NO.	JETS - 32nd 1	2	3	DEPTH OUT	FOOTAGE ON BIT	CUM. HRS ON BIT	CUM HRS ON WELL	FT/HR THIS BIT	COND DULL BIT T	B	G

BIT NO	WT ON BIT	RPM	STROKE LENGTH	SPM	LINER	GPM	ANN. VEL DP	ANN. VEL DC	SURF. PSI	BIT PSI	JET VEL	SURFACE HHP	BIT HHP	% HHP AT BIT	HP/IN2	

D.P. SIZE & CONN. ____ NO. DC. ____ OD= ____ ID= ____ THD. ____ HWDP. SIZE & CONN. ____

D.P. SIZE & CONN. ____ NO. DC. ____ OD= ____ ID= ____ THD. ____ B.H.A. LENGTH ____ WT. IN AIR ____ WT. IN MUD ____

B.H.A. ____

DEVIATION SURVEY

DAILY MUD ADDITIVES

DAILY MUD COST ____ TOTAL ____

MAJOR VENDOR COST ____

5500
1400

ACTIVITY	DAILY $	CUM $
DRILLING		396,873.
EVALUATION		82,340.
COMPLETION	6900	195,064.
MECH. TROUBLE		27,340.
LEASE EQUIP.		
TOTAL $	6900	701,617

RESERVOIR PRESSURE DATA

BV Channel

Date	Well	Reservoir Pressure @ - 7025 Psi
11-25-74	ESDU No. 5	4293
6-19-78	St. BV No. 1	4037
3-5-79	St. BV. No. 1	3603
12-6-79	St. BV. No. 2	3171
12-19-79.	St. BV No. 1	3154

BEFORE THE
OIL CONSERVATION COMMISSION
State of New Mexico
Case No. 6928 6927 Exhibit No. 11
Submitted by: ARCO
Hearing Date 6-5-80

11

1

ressure
psi)

080

060

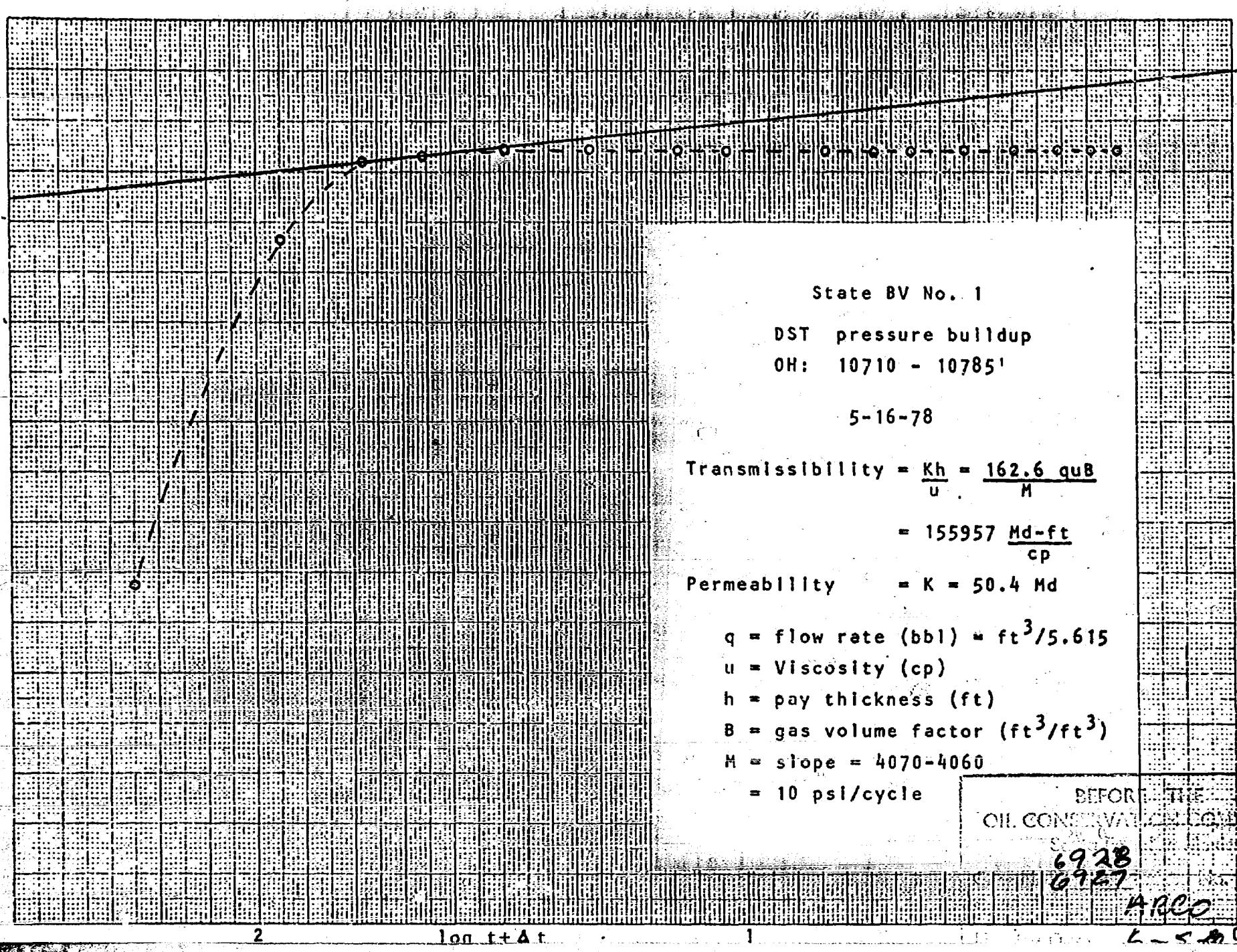
040

020

000

980

960



State BV No. 1

DST pressure buildup

OH: 10710 - 10785'

5-16-78

Transmissibility = $\frac{Kh}{u} = \frac{162.6\ quB}{M}$

= 155957 $\frac{Md\text{-}ft}{cp}$

Permeability = K = 50.4 Md

q = flow rate (bbl) = $ft^3/5.615$

u = Viscosity (cp)

h = pay thickness (ft)

B = gas volume factor (ft^3/ft^3)

M = slope = 4070-4060

= 10 psi/cycle

BEFOR[illegible] THE
OIL CONSERVATION COMMISSION
6928
6927
ARCO
12

2 log t+Δt 1

DOYLE HARTMAN
Oil Operator
SUITE 508
C & K PETROLEUM BUILDING
MIDLAND, TEXAS 79701

(915) 684-4011

May 2, 1980

To: All Working Interest Owners
(Address List Attached)

Re: South Empire State No. 1
S/2 Section 24, T-17-S, R-28-E
Eddy County, New Mexico

Gentlemen:

As mentioned in our previous letter to you dated April 18, 1980, we are enclosing two copies of AFE for our proposed South Empire State No. 1, located 660 FSL & 660 FWL Section 24, T-17-S, R-28-E, Eddy County, New Mexico. If this AFE meets with your approval, sign one copy and return it to this office. Upon receipt of a signed AFE, we will forward a Model-Form Operating Agreement. The second copy of the AFE may be retained for your files.

We are now in the process of scheduling a hearing before the full Commission of the New Mexico Oil Conservation Division in Santa Fe concerning our request for non-standard location of 660 FSL & 660 FWL Section 24. We will keep you informed on the progress of this hearing.

If you should have any further information in this regard, please let us hear from you.

Very truly yours,

Doyle Hartman

Doyle Hartman

DH/mh

Enclosures as above

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6928 6927 Exhibit No. 13
Submitted by ARCO
Hearing Date 6-5-80

RECEIVED
MAY 5 1980
ARCO OIL AND GAS CO.
NORTH & WEST LAND DEPT.
13

ADDRESS LIST

Pennzoil Company
P. O. Box 1828
Midland, Texas 79702

Attention: Mr. Mike McCullough

Inexco Oil Company
1100 Milam Building
Suite 1900
Houston, Texas 77002

Attention: Mr. William G. Goodwin

Maralo, Inc. and Mrs. Erma Lowe
4600 Post Oak Place
Suite 307
Houston, Texas 77027

Attention: Mr. John Burke

Exxon Company, U.S.A.
P. O. Box 1600
Midland, Texas 79702

Attention: Mr. H. W. Hugly

Continental Oil Company
P. O. Box 1959
Midland, Texas 79702

Attention: Mr. David M. Goodfellow

Tenneco Oil Company
6800 Park Ten Blvd.
Suite 200 North
San Antonio, Texas 78213

Attention: Mr. M. M. Hinze

Arco Oil and Gas Company
P. O. Box 1610
Midland, Texas 79702

Attention: Mr. Curt Krehbiel

DETAIL WELL ESTIMATE

LEASE NO. LG-6340 APPR. NO. _____

LEASE NAME South Empire State WELL NO. 1 W. I. _____

COUNTY Eddy STATE New Mexico FIELD Empire Morrow, South

LOCATION: 660 FSL and 660 FWL Section 24, T-17-S, R-28-E

DRILLING INTANGIBLES:	PRODUCER	DRY HOLE
1. Drilling Cost _____ Feet @ _____ Per Foot		
2. Day Work 52 Days at $5000./day		
Rig Mobilization $73,000.	330,000	330,000
3. Coring Service _____ Well Surveys _____	25,000	25,000
4. Testing _____		
_____	5,000	5,000
5. Fuel _____ Water _____		
6. Mud and Water Mud Logging _____	26,000	26,000
7. Cementing Service _____ Cement _____ Floats _____	42,800	17,800
8. Company Labor _____ Contract Labor _____	12,000	1,200
9. Digging Pits _____ Filling Pits _____	12,000	12,000
10. Roads & Bridges _____ Dredging & Grading _____	12,000	12,000
11. Acidizing _____ Fracturing _____ Perforating _____	150,000	---
12. Plugging _____		8,000
13. Trucking Cost _____	8,500	2,500
14. Development Superintendence 75 days @ $ 350.00 /day	26,250	18,200
15. Rental Equipment _____	23,000	18,000
16. Swabbing and Testing 15 days at $1,200.	18,000	---
17. Other Costs Bits	29,100	29,100
Contingence	30,350	15,200
_____		
Total Intangibles	750,000	520,000

WELL EQUIPMENT:

18. Casing	500	Ft. of	13 3/8	@	23.368	Per Ft.				
	2,500	Ft. of	8 5/8	@	11.853	Per Ft.				
	11,400	Ft. of	5 1/2	@	12.764	Per Ft.	186,826	41,317
19. Tubing	11,400	Ft. of	2 7/8	@	5.067	Per Ft.	57,764	
20. Casing Head _____							6,000	6,000
21. Xmas Tree or Pumping Connections _____							39,000	
22. Pumping Unit _____								
23. Engine _____								
24. Sucker Rods _____								
25. Pump _____								
26. Tank Battery _____							7,200	
27. Separator or Dehydration Equip. _____							32,000	
28. Metering Equipment _____								
29. Flow Lines _____							12,500	
30. Other Contingence							10,000	
_____							18,710	2,683
_____ Total Tangibles							370,000	50,000
TOTAL COST OF WELL							1,120,000	570,000

REMARKS: _____

Originated by Larry O. Neeny Title Engineer Date April 30, 1980

Approved _____ Title _____ Date _____

KELLAHIN and KELLAHIN
Attorneys at Law
500 Don Gaspar Avenue
Post Office Box 1769
Santa Fe, New Mexico 87501

Jason Kellahin
W. Thomas Kellahin
Karen Aubrey

Telephone 982-4285
Area Code 505

July 7, 1980

Mr. Doug Keen
Tenneco Oil Company
6800 Park Ten Blvd.
Suite 200 North
San Antonio, Texas 78213

re: Amoco Case 6930 (June 25, 1980)
Hartman Arco Cases 6927 & 6928
(June 5, 1980)

Dear Mr. Keen:

In accordance with your request I have borrowed from the New Mexico Oil Conservation Division a set of the exhibits used in each of the above referenced cases.

The transcripts for the 6930 case is not yet available. Enclosed is the transcript for the 6927-6928 case.

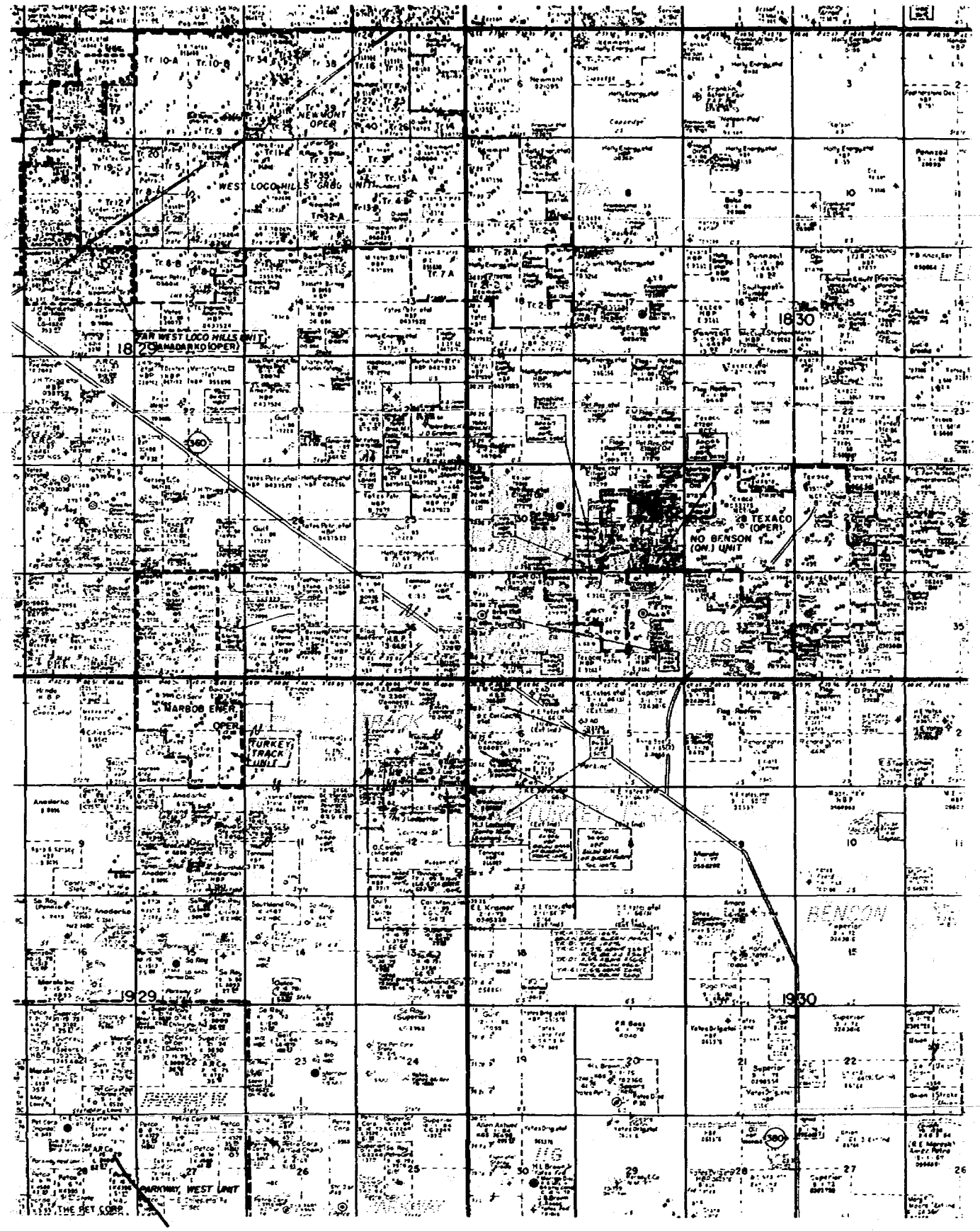
These are originals and I must return them to the Oil Division when you have reviewed them.

Very truly yours,

W. Thomas Kellahin

WTK:nb

Shall I send em each now w/ short letter?


Tr 10-A
Tr 10-B
Tr 9
NEW MONT OPER
WEST LOCO HILLS UNIT
Tr 7-A
Tr 2-B
1830
FAIR WEST LOCO HILLS (WI)
(AMOCO OPER)
1829
560
TEXACO (OPER)
NO BENSON (QN) UNIT
NARBOE ENER OPER
TURKEY TRACK UNIT
1929
1930
560
PARKWAY WEST UNIT
THE PET CORP.

May 2, 1980

WORKING INTEREST OWNERS ADDRESS LIST ATTACHED

Subject: ARCO Oil and Gas Company
Pennzoil 24 State Com #1 Well
S/2 Section 24, T-17-S, R-28-E
Eddy County, New Mexico
NM-4488

Gentlemen:

By letter dated December 13, 1979, to Pennzoil Company, ARCO proposed drilling the subject well and asked that you consider farming out. We are presently enclosing two copies of an Operating Agreement and AFE for your further consideration. We will appreciate those wishing to join signing and returning one copy each of the AFE and JOA. Those wishing to farmout need sign and return only a copy of the JOA. An Exhibit "A" showing the interests of the parties will be prepared and forwarded with copies of other parties' execution pages to complete your files. The agreement will be limited to rights below 2300' beneath the surface to the base of the Morrow formation. The farmout terms will provide for the farming out party to retain a 30% override out of which will be borne existing royalties and overrides with the option to convert the net portion of the retained override to a 50% working interest after payout, all subject to proportionate reduction.

After writing the December 13, 1979 letter, ARCO was advised by letter dated February 14, 1980, that Pennzoil had elected to farmout on the terms offered. By letter dated February 22, John Burke advised that the Lowe interests would participate in drilling the well rather than farming out. By copy of letter dated March 18, we were advised that Exxon was planning to drill in the E/2 of Section 23 and would prefer not to make a decision with regard to our well proposal until their well was completed. By letter dated March 20, Tenneco advised that it would prefer to participate subject to final management approval of the terms of any JOA and AFE. On March 25, Les Tacconi with Inexco advised by telephone that Inexco would prefer not to decide whether to join or farmout until the Exxon well in Section 23 was completed. In view of the position taken by Exxon and Inexco, ARCO was willing to defer its proposed well until the Exxon well was completed. By letter dated April 18, however, Doyle Hartman

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6927 Exhibit No. 7
Submitted by ARCO
Hearing Date 6-5-80

1

7

entered the picture and proposed a well on the same spacing unit but at an unorthodox location in the SW/4 of the SW/4. We understand he is trying to schedule a hearing this month before the New Mexico Oil and Gas Conservation Commission regarding the unorthodox location and the forced pooling of all interests in the S/2 of Section 24. ARCO intends to oppose the unorthodox location and continue with its plans to drill at the orthodox location in the SE/4 regardless of the outcome of the Exxon well in Section 23.

We are also attaching a schedule showing the interests of the parties in the S/2 of Section 24. ARCO's interest in this well including the farmout from Pennzoil is 37.50%. Should Inexco also elect to farmout, ARCO's interest will increase to 63.87%. A provision covering the farmout and rights to be earned will be included in the Exhibit "A" yet to be prepared.

We will appreciate your early attention to the execution and return of the enclosed JOA and AFE.

Yours very truly,

Curt Krehbiel

Curt Krehbiel

CK:bk

Enclosures

PARTY AND ADDRESS	ACRES	INTEREST
ARCO Oil and Gas Company P. O. Box 1610 Midland, Texas 79702	20.0000	6.2500%
Doyle Hartman 508 C & K Petroleum Building Midland, Texas 79701	100.0000	31.2500%
Pennzoil Company P. O. Drawer 1828 Midland, Texas 79702	100.0000	31.2500%
Inexco Oil Company 1100 Milam Building, Suite 1900 Houston, Texas 77002	84.3750	26.3672%
Exxon Company, U.S.A. P. O. Box 1600 Midland, Texas 79702	6.2500	1.9531%
M. Ralph Lowe, Inc.	3.1250	.9765%
Erma Lowe	1.5625	.4883
Maralo Inc. c/o Maralo Inc. 4600 Post Oak Place Suite 307 Houston, Texas 77027	1.5625	.4883%
Continental Oil Company P. O. Box 1959 Midland, Texas 79702	1.5625	.4883%
Tenneco Oil Company 6800 Park Ten Blvd. Suite 200 North San Antonio, Texas 78213	1.5625	.4883%
	320.0000	100.0000%

Pennzoil Company
ATTENTION: Kenneth Medlock
P. O. Drawer 1828
Midland, Texas 79702

Inexco Oil Company
ATTENTION: William G. Goodwin
1100 Milam Building, Suite 1900
Houston, Texas 77002

Doyle Hartman
508 C & K Petroleum Building
Midland, Texas 79701

Exxon Company, U.S.A.
ATTENTION: H. W. Hugly
P. O. Box 1600
Midland, Texas 79702

M. Ralph Lowe, Inc.
Erma Lowe
Maralo Inc. ATTENTION: John R. Burke
c/o Maralo Inc.
4600 Post Oak Place
Suite 307
Houston, Texas 77027

Continental Oil Company
ATTENTION: David M. Goodfellow
P. O. Box 1959
Midland, Texas 79702

Tenneco Oil Company
ATTENTION: Steve D. King
6800 Park Ten Blvd.
Suite 200 North
San Antonio, Texas 78213

Title: Penzoil 24 State Com #1: Drill & Equip

☒ Original authorization ☐ Revision number

Location: 660' FSL & 1980' FEL, Sec. 24, T-17-S, R-28-E, Eddy Co., New Mexico

APPR TD 10,900 OBJ Form Mor

Purpose of authorization
☒ Drilling - New ☐ Recompletion ☐ Workover ☐ Other
☐ Drill old well deeper
☒ Development ____ %*
☐ Exploratory ____ %*
* Show percent of total cost applicable to each.
☒ Single ☐ Dual ☐ Three or more

Primary objective of drilling
☐ Oil only ☒ Gas only ☐ Oil and/or gas

Signed (Dist. Eng. and/or Explor. group)

Reason for drilling
☒ Develop reserves ☐ Secondary recovery
☐ Field ☐ Replacement
☐ Comb. reserve & rate ____ % rate ☐ Service

See reverse side

Budget information
Budget (1) ____ Amt. ____
Item (2) ____ Amt. ____

Capital instabudget dated ____

☐ Named on instabudget
Amount capital differs from instabudget $ ____ Over/(under)

☐ Substituted for
Amount capital differs from instabudget $ ____ Over/(under)

☐ Addition to instabudget

Current year capital differs from instabudget current year by $ ____ Over/(under)

Originated by | AFE number
District: Permian West | Project identifier
Field name: Empire South Morrow
Lease record number: NM-4488
Expl. project No. | Field code
Subject to production payment? ☐ Yes ☐ No | Property code(s)
Has well plan been prepared? ☐ Yes ☐ No
Co-owner operator AFE No(s).

Use reverse side if needed

Component AFE No(s)	Description and justification	Account codes	Amounts—in whole dollars only: On hand	Capital	Expense	Total
	Tangible	031		217,000		217,000
	Intangible	037		606,000		606,000
	Total Drilling Cost			823,000		823,000
	Lease Equipment	038		35,000		35,000
	Gross totals			858,000		858,000
Operator		Net Atlantic Richfield share				
Atlantic Richfield ownership decimal		Range requested		Lower		Upper

Payout (years) (AFIT) | % Return (AFIT) | PW ____% (AFIT) | Start date | Completion date | $ Prior year Capital ____ Expense ____ | $ Curr. year Capital ____ Expense ____ | $ Thereafter Capital ____ Expense ____

Technical audits (check those required)
☐ Engineering ☐ Exploration ☐ Dallas budget ☐ Evaluation Other ☐ Procedural audits

☐ Co-owner approval
Signature ____
Company ____

Approvals (check highest level required) Authorized expenditure limit table No. ____

	Date		Date
☐ District		☐ Executive vice-president	
☐ Other		☐ President/Chairman	
☐ Regional		☐ Ex. Board of Directors	
☐ Senior vice-president			

Well name: Penzoil 24 State Com #1 | T.D.: 10,900

Location: 660' FSL & 1980' FEL Sec. 24, T-17-S, R-28-E

Region: Western | District: Permian | Field: Empire South Morrow

Objective: Morrow @ 10,700 ft. | @

[X] Development [X] Single
[ ] Exploratory [ ] Dual
[ ] Completion [ ] Multiple

Data Processing Information

Trans. Ident. 1 2 3 4	5	A.F.E. Number 6 7 8 9 10 11
A F E E	3	

Update code: 1 = Delete, 3 = Add

Original/Revision Indica: 1 = Original, 2 = Revision

Tangible costs	Dry hole	Completion costs	Detail code (12 13 14)	Total gross dollars (15 16 17 18 19 20 21 22)	Major account (23 24 25)
1. Tubular goods.					
20 " OD from 0 ' to 30 '	1,000				
" OD from ' to '					
13-3/8 " OD from 0 ' to 650 '	14,000				
" OD from ' to '					
8-5/8 " OD from 0 ' to 2650 '	28,000				
" OD from ' to '					
5-1/2 " OD from 0 ' to 10900 '		104,000			
2-3/8 " OD from 0 ' to 10700 '		36,000			
2. Casinghead and Christmas tree	12,000	14,000	504		
3. Tubing accessories		30,000	506		
4. Artificial lift accessories			507		
5. Unclassified materials	2,000	3,000	508		
Total tangibles	57,000	160,000			
Intangible costs					
6. Testing tubular goods		2,000	509		
7. Trucking tubular goods	2,000	2,000	509		
8. Casing accessories	2,000	2,000	512		
9. Site preparation, maint., clean up	8,000		514		
10. Permits, insurance, damages			515		
11. Moving expense	32,000		517		
12. Boat & barge rental			518		
13. Camp & catering			522		
14. Boiler			525		
15. Roads, airstrips & maintenance			556		
16. Air freight & air transportation			528		
17. Contract footage drilling					
ft @ $ / ft.			532		
Contract daywork (items 18 through 24)					
18. Drilling 41 days @ $5000 /day	205,000		533		
19. Casing 3 days @ $5000 /day	10,000	5,000	534		
20. Fishing days @ $ /day			536		
21. Lost circ. & flows 1 days @ $5000 /day	5,000		537		
22. Log test & core 5 days @ $5000 /day	15,000	10,000	538		
23. Shut down time days @ $ /day			539		
24. Completion or plugging days @ $ /day			541		
25. Completion unit daywork 7 days @ $1000 /day		7,000	542		
26. Rental: DP, DC, & related tools			543		
27. Well control equipment			547		
28. Drill bits #1 size 17-1/2	1,000		548		
#2 size 12-1/4	3,000				
#8 size 7-7/8	16,000				
# size					

A0291-117-0

Drilling Cost Estimate – Page 2

Penzoil 24 State Com #1

Prepared by: S. R. Keasler

3/25/80

Data Processing Information — Tran. ident. (1 2 3 4): A F E E; (5); A.F.E. number (6 7 8 9 10 11); Update code (1 = delete, 3 = add); Original items on indicator (1 = Original, 2 = Revision)

Intangible cost (continued)	Dry hole	Completion costs	Detail code (12 13 14)	Total gross dollars (15 16 17 18 19 20 21 22)	Major account (23 24 25 26)
Fuel, fresh water & drayage	30,000		549		
Drilling mud materials & drayage	20,000		551		
Drilling mud equipment	7,000		552		
Air compressor rental or gas cost			553		
Air or gas drlg. accessories & drayage			554		
Open hole surveys	50,000		557		
Data recording services			558		
Wireline formation tester			559		
Mud log			560		
Cased hole surveys		8,000	561		
Perforating fees	(vann)	23,000	562		
Sidewall coring =			563		
Core: diamond XXXXXXXXXXX 100 ft.	30,000		568		
Drill stem tests = 2	4,000		572		
X Acidize Fracture ____ gal. ____ lbs		28,000	577		
Cement & fees for casing					
13-3/8 " OD 1000 sacks	13,000				
" OD sacks					
8-5/8 " OD 1500 sacks	18,000				
" OD sacks					
5-1/2 " OD 2300 sacks		23,000			
" OD sacks					
Cement & fees for squeezes or plugs			579		
Fishing tool rental & drayage			580		
Directional drlg. tool rental & drayage			581		
Operations - prorate			590		
Unclassified tool rental & drayage	3,000	2,000	587		
Unclassified drayage & supplies	2,000	1,000	594		
Unclassified services & material losses	2,000	2,000	589		
Overhead	1,000	1,000	592		
Supervision by contract personnel			105		
Supervision by ARCO personnel	9,000	2,000	106		
Total intangibles	488,000	118,000			
Total cost (tangibles & intangibles)	545,000	278,000			
Estimated well cost (dry hole & comp.)	823,000				

Penzoil 24 State Com #1

Date: 5/1/80

Permian - West Area

660' FSL & 1980' FEL, Section 24, T-17-S, R-28-E, Eddy County, New Mexico

Morrow

Proved depth	Contract footage	Daywork depth
10900	10900	10900

Casing program:

Surface casing	Position	Length	Cmt.
20" conductor pipe set @ 30'	Cmt w/Redi-mix		
13.375" OD 8R STC 54.5# K-55	0-450	450	Circ
Protective string			
8.625" OD 8R STC 28# S-80	0-3500	3500	Circ
Liner string			
5.5" OD 8R LTC 17# L-80	0-10900	10900	Circ

Wellhead: 13-3/8" X 12" - 900; 900 X 10" - 1500; 10" - 1500 X 6" - 1500

Estimated formation tops

Yates	Bone Springs	3450	Strawn	9650
Queen	Dean	6280	Atoka	10150
Grayburg	Wolfcamp	7550	Morrow	10375
San Andres	Cisco	8800	Chester	10925

Mud program

0	-	450	Spud mud dry drill w/fresh water if
450	-	3500	10# Brine
3500	-	10000	Cut Brine
10000	-	TD	Brine polymer 9.2 - 9.5#/gal. Vis. 34 WL 8-10

Logs

BHC-Sonic	Surface to TD
FDC-CNL-GR	TD - 3000'
DLL-MSFL	TD - 3000'
Dipmeter	Minimum run

1

...ring

2 50' cores in Morrow Approximately 10,700 depth

...re priority

none

...ll stem tests

1-Cisco, Strawn or Atoka
1-Morrow

...mples

10- intervals from 3000'-TD

...id samples

2 qts - analyze locally

...d logging

2 - man unit, 6400' to TD

...vations

...pe completion

Single gas well

...mpletion equipment

2-3/8" tbg w/pkr

... (District Drilling Superintendent)

...orsed

... Operations Manager | Date

... Engineer | Date

... Superintendent (geology) | Date

...roved

... Manager | Date

Proposed Location
Doyle Hartman
South Empire State No. 1
SW/4 SW/4 Section 24
T-17-S, R-28-E

GAS PRODUCTION HISTORIES
SOUTH EMPIRE MORROW &
AID MORROW POOLS
T-17-S & T-18-S, R-28-E & R-29-E
Eddy County, New Mexico

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Pennzoil Company

Well: Aid State Com #1

Location: A-24-17-28

Pool: Aid Morrow (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks:

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	455	227	2123.9			
1979	12	8337	695	2123.4			
1978	12	116435	9703	2115.1			
1977	12	112200	9350	1998.7			
1976	12	171798	14316	1886.5			
1975	12	290089	24174	1714.7			
1974	12	237443	19787	1424.6			
1973	12	228467	19039	1187.2			
1972	12	714004	59500	958.7			
1971	5	244709	48942	244.7			

1979 Detail Summary

Jan.	1036	July	615
Feb.	535	Aug.	693
March	718	Sept.	772
April	790	Oct.	655
May	400	Nov.	874
June	712	Dec.	537

1980 Detail Summary

Jan.	330	July	
Feb.	125	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 455 MCF

Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 227 MCF/Mo.

3-1-80 Cum: 2123.9 MMCF

Field:	Aid Morrow (Gas)
Operator:	Pennzoil Company
Well:	Aid State Com #1
Location:	A-24-17-28
County:	Eddy State: New Mexico
Date Prod. Began:	8-71 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

DEC. MAR. JUN. SEP. DEC.

1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Hondo Oil & Gas Company

Well: State BV #2

Location: F-25-17-28

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 1-80

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	542897	271448	542.9	7975	3987	7975

19____ Detail Summary

Jan.		July	
Feb.		Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

19 80 Detail Summary

Jan.	326911	July	
Feb.	215986	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 542897 MCF

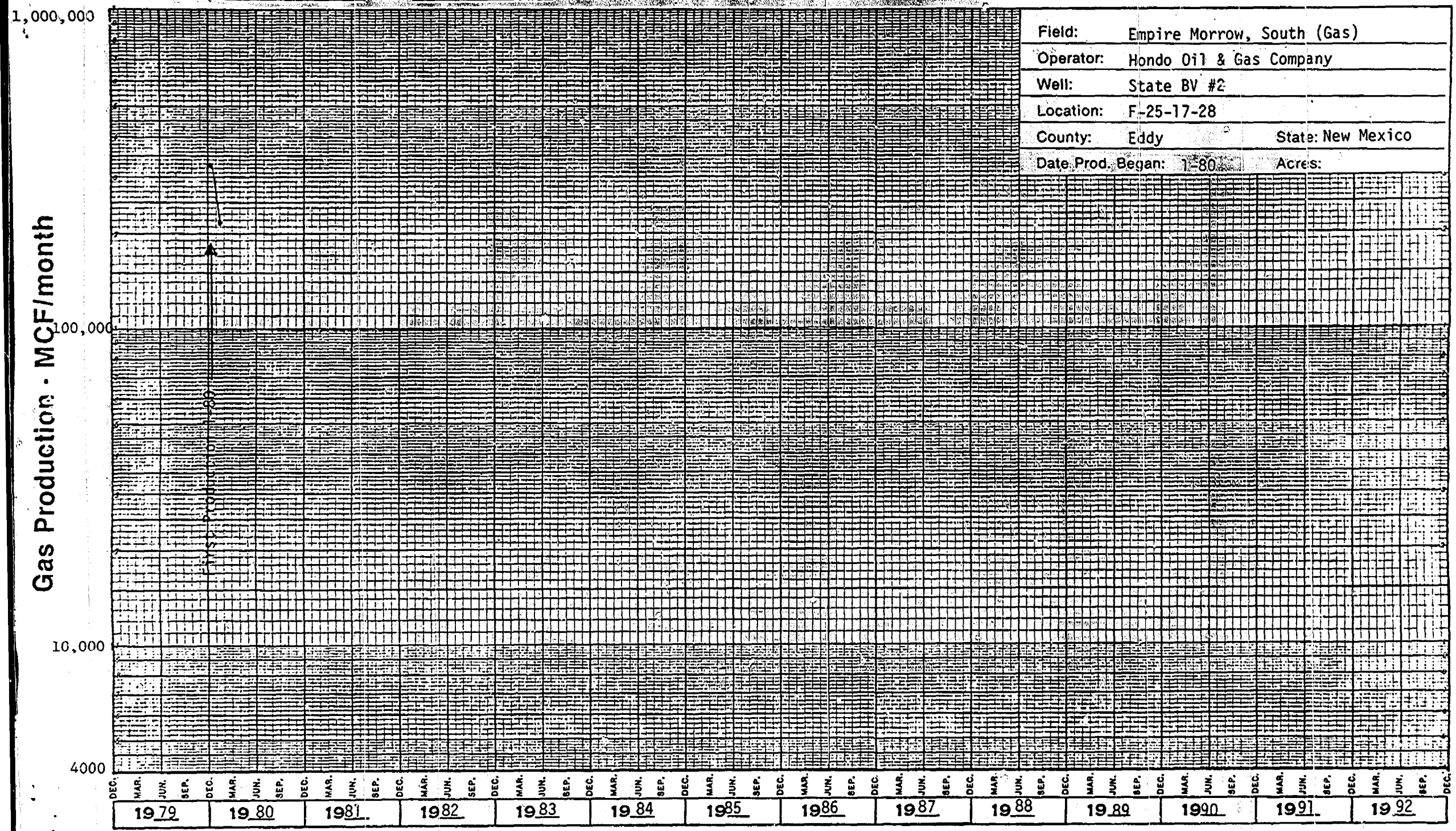
Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 271448 MCF/Mo.

F-25-17-28

3-1-80 Cum: 542.9 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Hondo Oil & Gas Company
Well:	State BV #2
Location:	F-25-17-28
County:	Eddy State: New Mexico
Date Prod. Began:	1-80 Acres:



GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Hondo Oil & Gas Company

Well: State BV #1

Location: J-25-17-28

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 7-78

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	626454	313227	6542.0	9639	4819	107525
1979	12	4076169	339681	5915.5	66592	5549	97886
1978	6	1839353	306559	1839.3	31294	5216	31294

1979 Detail Summary

Jan.	361118	July	374227
Feb.	350010	Aug.	367270
March	300791	Sept.	344484
April	367181	Oct.	346654
May	345625	Nov.	280433
June	333033	Dec.	305343

1980 Detail Summary

Jan.	326911	July	
Feb.	299543	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

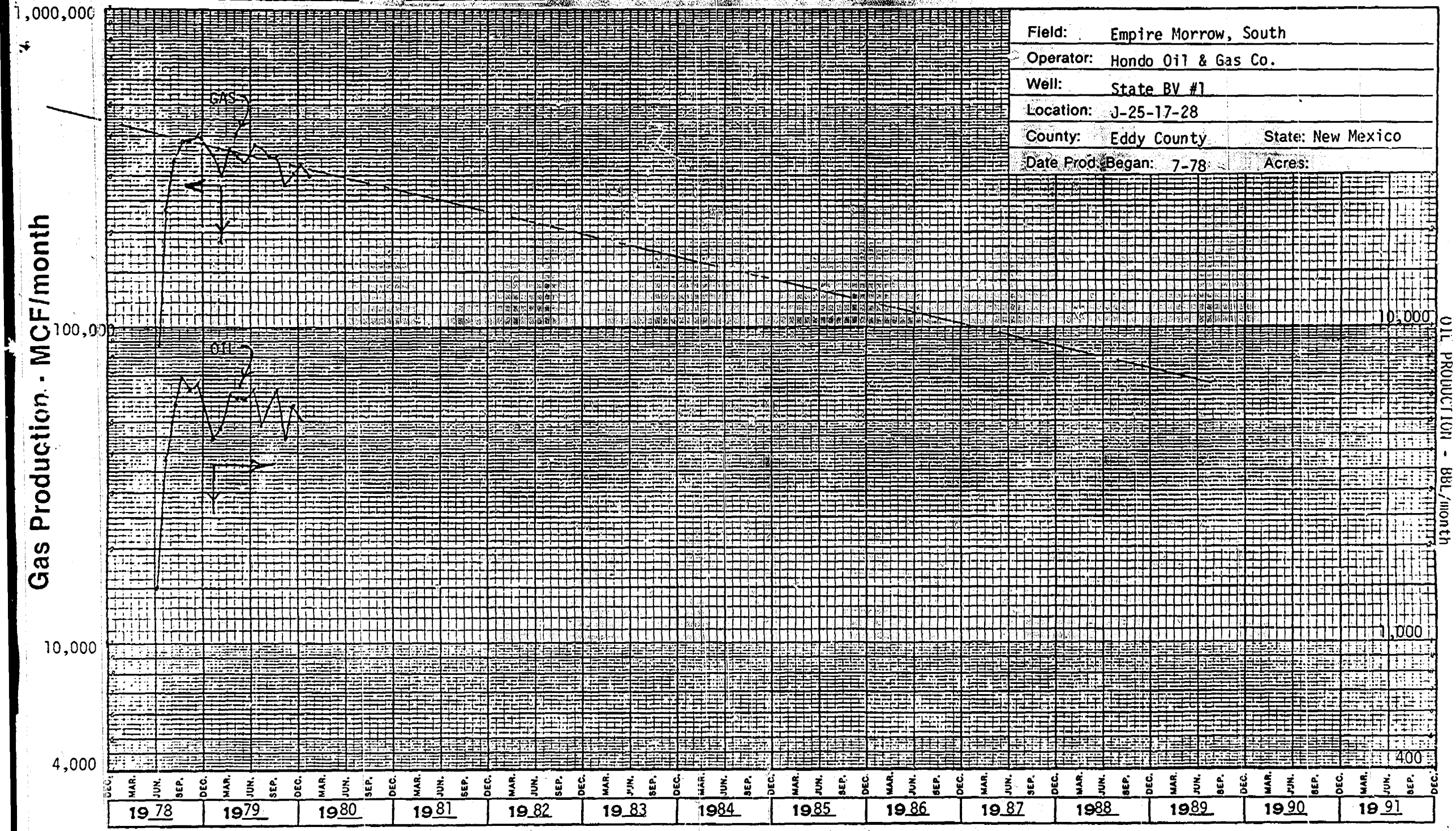
Production (Y-T-D) 626454 MCF

Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 313227 MCF/Mo.

2-1-80 Cum:- 5881.3 MMCF

Field:	Empire Morrow, South
Operator:	Hondo Oil & Gas Co.
Well:	State BV #1
Location:	J-25-17-28
County:	Eddy County State: New Mexico
Date Prod. Began:	7-78 Acres:



GAS PRODUCTION HISTORY

Date 5-30-80 Page 1 of 1

Operator: General American Oil Co. of Texas

Well: Green "B" No. 9

Location: G-19-17-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 7-79.

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	214316	107158	1159.9			
1979	6	945592	157599	945.6			

19 79 Detail Summary

Jan.		July	29209
Feb.		Aug.	228881
March		Sept.	196612
April		Oct.	184264
May		Nov.	170217
June		Dec.	136409

19 80 Detail Summary

Jan.	119693	July	
Feb.	94623	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 214316 MCF

Days or Months (Y-T-D) 2 mos.

Avg. Rate (Y-T-D) 107158 MCF/mo.

3-1-80 Cum: 1159.9 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	General American Oil Co. of Texas
Well:	Green "B" #9
Location:	G-19-17-29
County:	Eddy State: New Mexico
Date Prod. Began:	7-79 Acres:

Gas Production - MCF/month

100000

10000

1000

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1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992

GAS PRODUCTION HISTORY

Date 5-29-80 Page 1 of 1

Operator: Conoco, Inc.
Well: State "19" Com. #1
Location: N-19-17-29

Pool: Empire Morrow, South (Gas)
Spud Date: Original Completion Date:
Completion Interval (Gas):
Completion Date (Gas): First Production (Gas):
Remarks: First Production 5-79.

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	69773	34886	630.2			
1979	8	560423	280211	560.4			

19 79 Detail Summary

Jan.		July	95381
Feb.		Aug.	81987
March		Sept.	79888
April		Oct.	65529
May	47387	Nov.	42793
June	99566	Dec.	47892

19 80 Detail Summary

Jan.	38414	July	
Feb.	31359	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 69773 MCF
Days or Months (Y-T-D) 2 mos.

Avg. Rate (Y-T-D) 34886 MCF/mo.

N-19-17-29

3-1-80 Cum. 650,241 MCF

Field:	Empire Morrow, South (Gas)
Operator:	Conoco, Inc.
Well:	State "19" Com. #1
Location:	N-19-17-29
County:	Eddy State: New Mexico
Date Prod. Began:	5-79 Acres:

Gas Production - MCF/month

10000

10000

1000

First Production 5-79

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1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Harvey E. Yates Company

Well: Empire S. Deep Unit #18

Location: F-30-17-29

Pool: Empire Morrow South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 6-78

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	97144	48572	3247.9	453	226	42755
1979	12	2036371	169698	3150.8	23205	1934	42302
1978	7	1114356	159194	1114.4	19097	2728	19097

1979 Detail Summary

Jan.	226148	July	175931
Feb.	198994	Aug.	161343
March	214489	Sept.	140972
April	201013	Oct.	125226
May	192103	Nov.	122349
June	177256	Dec.	100547

1980 Detail Summary

Jan.	72299	July	
Feb.	24845	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 97144 MCF

Avg. Rate (Y-T-D) 48572 MCF/Mo.

Days or Months (Y-T-D) 2 Months

F-30-17-29

3-1-80 Cum: 3247.9 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Harvey E. Yates Company
Well:	Empire S. Deep Unit #18
Location:	F-30-17-29
County:	Eddy State: New Mexico
Date Prod. Began: 6-78	Acres:

Gas Production - MCF/month

1,000,000

100,000

10,000

4000

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1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Harvey E. Yates Company

Well: Empire S. Deep Unit #13*

Location: N-30-17-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 7-77

*Upper Morrow Completion.

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	110637	55318	1624.3	3496	1748	71494
1979	12	784055	65338	1513.7	29693	2474	67998
1978	10	717262	71726	729.6	37620	3762	38305
1977	1	12339	12339	12.3	685	685	685

19 79 Detail Summary

Jan.	74788	July	65875
Feb.	66481	Aug.	64303
March	72710	Sept.	61534
April	69512	Oct.	60943
May	67286	Nov.	58627
June	63195	Dec.	58801

19 80 Detail Summary

Jan.	57364	July	
Feb.	53273	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 110637 MCF

Avg. Rate (Y-T-D) 55318 MCF/Mo.

Days or Months (Y-T-D) 2 Months

N-30-17-29

3-1-80 Cum: 1624.3 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Harvey E. Yates Company
Well:	Empire S. Deep Unit #13
Location:	N-30-17-29
County:	Eddy State: New Mexico
Date Prod. Began: 7-77	Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC.

1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco Production Company

Well: Empire S. Deep Unit #5

Location: G-31-17-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 1-75

Last Production 1-80

Year	No. of Mos.	Annuzl Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	1	311	311	1608.4			
1979	12	244793	20399	1608.1			
1978	12	414272	34523	1363.3			
1977	12	347283	28940	949.0			
1976	12	325967	27164	601.7			
1975	12	275756	22980	275.8			

19 79 Detail Summary

Jan.	33978	July	14560
Feb.	34901	Aug.	13297
March	34689	Sept.	10307
April	31116	Oct.	9700
May	25560	Nov.	6219
June	20932	Dec.	9534

1980 Detail Summary

Jan.	311	July	
Feb.	0	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 311 MCF

Days or Months (Y-T-D) 1 Mo.

Avg. Rate (Y-T-D) 311 MCF/Mo.

3-1-80 Cum: 1608.4 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Company
Well:	Empire S. Deep Unit #5
Location:	G-31-17-29
County:	Eddy State: New Mexico
Date Prod. Began: 1-75	Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

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19 75 | 19 76 | 19 77 | 19 78 | 19 79 | 19 80 | 19 81 | 19 82 | 19 83 | 19 84 | 19 85 | 19 86 | 19 87 | 19 88

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco Production Company

Well: Empire S. Deep Unit #3

Location: N-31-17-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 8-73

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	5876	2938	4761.7			
1979	12	307099	25592	4755.8			
1978	12	649359	54113	4448.7			
1977	12	738336	61528	3799.4			
1976	12	1045812	87151	3061.0			
1975	9	635994	70666	2015.2			
1974	7	916019	130860	1379.2			
1973	5	463219	92644	463.2			

1979 Detail Summary

Jan.	21993	July	18153
Feb.	30306	Aug.	18621
March	35028	Sept.	17862
April	35523	Oct.	19416
May	46432	Nov.	13124
June	34162	Dec.	16479

1980 Detail Summary

Jan.	2207	July	
Feb.	3669	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 5876 MCF

Avg. Rate (Y-T-D) 2938 MCF/Mo.

Days or Months (Y-T-D) 2 Months

N-31-17-29

3-1-80 Cum: 4761.7 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Company
Well:	Empire S. Deep Unit #3
Location:	N-31-17-29
County:	Eddy State: New Mexico
Date Prod. Began:	8-73 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

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1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988

GAS PRODUCTION HISTORY

Date 5-29-80 Page 1 of 1

Operator: Amoco Prod. Co.
Well: Empire S. Deep Unit #10
Location: G-1-18-28

Pool: Empire Morrow, South (Gas)
Spud Date: Original Completion Date:
Completion Interval (Gas):
Completion Date (Gas): First Production (Gas):
Remarks: First Production 4-77.
Last Production 5-79.

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1979	5	8412	1682	36.4			
1978	11	16543	1504	28.0			
1977	7	11429	1633	11.4			

19 78 Detail Summary

Jan.	848	July	2094
Feb.	2391	Aug.	1592
March	580	Sept.	2364
April	3547	Oct.	1118
May	399	Nov.	596
June	-0-	Dec.	1014

19 79 Detail Summary

Jan.	1555	July	-0-
Feb.	2222	Aug.	-0-
March	1576	Sept.	-0-
April	2316	Oct.	-0-
May	743	Nov.	-0-
June	-0-	Dec.	-0-

Production (Y-T-D) 8412 MCF
Days or Months (Y-T-D) 5 mos.
Avg. Rate (Y-T-D) 1682 MCF/mo.

6-1-79 Cum: 36.4 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Prod. Co.
Well:	Empire S. Deep Unit #10
Location:	G-1-18-28
County:	Eddy State: New Mexico
Date Prod. Began:	4-77 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

Last production 5-79.

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1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco Production Company

Well: Empire S. Deep Unit #6

Location: O-1-18-28

Pool: Empire South, Morrow (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 3-77

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	35992	17996	1045.7	549	274	13930
1979	12	316023	26335	1009.7	3919	327	13381
1978	12	347297	28941	693.7	4170	347	9462
1977	10	346407	34641	346.4	5184	518	5292
1976					108	108	108

19 79 Detail Summary

Jan.	30674	July	28394
Feb.	26576	Aug.	25830
March	25329	Sept.	13414
April	27437	Oct.	33512
May	27231	Nov.	26990
June	19812	Dec.	30824

19 80 Detail Summary

Jan.	16796	July	
Feb.	19196	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 35992 MCF

Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 17996 MCF/Mo.

3-1-80 Cum: 1045.7 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Company
Well:	Empire S. Deep Unit #6
Location:	O-1-18-28
County:	Eddy State: New Mexico
Date Prod. Began:	3-77 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

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19 77 | 19 78 | 19 79 | 19 80 | 19 81 | 19 82 | 19 83 | 19 84 | 19 85 | 19 86 | 19 87 | 19 88 | 19 89 | 19 90

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco

Well: Empire S. Deep Unit #14

Location: G-5-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 8-77

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	582	291	39.1			
1979	12	4260	355	38.5			
1978	10	4609	461	34.2			
1977	5	29597	5919	29.6			

1979 Detail Summary

Jan.	73	July	397
Feb.	0	Aug.	712
March	34	Sept.	137
April	855	Oct.	580
May	85	Nov.	455
June	928	Dec.	4

1980 Detail Summary

Jan.	358	July	
Feb.	224	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 582 MCF

Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 291 MCF/Mo.

5-1-89 Cum: 59.1 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Co.
Well:	Empire S. Deep Unit #4
Location:	G-5-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	8-77 Acres:

Gas Production - MCF/month

10000
1000
100

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1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco

Well: Empire S. Deep Unit #12

Location: K-5-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 2-77

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	32280	16140	947.6	425	212	15599
1979	12	225784	18815	915.3	2916	243	15174
1978	12	283003	23584	689.5	4530	377	12258
1977	10	406493	40649	406.5	7728	773	7728

19 79 Detail Summary

Jan.	19582	July	15039
Feb.	16645	Aug.	14232
March	18453	Sept.	19816
April	18559	Oct.	21533
May	18668	Nov.	23147
June	15099	Dec.	25011

19 80 Detail Summary

Jan.	18370	July	
Feb.	13910	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 32280

Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 16140 MCF/Mo.

K-5-18-29

3-1-80 Cum: 947.6 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Co.
Well:	Empire S. Deep Unit #12
Location:	K-5-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	2-77 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

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1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco Production Company
Well: Empire S. Deep Unit #1
Location: F-6-18-29

Pool: Empire Morrow, South (Gas)
Spud Date: Original Completion Date:
Completion Interval (Gas):
Completion Date (Gas): First Production (Gas):
Remarks: First Production 9-72

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	144356	72178	15232.8	1145	572	239702
1979	12	955190	79599	15088.4	6987	582	238557
1978	12	1131310	94276	14133.2	5955	496	231570
1977	12	1607844	133987	13001.9	14057	1171	225615
1976	12	2165513	180459	11394.0	22103	1842	211558
1975	12	3182806	265234	9228.5	44623	3719	189455
1974	9	1655392	183932	5953.3	33012	3668	144832
1973	12	3539078	294923	4297.9	86379	7198	111820
1972	4	758781	189695	758.8	24440	6110	25441

19 79 Detail Summary

Jan.	109226	July	79515
Feb.	95920	Aug.	77125
March	79218	Sept.	87590
April	74820	Oct.	48209
May	73171	Nov.	61619
June	77090	Dec.	91687

19 80 Detail Summary

Jan.	65815	July	
Feb.	78541	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 144356 MCF
Days or Months (Y-T-D) 2 Months
Avg. Rate (Y-T-D) 72178 MCF/Mo.

F-6-18-29

3-1-80 Cum: 15232.8 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Co.
Well:	Empire S. Deep Unit #1
Location:	F-6-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	9-72 Acres:

Gas Production - MCF/month

1,000,000
100,000
10,000
4000

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1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco

Well: Empire S. Deep Unit #2

Location: K-6-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 9-72

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	39807	19903	1282.7			
1979	12	66039	5503	1242.9			
1978	12	92932	7744	1176.9			
1977	12	130939	10912	1084.0			
1976	12	126961	10580	953.0			
1975	12	134415	11201	826.1			
1974	7	199676	28525	691.7			
1973	12	239548	19962	492.0			
1972	4	252429	63107	252.4			

19 79 Detail Summary

Jan.	7616	July	3580
Feb.	5784	Aug.	4745
March	4539	Sept.	10448
April	4363	Oct.	8643
May	3974	Nov.	5498
June	4003	Dec.	2846

19 80 Detail Summary

Jan.	17156	July	
Feb.	22651	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 39807 MCF

Avg. Rate (Y-T-D) 19903 MCF

Days or Months (Y-T-D) 2 Months

3-1-80 Cum: 1282.7

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Co.
Well:	Empire S. Deep Unit #2
Location:	K-6-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	9-72 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

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19 72 | 19 73 | 19 74 | 19 75 | 19 76 | 19 77 | 19 78 | 19 79 | 19 80 | 19 81 | 19 82 | 19 83 | 19 84 | 19 85

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco

Well: Empire S. Deep Unit #16

Location: G-7-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 1-78

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	299864	149932	2930.1	1531	765	40956
1979	12	1624341	135362	2630.2	20024	1669	39425
1978	12	1005876	83823	1005.9	19401	1617	19401

19 79 Detail Summary

Jan.	94638	July	183340
Feb.	91741	Aug.	182591
March	121226	Sept.	17045
April	89075	Oct.	172160
May	174377	Nov.	156599
June	182990	Dec.	158559

19 80 Detail Summary

Jan.	159180	July	
Feb.	140684	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 299864 MCF

Avg. Rate (Y-T-D) 149932 MCF/Mo.

Days or Months (Y-T-D) 2 Months

3-1-80 Cum. 2930.1 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Co.
Well:	Empire S. Deep Unit #16
Location:	G-7-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	1-78 Acres:

Gas Production - MCF/month

1,000,000
100,000
10,000
4000

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19 78 | 19 79 | 19 80 | 19 81 | 19 82 | 19 83 | 19 84 | 19 85 | 19 86 | 19 87 | 19 88 | 19 89 | 19 90 | 19 91

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Harvey E. Yates

Well: Travis Bassett-Birney #1

Location: J-7-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 3-78

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	133961	66980	2264.0	1125	562	31502
1979	12	1109841	9248	2130.0	13258	1105	30377
1978	10	1020152	102015	1020.2	17119	1712	17119

19 79 Detail Summary

Jan.	112023	July	92846
Feb.	100270	Aug.	87576
March	110039	Sept.	82437
April	104678	Oct.	78076
May	100223	Nov.	74791
June	92797	Dec.	74085

19 80 Detail Summary

Jan.	70467	July	
Feb.	63494	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 133961 MCF Avg. Rate (Y-T-D) 66980 MCF/Mo.

Days or Months (Y-T-D) 2 Months

3-1-80 Cum: 2264.0 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Harvey E. Yates
Well:	Travis Bassett-Birney #1
Location:	J-7-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	3-78 Acres:

Gas Production - MCF/month

1,000,000
100,000
10,000
4000

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19 78 | 19 79 | 19 80 | 19 81 | 19 82 | 19 83 | 19 84 | 19 85 | 19 86 | 19 87 | 19 88 | 19 89 | 19 90 | 19 91

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Amoco

Well: Empire S. Deep Unit #15

Location: E-8-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 12-77

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	70283	35141	1043.4	547	273	15471
1979	12	520767	43397	973.1	6248	521	14924
1978	12	414877	34573	452.3	7977	665	8676
1977	1	37461	37461	37.5	699	699	699

19 79 Detail Summary

Jan.	43550	July	46076
Feb.	35337	Aug.	46148
March	38353	Sept.	44093
April	40051	Oct.	43876
May	50599	Nov.	42457
June	48654	Dec.	41573

19 80 Detail Summary

Jan.	35488	July	
Feb.	34795	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 70283 MCF

Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 35141 MCF/Mo.

E-8-18-29

3-1-80 Cum: 1043.4 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Amoco Production Co.
Well:	Empire S. Deep Unit #15
Location:	E-8-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	12-77 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

DEC. MAR. JUN. SEP. DEC.

1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990

GAS PRODUCTION HISTORY

Date 5-30-80 Page 1 of 1

Operator: Harvey E. Yates Co.

Well: Loco Hills Welch No. 1

Location: D-9-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 8-79.

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	44733	22366	165.9			
1979	5	121157	24231	121.2			

19 79 Detail Summary

Jan.		July	
Feb.		Aug.	27614
March		Sept.	27250
April		Oct.	27680
May		Nov.	21440
June		Dec.	17173

19 80 Detail Summary

Jan.	22635	July	
Feb.	22098	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 44733 MCF Avg. Rate (Y-T-D) 22366 MCF/mo.

Days or Months (Y-T-D) 2 mos.

D-9-18-29

3-1-80 Cum: 165.9 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Harvey E. Yates Co.
Well:	Loco Hills Welch #1
Location:	D-9-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	8-79 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

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1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992

GAS PRODUCTION HISTORY

Date 5-30-80 Page 1 of 1

Operator: Harvey E. Yates Co.

Well: Travis Deep Com. No. 4

Location: H-18-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 8-79.

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/mo.)	Cum. Gas Production (MMCF)	Annual SIP (psia)		
1980	2	43666	21833	133.0			
1979	5	89263	17852	89.3			

19 79 Detail Summary

Jan.		July	
Feb.		Aug.	11539
March		Sept.	17365
April		Oct.	18589
May		Nov.	18944
June		Dec.	22826

Production (Y-T-D) 43666 MCF

Days or Months (Y-T-D) 2 mos.

19 80 Detail Summary

Jan.	23742	July	
Feb.	19924	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Avg. Rate (Y-T-D) 21833 MCF/mo.

3-1-80 Cum: 133.0 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Harvey E. Yates Co.
Well:	Travis Deep Com. #4
Location:	H-18-18-29
County:	Eddy State: New Mexico
Date Prod. Began:	8-79 Acres:

Gas Production - MCF/month

100,000
10,000
1,000
400

DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC. MAR. JUN. SEP. DEC.

1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992

GAS PRODUCTION HISTORY

Date May 15, 1980 Page 1 of 1

Operator: Harvey E. Yates Company

Well: Travis Deep Unit #1

Location: K-18-18-29

Pool: Empire Morrow, South (Gas)

Spud Date: Original Completion Date:

Completion Interval (Gas):

Completion Date (Gas): First Production (Gas):

Remarks: First Production 1-78

Year	No. of Mos.	Annual Gas Production (MCF)	Avg. Gas Rate (MCF/Mo.)	Cum. Gas Production (MMCF)	Annual Oil Production (BBLS)	Average Oil Rate (BBLS/Mo.)	Cum. Oil Production (BBLS)
1980	2	5545	2772	429.2	8	8	5262
1979	12	113588	9466	423.7	638	53	5254
1978	9	210802	23422	310.1	1856	206	4616

1979 Detail Summary

Jan.	12776	July	7790
Feb.	9186	Aug.	708
March	18730	Sept.	3576
April	24155	Oct.	7052
May	12997	Nov.	4409
June	7615	Dec.	4594

1980 Detail Summary

Jan.	2146	July	
Feb.	3399	Aug.	
March		Sept.	
April		Oct.	
May		Nov.	
June		Dec.	

Production (Y-T-D) 5545 MCF

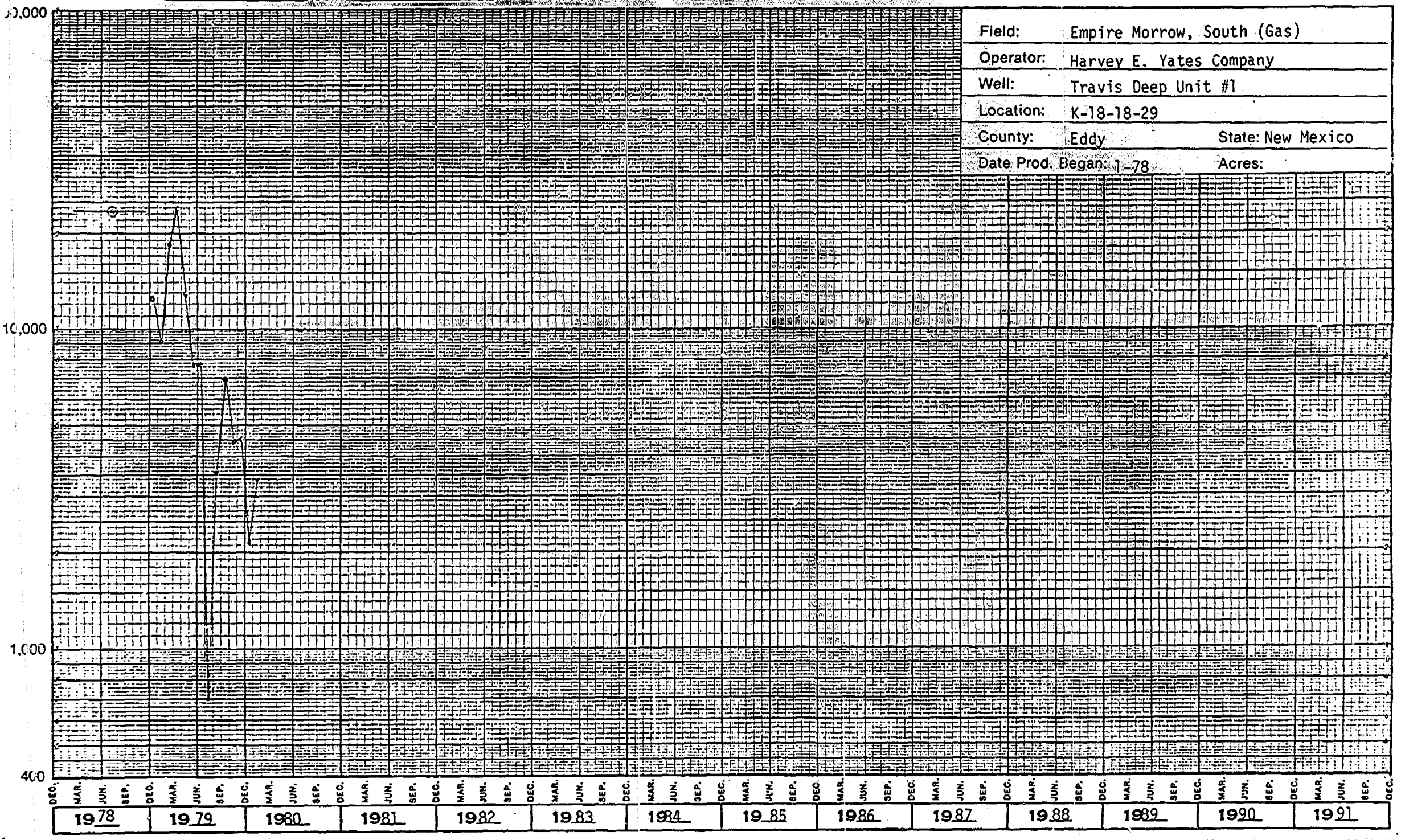
Days or Months (Y-T-D) 2 Months

Avg. Rate (Y-T-D) 2772 MCF/Mo.

K-18-18-29

3-1-80 Cum. 429.2 MMCF

Field:	Empire Morrow, South (Gas)
Operator:	Harvey E. Yates Company
Well:	Travis Deep Unit #1
Location:	K-18-18-29
County:	Eddy State: New Mexico
Date Prod. Began: 1-78	Acres:



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 6930
Order No. R-6415

APPLICATION OF AMOCO PRODUCTION COMPANY FOR AN UNORTHODOX GAS WELL LOCATION, EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on June 25, 1980, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 5th day of August, 1980, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Amoco Production Company, seeks approval of an unorthodox well location for its Empire South Deep Unit Well No. 21 to be drilled 660 feet from the North line and 660 feet from the East line of Section 36, Township 17 South, Range 28 East, NMPM, to test the Morrow formation, Eddy County, New Mexico.

(3) That the E/2 of said Section 36 is to be dedicated to the well.

(4) That a well at said unorthodox location will better enable applicant to produce the gas underlying the proration unit.

(5) That the offset operator, ARCO Oil and Gas Company, has objected to the proposed location relative to one zone of

the Morrow formation identified as the "BV" Channel zone found at a depth of from 10,660 feet to 10,780 feet in its State "BV" Well No. 1 located in Unit J of Section 25, Township 17 South, Range 28 East, NMPM, Eddy County, New Mexico.

(6) That said offset operator presented evidence tending to demonstrate that there are no more than approximately 54 productive acres in said "BV" channel sand under the E/2 of said Section 36.

(7) That the applicant presented evidence tending to demonstrate that there are as many as 195 productive acres in said "BV" channel sand under the E/2 of said Section 36.

(8) That all of the geologic evidence presented was interpretive, subjective, speculative and not subject to significant proof even if the well should be drilled as proposed.

(9) That to offset such advantage gained over the protesting offset operator, production from the well at the proposed unorthodox location should be limited from the "BV" Channel zone of the Morrow formation.

(10) That the unreliable estimates of productive acreage presented in this case should not be used as a tool to attempt to offset such advantage.

(11) That in the absence of reliable data on productive acreage such limitation should be based upon the well location as it relates to a standard well location for the affected zone.

(12) That the proposed unorthodox well location would be a standard location for a well in a 160-acre spaced gas reservoir.

(13) That the well should be assigned an allowable limitation factor based upon a 160-acre spaced location or 50 percent (160 acres divided by 320 acres) in the Morrow "BV" channel sand only.

(14) That no allowable limitation factor should be applied in any other zone of the Wolfcamp or Pennsylvanian formations.

(15) That in the absence of any special rules and regulations for the prorationing of production from said Morrow "BV" channel sand, the aforesaid production limitation factor should be applied against said well's ability to produce into the pipeline as determined by periodic well tests.

(16) That the minimum calculated allowable for the subject well should be reasonable, and 1,000,000 cubic feet of gas per day is a reasonable figure for such minimum allowable.

(17) That approval of the subject application subject to the above provisions and limitations will afford the applicant the opportunity to produce its just and equitable share of the gas in the subject reservoir or other productive zones found, will prevent the economic loss caused by the drilling of unnecessary wells, avoid the augmentation of risk arising from the drilling of an excessive number of wells, and will otherwise prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That an unorthodox well location for the Wolfcamp and Pennsylvanian formations is hereby approved for the Amoco Production Company Empire South Deep Unit Well No. 21 to be located at a point 660 feet from the North line and 660 feet from the East line of Section 36, Township 17 South, Range 28 East, NMPM, Eddy County, New Mexico.

(2) That the E/2 of said Section 36 shall be dedicated to the above-described well.

(3) That said well is hereby assigned a Production Limitation Factor of 0.50 in the "BV" channel sand of the Morrow formation as described in Finding No. (5) of this order.

(4) That in the absence of any Special Rules and Regulations prorating gas production in said Morrow "BV" channel sand, the Special rules hereinafter promulgated shall apply.

(5) That the following Special Rules and Regulations for a non-prorated gas well at an unorthodox location shall apply to the subject well:

SPECIAL RULES AND REGULATIONS
FOR THE
APPLICATION OF A "PRODUCTION LIMITATION FACTOR"
TO A NON-PRORATED GAS WELL

APPLICATION OF RULES

RULE 1. These rules shall apply to the Amoco Production Company South Empire Deep Unit Well No. 21, located 660 feet from the North line and 660 feet from the East line of Section

36, Township 17 South, Range 28 East, NMPM, Eddy County, New Mexico, which well's Production Limitation Factor of 0.30 shall be applied to the well's deliverability (as determined by the hereinafter set forth procedure) to determine its maximum allowable rate of production.

ALLOWABLE PERIOD

RULE 2. The allowable period for the subject well shall be six months.

RULE 3. The year shall be divided into two allowable periods commencing at 7:00 o'clock a.m. on January 1 and July 1.

DETERMINATION OF DELIVERY CAPACITY

RULE 4. Immediately upon connection of the well the operator shall determine the open flow capacity of the well in accordance with the Division "Manual for Back-Pressure Testing of Natural Gas Wells" then current, and the well's initial deliverability shall be calculated against average pipeline pressure.

RULE 5. The well's "subsequent deliverability" shall be determined twice a year, and shall be equal to its highest single day's production during the months of April and May or October and November, whichever is applicable. Said subsequent deliverability, certified by the pipeline, shall be submitted to the appropriate District Office of the Division not later than June 15 and December 15 of each year.

RULE 6. The Division Director may authorize special deliverability tests to be conducted upon a showing that the well has been worked over or that the subsequent deliverability determined under Rule 5 above is erroneous. Any such special test shall be conducted in accordance with Rule 4 above.

RULE 7. The operator shall notify the appropriate district office of the Division and all offset operators of the date and time of initial or special deliverability tests in order that the Division or any such operator may at their option witness such tests.

CALCULATION AND ASSIGNMENT OF ALLOWABLES

RULE 8. The well's allowable shall commence upon the date of connection to a pipeline and when the operator has complied

with all appropriate filing requirements of the Rules and Regulations and any special rules and regulations.

RULE 9. The well's allowable during its first allowable period shall be determined by multiplying its initial deliverability by its production limitation factor.

RULE 10. The well's allowable during all ensuing allowable periods shall be determined by multiplying its latest subsequent deliverability, as determined under provisions of Rule 5, by its production limitation factor. If the well shall not have been producing for at least 60 days prior to the end of its first allowable period, the allowable for the second allowable period shall be determined in accordance with Rule 9.

RULE 11. Revision of allowable based upon special well tests shall become effective upon the date of such test provided the results of such test are filed with the Division's district office within 30 days after the date of the test; otherwise the date shall be the date the test report is received in said office.

RULE 12. Revised allowables based on special well tests shall remain effective until the beginning of the next allowable period.

RULE 13. In no event shall the well receive an allowable of less than one million cubic feet of gas per day.

BALANCING OF PRODUCTION

RULE 14. January 1 and July 1 of each year shall be known as the balancing dates.

RULE 15. If the well has an underproduced status at the end of a six-month allowable period, it shall be allowed to carry such underproduction forward into the next period and may produce such underproduction in addition to its regularly assigned allowable. Any underproduction carried forward into any allowable period which remains unproduced at the end of the period shall be cancelled.

RULE 16. Production during any one month of an allowable period in excess of the monthly allowable assigned to the well shall be applied against the underproduction carried into the period in determining the amount of allowable, if any, to be cancelled.

RULE 17. If the well has an overproduced status at the end of a six-month allowable period, it shall be shut in until such overproduction is made up.

RULE 18. If, during any month, it is discovered that the well is overproduced in an amount exceeding three times its average monthly allowable, it shall be shut in during that month and during each succeeding month until it is overproduced in an amount three times or less its monthly allowable, as determined hereinabove.

RULE 19. The Director of the Division shall have authority to permit the well, if it is subject to shut-in pursuant to Rules 17 and 18 above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for the well if it has produced in excess of the monthly rate authorized by the Director.

RULE 20. The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 17, 18, or 19 above upon a showing at public hearing that the same is necessary to avoid material damage to the well.

GENERAL

RULE 21. Failure to comply with the provisions of this order or the rules contained herein or the Rules and Regulations of the Division shall result in the cancellation of allowable assigned to the well. No further allowable shall be assigned to the well until all rules and regulations are complied with. The Division shall notify the operator of the well and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

(6) 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 the day and year herein-above designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY
Director

S
fd/

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

August 6, 1980

Re: CASE NO. 6930
ORDER NO. R-6415

Mr. Guy Buell, Attorney
Amoco Production Company
P. O. Box 3092
Houston, Texas 77001

Applicant:

~~Amoco Production Company~~

Dear Sir:

Enclosed herewith are two copies of the above-referenced Division order recently entered in the subject case.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCD _____
Artesia OCD X
Aztec OCD _____

Other ~~Owen Lopez~~

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 6930
Order No. R-6415

APPLICATION OF AMOCO PRODUCTION COMPANY
FOR AN UNORTHODOX GAS
WELL LOCATION, EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on June 25, 1980 at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 19th day of September, 1980, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Amoco Production Company, of its Empire South Deep Unit Well No. 21 to be drilled seeks approval of an unorthodox gas well location 660 feet from the North line and 660 feet from the East line of Section 36, Township 17 South, Range 28 East, NMPM, to test the Morrow formation, _____ Pool, Eddy County, New Mexico.

(3) That the E/2 of said Section 36 is to be dedicated to the well.

(4) That a well at said unorthodox location will better enable applicant to produce the gas underlying the proration unit.

ARCO Oil and Gas Company

(5) That the offset operator has objected to the proposed location relative to one zone of the Morrow formation identified as the "BV" Channel zone found at a depth of from 10,660 feet to 10,780 feet in the ~~Atlantic Richfield~~ it's State "BV" Well No. 1 located in Unit J of Section 25, Township 17 South, Range 28 East, NMPM, Eddy County, New Mexico.

(6) That said offset operator, ~~ARCO Oil and Gas Company,~~ presented evidence tending to demonstrate that there are no more than approximately 54 productive acres in said "BV" channel sand under the E/2 of said Section 36.

(7) That the applicant presented evidence tending to demonstrate that there are as many as 195 productive acres in said "BV" channel sand under the E/2 of said Section 36.

(8) That all of the geologic evidence presented was interpretive, subjective, speculative and not subject to significant proof even if the well should be drilled as proposed.

(10) ~~(9)~~ That the unreliable estimates of productive acreage presented in this case ~~used in this case~~ should not be used as a tool to attempt to offset such ~~any~~ advantage, ~~gained over the protesting offset operator~~.

(9) ~~(10)~~ That to offset such advantage gained over the protesting offset operator, production from the well at the proposed unorthodox location should be limited from the "BV" Channel zone of the Morrow formation.

(11) That in the absence of reliable data on productive acreage such limitation should be based upon the well location as it relates to a standard well location for the affected zone.

(12) That the proposed unorthodox well location would be a standard location for a well in a 160-acre spaced gas reservoir.

(13) That the well should be assigned an allowable limitation factor based upon a 160-acre spaced location or 50 percent (160 acres divided by 320 acres) in the Morrow "BV" channel sand only.

(14) That no allowable limitation factor should be applied in any other zone of the Wolfcamp or Pennsylvanian formations.

(15) ~~(12)~~ That in the absence of any special rules and regulations for the prorationing of production from ~~said Undesignated Morrow Gas Pool~~ said Morrow "BV" channel sand, the aforesaid production limitation factor should be applied against said well's ability to produce into the pipeline as determined by periodic well tests.

(16) ~~(13)~~ That the minimum calculated allowable for the subject well should be reasonable, and 1,000,000 cubic feet of gas per day is a reasonable figure for such minimum allowable.

(17) ~~(14)~~ That approval of the subject application subject to the above provisions and limitations will afford the applicant the opportunity to produce its just and equitable share of the gas in the subject ~~pool~~ reservoir or other productive zones found, will prevent the economic loss caused by the drilling of unnecessary wells, avoid the augmentation of risk arising from the drilling of an excessive number of wells, and will otherwise prevent waste and protect correlative rights.

~~correlative rights.~~

IT IS THEREFORE ORDERED:

(1) That an unorthodox ~~gas~~ well location for the Wolfcamp and Pennsylvanian the Amoco Production Company Empire South Deep Unit Well No. 21 formations is hereby approved for ~~xxxxx~~ to be located at a point 660 feet from the North line and 660 feet from the East line of Section 36, Township 17 South, Range 28 East, NMPM, ~~xxxx

RULE 6. The Division Director may authorize special deliverability tests to be conducted upon a showing that the well has been worked over or that the subsequent deliverability determined under Rule 5 above is erroneous. Any such special test shall be conducted in accordance with Rule 4 above.

RULE 7. The operator shall notify the appropriate district office of the Division and all offset operators of the date and time of initial or special deliverability tests in order that the Division or any such operator may at their option witness such tests.

CALCULATION AND ASSIGNMENT OF ALLOWABLES

RULE 8. The well's allowable shall commence upon the date of connection to a pipeline and when the operator has complied with all appropriate filing requirements of the Rules and Regulations and any special rules and regulations.

RULE 9. The well's allowable during its first allowable period shall be determined by multiplying its initial deliverability by its production limitation factor.

RULE 10. The well's allowable during all ensuing allowable periods shall be determined by multiplying its latest subsequent deliverability, as determined under provisions of Rule 5, by its production limitation factor. If the well shall not have been producing for at least 60 days prior to the end of its first allowable period, the allowable for the second allowable period shall be determined in accordance with Rule 9.

RULE 11. Revision of allowable based upon special well tests shall become effective upon the date of such test provided the results of such test are filed with the Division's district office within 30 days after the date of the test; otherwise the date shall be the date the test report is received in said office.

RULE 12. Revised allowables based on special well tests shall remain effective until the beginning of the next allowable period.

RULE 13. In no event shall the well receive an allowable of less than one million cubic feet of gas per day.

BALANCING OF PRODUCTION

RULE 14. January 1 and July 1 of each year shall be known as the balancing dates.

[illegible] deliverability, certified by the [illegible] the appropriate District Office [illegible] June 15 and December 15 of each year

RULE 15. If the well has an underproduced status at the end of a six-month allowable period, it shall be allowed to carry such underproduction forward into the next period and may produce such underproduction in addition to its regularly assigned allowable. Any underproduction carried forward into any allowable period which remains unproduced at the end of the period shall be cancelled.

RULE 16. Production during any one month of an allowable period in excess of the monthly allowable assigned to the well shall be applied against the underproduction carried into the period in determining the amount of allowable, if any, to be cancelled.

RULE 17. If the well has an overproduced status at the end of a six-month allowable period, it shall be shut in until such overproduction is made up.

RULE 18. If, during any month, it is discovered that the well is overproduced in an amount exceeding three times its average monthly allowable, it shall be shut in during that month and during each succeeding month until it is overproduced in an amount three times or less its monthly allowable, as determined hereinabove.

RULE 19. The Director of the Division shall have authority to permit the well, if it is subject to shut-in pursuant to Rules 17 and 18 above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for the well if it has produced in excess of the monthly rate authorized by the Director.

RULE 20. The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 17, 18, or 19 above upon a showing at public hearing that the same is necessary to avoid material damage to the well.

GENERAL

RULE 21. Failure to comply with the provisions of this order or the rules contained herein or the Rules and Regulations of the Division shall result in the cancellation of allowable assigned to the well. No further allowable shall be assigned to the well until all rules and regulations are complied with. The Division shall notify the operator of the well and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

(6) 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 the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY
Director

S E A L

fd/

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG
SANTA FE, NEW MEXICO
25 June 1980

EXAMINER HEARING

IN THE MATTER OF:

Application of Amoco Production Company for an unorthodox well location, Eddy County, New Mexico. CASE 6930

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant, Amoco Production Company: Guy Buell, Esq.
Amoco Production Company
Houston, Texas

For ARCO: Owen Lopez, Esq.
MONTGOMERY, ANDREWS Law Firm
Paseo de Peralta
Santa Fe, New Mexico 87501

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

I N D E X

HAROLD M. BROWN

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JERRY L. TWEED

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SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

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SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 435-7409

MR. STAMETS: We'll call at this time Case 6930.

MR. PADILLA: Application of Amoco Production Company for an unorthodox well location, Eddy County, New Mexico.

MR. BUELL: May it please the Examiner, my name is Guy Buell, representing Amoco Production Company.

MR. STAMETS: Are there other appearances in this case?

MR. LOPEZ: Mr. Examiner, my name is Owen Lopez, with the law firm of Montgomery and Andrews, P. A., Santa Fe, New Mexico, appearing on behalf of the Atlantic Richfield Company, and I have one witness to be sworn.

MR. STAMETS: Any other appearances? I'd like to have all those who are going to be witnesses in this case stand and be sworn at this time.

(Witnesses sworn.)

MR. BUELL: Mr. Examiner, I realize the hour is late and everyone here, that's still here, is tired, so I will make every effort to move right along.

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

HAROLD M. BROWN

being called as a witness and having been duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Brown, would you state your complete name, by whom you're employed, and in what capacity, and at what location, please?

A My name is Harold Michael Brown. I'm presently employed by Amoco Production Company as a staff petroleum engineer, senior grade, in the Houston Regional Office.

Q Did you ever go to school?

A Yes.

Q What is your educational background in the field of engineering?

A I received a BS degree in mechanical engineering from the University of Houston in June of 1974.

Q Since graduation have you been employed by Amoco in various petroleum engineering capacities?

A Yes. Immediately upon graduation I reported for work for Amoco Production Company in Odessa as a petroleum engineer. Since that time I've handled various projects, primarily in the Permian Basin, in Michigan, Niagara,

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Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q In your area of responsibility in our Houston Office have you made a study of the Morrow formation in and around our requested unorthodox location application?

A That's right.

MR. BUELL: Any questions, Mr. Examiner?

MR. STAMETS: No, the witness is considered qualified.

Q Will you look, Mr. Brown, at what has been identified as Amoco's Exhibit One? What is that exhibit?

A Exhibit Number One is a map of the Empire South Deep Unit area, which depicts those wells that have penetrated the Morrow formation.

If you'll note, our Empire South Deep Unit is bordered by the heavy dark line, highlighted by yellow pencil.

Our Empire South Deep Unit No. 21, the well in question is designated by a red dot with a red arrow.

Q All right, sir, I notice you have at least three different well symbols on Exhibit One for different, I'm sure, different categories of well. Would you run through that legend for us, please?

A Yes, sir. The open circle with the four tick marks designates those wells which penetrated the Morrow and were found noncommercial.

The standard gas symbol, which is high-

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Phone (505) 455-7409

lighted by the orange dot, depicts those wells that were productive, currently productive in the Morrow formation.

The standard gas symbols that are not highlighted by yellow, by the orange, were productive and have since depleted in the Morrow formation.

Q All right, Mr. Brown, so the Examiner can orient himself on our Exhibit One, what is our principal area of interest reflected on Exhibit One?

A The principal area is our section -- well, the east half of Section 36, which is bordered on the north by ARCO's BV -- State BV Lease in Section 25, Section 30, Section 31 to the east, which are within the Empire South Deep Unit, and the west half of Section 36, which currently has no production, producing wells.

Q And we're blessed here by a range dividing line putting Section 25 and 28 East, along with 36, and over on to the east to the righthand side, 30 and 31 and 29 East?

A That's correct.

Q All right, sir, I think we've got our sections identified clearly enough now in the record that we can just refer to 25, 30, 31, and 36.

All right, sir, what is our primary objective in this Morrow test which we're asking permission of the Oil Conservation Division to drill 660 feet from the north and 660 feet from the east line of Section 36?

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Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. Our main objective is a Lower Morrow Sand channel which is found present at the State BV Wells No. 1 and No. 2 in our Empire South Deep Unit Well No. 5.

Q. Okay. Let's just refer to it as the BV channel, okay?

A. All right.

Q. Is that okay with you?

A. Yes, sir.

Q. Are you ready now to go to Exhibit Two?

A. Yes, sir.

Q. What is Exhibit Two?

A. Exhibit Two is a cross section designated as A-A'.

Q. Wait just a moment and let everyone --

MR. STAMETS: Put that up on the wall, Guy.

MR. BUELL: Well, we've got another one about the same size. Let's do it that way.

MR. STAMETS: Put them all up on the wall.

Q. Mr. Brown, will you now go to the Exhibit Two on the board and finish your description of what Exhibit Two reflects?

A. Yes, Exhibit Two, Cross Section A-A', as noted by the map on the righthand side, goes through the ARCO State BV No. 2, BV No. 1, the projection of the proposed

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Santa Fe, New Mexico 87501
Phone (505) 455-7409

location No. 21, out to the Empire South Deep Unit No. 5.

Q And as you were pointing that out you were referring to an inserted map on the righthand side of the Exhibit that shows a trace of this cross section.

A Yes, sir, that is correct.

Q And generally speaking, it's northwest-southeast trending, the offset.

All right, sir, what data have you shown on the cross section that is common to all three logs you're using? By that, I'm talking about your horizontal indications you have on there?

A Okay. The three logs were hung on a subsea datum of -6700 feet. Shown on each of the logs are the Atoka, the Morrow, and the Barnett Shale formations.

Q And you've shown that by a blue solid line that traverses the entire trajectory of the cross section.

A Yes, sir.

Q Is it fair to say that at the bottom of the Atoka is generall the top of the Morrow and the bottom of the Morrow is generally the top of the Barnett Shale?

A Yes, that's generally.

Q All right, sir, now go to the log on the extreme left. That's ARCO's State BV No. 2, and explain what is reflected on that log.

A On this log we've shown by yellow coloring

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

those sand members that we consider to be fairly clean sand with less than 50 API units on the gamma ray log.

At the bottom you'll note a very thick sand member, which in this is considered -- we're considering the BV channel.

The well was completed, as shown here, by the standard perforated symbol and in December of 1979 it had an open flow potential of 40-million a day and cum to 3-1-80, which was two months production, of .22 Bcf.

From testimony given by ARCO in their hearing on June 5th, Case 6928, I understand the well is making 10-million a day at the present time.

Q All right, sir. Now, while you have covered other members of the Morrow up the hole from what you've identified as the BV channel, that well is not open in any of those.

A No, sir.

Q Is the BV channel very easy to recognize on a well by its wiggly or un-wiggly characteristics?

A Yes, sir, in this area it is. It's very clean, with very little shale breaks within the sand itself.

Q It's the type of Morrow sand deposit that you seldom see in southeast New Mexico, is it not?

A Yes, sir.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q All right, sir, let's move right on over now to the next well to the right on your cross section. I believe that's ARCO State BV No. 1.

A Yes. And again, in the BV No. 1 we highlighted that sand which we consider to be clean sand. Again you'll note the very thick sand member at the bottom of the well and again the standard perforated interval, which shows this sand to be almost totally open in the BV-1.

This well was completed in June of 1978 with an open flow of 61-million a day and cum to March 1 of 1980 was 6-1/2 Bcf.

The well is presently making 10-million a day.

Q All right. What do we see, moving next to the right? It's not a log. It's what I call a stick. What is that, the location of our proposed Well No. 21?

A Yes, sir, we projected our proposed well, as a stick, into this particular cross section.

Q And again, as you've testified in reference to the Exhibit One, our objective is the BV channel which you've identified on the two ARCO wells.

Now let's move over to the last well on the right, our Empire South Deep Unit No. 5.

A Yes, sir. The Empire South Deep Unit, again we highlighted clean sand with yellow. Again we find

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

the thick sand member at the bottom, what we're calling the BV channel. We show our perforations in the top 10 feet or so of this sand member.

Our well was completed in November of 1974 with an open flow of just under 13-million a day and a sum to March 1 of 1.6 Bcf.

Q All right, sir, looking at either the inset map on Exhibit Two or back to our Exhibit One, and knowing that the three wells in this area are producing from the BV channel, in your opinion does our requested location for our Well 21 offer the best opportunity to encounter the BV channel productive?

A Yes, sir.

Q All right, sir, let's move on now to Exhibit Three. It's another cross section, is it not?

A Yes, it is.

Q Same format as Exhibit Two.

A Yes, sir.

Q Only this is more nearly a north-south cross section.

A That's correct.

Q The same, the Atoka, the Morrow, Barnett Shale are identified, the same datum, so why don't you just start with the well on the extreme left, the Harvey Yates No. 18, and point out anything you'd like to about that well?

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Phone (505) 455-7409

A. What we wanted to point out on the Harvey Yates 18, their completion interval is a fairly thick sand member near the bottom of the well, and also a Lower Morrow sand channel, which we believe runs parallel to the BV channel and to the north of the BV channel.

Q Again, looking at that big blob of yellow, it's near the bottom of the well, again it has some of the same characteristics as the BV channel as shown on Exhibit Two, but is yet a little different.

A Yes.

Q It's still different from the Morrow pay you've identified up and down the holes?

A That's correct.

Q All right, sir, move on over now to Harvey Yates, moving south to his No. 13.

A The Harvey Yates No. 13 , he did not encounter the thick sand member at the bottom, which we're calling either the BV or the same zone as found in his No. 18 Well.

He's completed up the hole in about a 20-foot sand stringer and is -- started flowing 5-million a day, and he's made 1.6 Bcf as of March 1.

We do find what could possibly be the remnants of the BV channel in the very bottom part of the hole. We feel that the Empire South Deep Unit No. 13 is the northeast

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

boundary of the BV channel.

Q All right, sir, move right on over now and I believe we're coming to our stick again for Well No. 21, are we not?

A Yes, sir. We've again projected our Well No. 21 into this cross section.

Q And one more well to the south, what is that well?

A This is our Empire South Deep Unit No. 19 in which we encountered very little that we considered clean sand. We perforated several thin sand stringers up the hole; produced about 500 Mcf a day of gas. We then opened up a lower member at the very bottom of the Morrow; testing all these zones we still received only 3 to 400 Mcf a day.

We then plugged the top three intervals, fracture stimulated the bottom zone, and could not recover any meritable hydrocarbons.

Q All right, looking at the interval colored in yellow at the bottom of our Well No. 19, and also with the perforations opposite, and comparing it with the BV channel characteristics shown on No. 2, would it appear that we have a remnant of the BV channel in Well No. 19?

A Yes, sir.

Q But essentially due to lack of porosity and permeability development, it did not produce?

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A. That's correct.

Q. All right, sir. Looking at your insert map on Exhibit Three, on the extreme right, and the three wells, wells which are included on this section, and the location of our Well No. 21 in the east half of 36, and I'll ask you again with regard to encountering the BV channel productive in the east half of Section 31, to you feel that our recommended location of Well 21 is at the appropriate spot?

A. Yes, I do.

Q. All right, sir, do you have any other comments on either Exhibit Two or Three?

A. None.

MR. BUELL: Mr. Examiner, if you all would turn now to what has been identified as Exhibit Four. This is a portion of ARCO's Exhibit Number Eight that was introduced in Case Number 6928, which was heard before the full Commission on June the 5th. I say a portion, some of the contour lines, a very small bit of them on the east side, which are not critical to our area, had to be omitted due to lack of large duplicating facilities.

What I'm doing in an effort to -- I had hoped to eliminate controversy. It did not eliminate the controversy but I'm hoping in an effort to mitigate the controversy between Amoco and ARCO, that I hereby for the record accept ARCO's Exhibit Eight at that June 5th hearing as our

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Exhibit Number Four, and that Amoco will accept the commercial production as defined by ARCO in their testimony at that hearing.

And to make that a little more vivid to the Examiner, I'll cover it in testimony so it will be under oath.

MR. STAMETS: What was the --

MR. BUELL: ARCO testified that anything above the 40-foot contour interval on this gross Isopach would be commercial and that anything below the 40-foot contour interval would likely be noncommercial.

So to give you an idea of the area in the east half of 36 that is above the 40-foot contour interval, we have shaded it in green. That is our work. That was not ARCO's work. And to carry on across to Section 31 we have cross hatched Section 31's Empire South Deep Unit. We have cross hatched in green that area above the 40-foot contour interval in Section 31.

Now --

MR. LOPEZ: Mr. Examiner, I have no objection to Mr. Buell accepting ARCO's exhibit in the other case. I do object to the method in which he's characterized the testimony and I would request that before we're all misled I would like Mr. Buell to refer to the record wherein that ARCO did state that everything above the 40-foot contour was

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

commercially productive.

As I recall, this exhibit was introduced as a gross sand map, not a net pay map.

MR. BUELL: Mr. Lopez, so you can follow me, I'm going to start reading on page 122 where Mr. Johnston, an engineering witness for ARCO, goes under direct examination by one of your colleagues, a Mr. Draper. Are you there?

MR. LOPEZ: As much as I can be, Mr. Buell.

MR. BUELL: It's starting at the bottom of the page, Mr. Examiner.

(Reading) I'd like to refer back to Exhibit Eight. I had earlier -- I had referred earlier to pink and green shading. Using this objective mapping technique and trying to demonstrate from this where we believe would be the potential productive areas, we noted that with one exception wells encountering 40 feet of sand, as we have determined it, or less, were dry in Cycle Two. As such, we have shaded on that contour line and what we believe would be the productive limit in the southeast -- excuse me, correct that -- southwest portion of Section 24.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

That's up here immediately north of ARCO's State BV Lease in Section 25 on our Exhibit Four, their Exhibit Eight.

Then under cross examination by Mr. Kellahin, starting at page 136, and again at the bottom, starting with a question by Mr. Kellahin:

(Reading) If I understood you correctly that if the Morrow Sand present was less than 40 feet thick of gross interval it would not be commercial.

ANSWER: (On page 137) That is an observation based on looking at this map. There is one exception to that, otherwise it's consistent.

MR. LOPEZ: Mr. Examiner, I --

MR. BUELL: So we'll let the record speak for itself.

MR. LOPEZ: Exactly.

MR. STAMETS: I take it, though, that Mr. Buell and Mr. Lopez feel that the record says two different things.

MR. LOPEZ: I believe that's correct.

MR. BUELL: I think it completely backs up the way I characterized our Exhibit Four, their Exhibit Eight.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
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Phone (505) 455-7409

MR. STAMETS: I've heard what the record says and will give it the weight that it should in this case.

MR. BUELL: All right, sir.

Q Now, Mr. Brown, --

MR. STAMETS: While we're there, I'd like to get this a little bit clarified.

In that case they were referring to Section 24, right?

MR. BUELL: Yes, sir.

MR. STAMETS: And no one said anything at all about Section 36, but this was a large map. Was this the southern part of their map?

MR. BUELL: That is the end of their map, Mr. Examiner. I intended to bring that file in so that both you and Mr. Lopez could look at the original Exhibit Eight. I have pieced together with Scotch tape their --

MR. STAMETS: Mr. Lopez has a copy of the map.

MR. BUELL: Well, that will sure take precedence over my Scotch tape.

MR. STAMETS: Mr. Lopez, I would appreciate it.

Okay. All right, if Mr. Lopez has a different interpretation of what was said, we'll allow him to tell us what that interpretation is when he has his turn.

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. BUELL: Mr. Examiner, you've always been fair.

Q Moving right along, Mr. Brown, would you look now at our Exhibit Four, and from now on I'm just going to refer to our Exhibit Four. I think the record is clear that it is ARCO's Exhibit Eight. And does this gross Isopach apparently reflect two Morrow channels, one to the north -- I believe you discussed that in the interval on the Harvey Yates 18 -- and one to the south, which I have been calling the BV or the ARCO channel?

A Yes, I believe it does.

Q And our primary interest and objective in our No. 21 Well is the BV channel.

A That's correct.

Q So if you would just direct your attention, then, to the south channel, the BV channel, and you heard me say that the area that I colored in green in the east half of Section 36?

A Yes.

Q And you heard me say that the area that we've colored in cross hatched green in Section 31?

A Yes.

Q And you've heard me state my reason.

A Yes.

Q Do you have a different opinion?

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A No.

Q All right, sir.

MR. BUELL: We now have that in under oath, Mr. Examiner.

MR. STAMETS: Thank you.

Q Have you planimetered the area in the east half of 36 that is above the 40-foot contour interval?

A No.

Q Let me ask you this. In connection with your exhibits Two and Three, you pointed out that based on the area of the BV channel, as reflected by those two exhibits, that in your opinion the location we're requesting for No. 21 is the proper location to encounter the BV channel, is that correct?

A Yes.

Q Is there anything reflected on our Exhibit Four that would change your opinion that that is the proper location for a well to be drilled in the east half of 36 with its primary objective being the BV channel?

A No.

Q All right, sir, let me ask this question now. In your opinion, if there are reserves of BV channel gas underneath the east half of 36, and a well is not drilled at a location that would make a commercial producer in the BV channel, is there any way that the owners of interest in

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

the east half of 36 can ever recover those reserves?

A No, sir.

Q If a well is not drilled at a location to be a commercial well, in your opinion, looking at ARCO's -- at our Exhibit Four, what wells would have the best opportunity to produce the BV channel reserves under the east half of Section 36?

A The ARCO BV Wells to the north.

Q Based on data that we know now and again looking at our Exhibit Number Four, do you see how any way in the world the Oil Conservation Division approving our location could cause migration of BV channel gas from Section 25 to the east half of 36?

A No, sir.

Q Do you have anything else you'd care to add at this time?

A No, sir.

MR. BUELL: May it please the Examiner, that's all we have by way of direct at this time.

I would like to formally offer our Exhibits One through Four.

MR. STAMETS: These exhibits will be admitted.

Are there questions of Mr. Brown?

MR. LOPEZ: If you please, Mr. Examiner.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. STAMETS: Mr. Lopez.

CROSS EXAMINATION

BY MR. LOPEZ:

Q Mr. Brown, I'd first like to have you establish for us the production history of your Amoco Empire South Deep Unit No. 19, is it, that you drilled in Section 36?

A Yes. We perforated three sand stringers in the upper part of the Morrow. They -- we did potential them at 529 Mcf a day with 6 barrels of condensate. Then we later opened up the lower portion of the hole and acidized all perforations and on a test in June of 1979 the well had produced only 352 Mcf a day with 3 barrels of condensate.

At that time we cement squeezed the upper three sets of perforations, leaving open only the bottom set. We fracture stimulated that with approximately 100,000 gallons of gelled water and after the fracture stimulation did not -- did not recover any hydrocarbons.

Q All right. I misspoke but that's fine. I was more interested in the well in Section 31, which is your Amoco Empire South Deep Unit No. 5.

Well, before we get on that subject, did you make any water in this last well you're just discussing?

A According to the test we made a small amount of water in the upper three sand members, 5 barrels a

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day.

Q All right. Now turning to the Empire Deep Unit No. 5, located in Section 31, I believe.

A Yes.

Q Would you explain the location of the perforations and why it appears to be so limited compared to the ARCO State Nos. 1 and 2?

A We opened up the top portion of that thick sand member. There is a gas/water contact encountered in this well below the perforations that we have open.

Q Is that well still producing?

A Yes, sir, it is.

Q Is it making water?

A Yes, it is.

Q How much?

A Don't know the exact amounts since we got it back on production and we did some work on it. It was making approximately 100 barrels of water, or so, back in 1979. I don't know the latest test in water, but I understand it is making water.

Q Would you agree with me that a gross sand cor our map differs materially in many respects from a net pay map?

A Yes.

Q And isn't your Exhibit Number Four a gross

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

sand map rather than a net pay map?

A Yes.

Q And what evidence do you have, besides the record, which speaks for itself, that any production above the 40-foot contour map would be commercial?

A As far as ARCO's map is concerned, the only evidence I have is the testimony of the 40-foot contour line.

Q And we'll let the record speak for itself as Mr. Buell and I agreed.

Excepting your Exhibit Number Four, which was ARCO's Exhibit Number Eight in the other case, I note that the area shaded in green does not include the entire half section. In that light would you agree with me that a penalty is in order, even based -- assuming, an assumption with which I disagree, that the area shaded in green is commercially productive?

A No, sir.

Q And what is your reason for that? When you already have one well that is drilled to the Morrow and has condemned a great portion of the section?

A The problem is equating gross pay to deliverability.

Q That's a new concept; always glad to get.

A Well --

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. BUELL: Mr. Examiner, maybe I could make a statement on behalf of Amoco that would clear this up and probably save a lot of cross examination and may save even some direct on the part of ARCO.

MR. STAMETS: Well, if you could, we'd be ---

MR. BUELL: Mr. Examiner, looking at Exhibit Four, we understand with the -- a noncommercial well immediately south of our location in the east half of Section 36, that we do not contend that the entirety of the east half of Section 36 in productive.

Now this well did produce gas. It was a noncommercial quantity but we realize that asking for an off-pattern location a penalty will be in order to protect not only ARCO but all of the interest owners in the field, and that is the reason that we -- I accepted for Amoco the ARCO exhibit that showed that a portion of the east half of 36, under my interpretation of the record, could be considered noncommercial.

We realize that at some time a penalty could be appropriate to protect all the interest owners in the BV channel pool, as I call it. But at this time I think it's completely inappropriate until the Commission, if they approves our location and we drill it, the best evidence with regard to a penalty will be the data that will be revealed

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Rt. 1 Box 193-B
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by Well No. 21. It could end up -- we all know how Morrow is -- it could end up with a much thicker section in the BV channel than even ARCO's 1 and 2. It could be even a dry hole, Mr. Examiner.

So I'm not saying that Amoco is trying to avoid a penalty. The only thing we want is to have all the facts, all the data, and have a penalty that will be appropriate, not only to protect ARCO in Section 25, but all of the interest owners in the BV channel pool.

You know from the hearing on June 5th a well was going to be drilled to the north up in Section 24 in either the southwest quarter or the southeast quarter, which will reveal a lot of data to us.

So we're not trying to avoid a penalty, but we want the penalty to be appropriate and assessed at the proper time to protect everyone in this pool and not just ARCO.

MR. LOPEZ: Mr. Examiner, Mr. Buell never ceases to amaze me with his imagination. I think, however, we will have another proposal when we put on our direct case.

MR. BUELL: The purpose of my statement was not to amaze you, because I have observed that you're fairly easy -- easily amazed. My purpose was to clear the record up. We're not trying to avoid a penalty. We want an appropriate penalty, a proper penalty at the proper time.

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Phone (505) 455-7409

MR. LOPEZ: I just feel, Mr. Buell, that your proposal does depart from normal Commission practices and procedures.

MR. BUELL: I don't see anything in my proposal contradictory to the normal Commission practice.

MR. STAMETS: I don't believe this discussion is getting us anywhere and I think it should end, and let's go ahead with the cross examination of the witness.

MR. LOPEZ: All right. That's all I have.

MR. STAMETS: All right.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Brown, looking at Exhibit Four.

A Yes, sir.

Q It would appear that you have two legal locations available to you in Section 36 if you make two lay-down proration units and locate the wells 1980 from the east line of the section.

A Yes, sir.

Q Why have you chosen not to do that?

A Our primary reason for bringing it 660 is to get closer to what we feel the control is; that is, the line between the ARCO BV Wells and our Well No. 5.

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We realize the SV channel as such is a narrow channel. We think it's bordered, probably, by our Well No. 19, and the Empire South Deep Unit Well No. 13. We'd like to stay as close to our control as possible.

We realize having a dry hole it could -- it's a risky location no matter where you drill it.

Q. If this were a lay-down proration unit you would only be crowding yourself and not ARCO, is that correct?

A. If this were a lay-down, I'm not sure --

MR. BUELL: He's talking about the north half of 36.

A. Yes, I understand that. If it's a --

Q. You would be 660 feet from the line which is standard as to the north line of the north half --

A. Yes.

Q. -- proration unit.

A. Right.

Q. So you would not be crowding ARCO under those circumstances but only crowding Amoco.

A. I guess I'm not following your question. Were we going to lay-down the unit, a standard location being 660 from the north line?

Q. No.

A. 1980 from the north line and 660 from the

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

east line?

Q If you have a lay-down proration unit consisting of the north half of 36, then the standard location becomes 660 from the north, 1980 from the east line.

A Yes, sir.

Q And so your 660/660 would not be crowding ARCO but would only be crowding Amoco. Is that correct?

A It's bringing us closer into the unit, yes, sir.

Q Okay.

MR. STAMETS: Any other questions of the witness? He may be excused.

Do you have anything further, Mr. Buell?

MR. BUELL: I have one question on re-direct for Mr. Brown, relating to your question.

REDIRECT EXAMINATION

BY MR. BUELL:

Q But looking at Exhibit One, Mr. Brown, a unit consisting of the north half, such as Mr. Stamets was suggesting, half of that unit would be outside the Empire South Deep Unit?

A Yes, sir.

MR. BUELL: That's all.

MR. STAMETS: Any other questions? This

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

witness may be excused.

JERRY L. TWEED

being called as a witness and having been duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. LOPEZ:

Q. Would you please state your name and where you reside?

A. Jerry L. Tweed, and I live in Midland, Texas.

Q. By whom are you employed and in what capacity?

A. ARCO Oil and Gas, which is a subsidiary of Atlantic Richfield Company.

I am employed as a District Petroleum Engineer and my area of responsibility is New Mexico.

Q. Have you previously testified before the Commission and had your qualifications accepted as a matter of record?

A. Yes, I have.

MR. LOPEZ: Are the witness' qualifications acceptable, Mr. Examiner?

MR. STAMETS: They are.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q What is it that -- well, first of all, let's just refer to your Exhibit Number One and I'd ask you to describe it.

A Were you going to ask why is it that we are requesting --

Q Yes.

A We are requesting an allowable restriction on the proposed Amoco location in order to protect our correlative rights.

In reference to Exhibit Number One, this is somewhat similar, I believe, to Amoco's Exhibit Number Four, and it's similar to the one that we put in testimony at the previous hearing.

What it is, is a gross sand map on Cycle Two of the Morrow. ARCO Oil and Gas breaks the Morrow sequence into four depositional cycles. The cycles represent maximum periods of sand deposition, separated by shale deposition.

The gross sand thickness was picked off a gamma ray log and did not take into consideration the presence of hydrocarbons, permeability, or porosity, or -- or porosity of the sand involved.

Just generally, this gross sand development map does show the general northwest/southeast trending sand development in this area.

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Rt. 1 Box 193-B
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Phone (505) 455-7409

I might -- I will point out later that in reference to Mr. Johnston's testimony, he referred to a 40-foot contour line in the south half of Section 24 and in the north half of Section 25, and his comments as to what constituted the economic limit, or what or where a commercial well could be obtained, I believe, was contained to those two half sections.

Shown in red on this map is the boundary of the Empire South Deep Unit. ARCO Oil and Gas owns some 3.1 percent of this unit. We are the operator of the two BV Wells, BV 1 and 2, Section 25, and own a 50 percent interest in this section. I believe the wells are listed as Hondo Oil and Gas as the operator. Hondo Oil and Gas is a wholly owned subsidiary of ARCO.

That's all I wish to show.

Q Show on that exhibit, I guess the rest will speak for itself.

Now I refer you to Exhibit Number Two and ask you to explain and describe it.

A Okay. May I go to the --

Q Sure.

A Our two cross sections are somewhat similar to those presented by Amoco.

The first one, Exhibit Two, is a northwest/southeast cross section through the area of interest. It

SALLY W. BOYD, C.S.R.
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Phone (505) 455-7409

shows -- it starts at the Pennzoil -- Pennzoil Well in Section 24. I think you can see on this log, it shows a lack of commercial sand zone in the Pennzoil Well, which is a north -- I guess you'd consider it a northwest parameter of the channel.

It then goes to our State BV No. 2. It shows a good sand development in this well, along with the producing perforations.

And then to the State -- our State BV No. 1, which there again, shows a clean, thick sand zone, along with our perforations.

This -- these logs are gamma ray logs on the left side; a density log is the solid curve and a neutron log is the dotted curve. The neutron log is affected by the presence of gas and tends to read more dense in the zones that have gas in them.

You'll note the good separation in between the two curves on our State BV No. 2 and State BV No. 1.

Going to Amoco Empire South Deep Unit No. 5, they also encountered a thick sand member. As testified by their witness, they perforated the top of the interval. Let's see if I have those perforations. No, I don't have. It would be, I believe, 10,795 to 10,805.

The last information that I have, the well was temporarily abandoned. Apparently they have later

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

information that the well has been turned back on. It last --- according to our records, it last produced in January, 1980, and December of 1979 was the last information I had as to -- as to a full month's production, and that month the well produced 9,534 Mcf of gas, 3,720 barrels of water, 120 barrels of water per day, and 30 barrels of condensate.

The well was initially potentialed on 11-15-74 for 4.4 MMCF per day; had a calculated absolute open flow of 12 MMCF per day.

Cumulative at abandonment in January of 1980 was 1.6 Bcf.

I might add that looking back here, according to what we can analyze in our regulation as a working interest owner in this well, the reason that they perforated in the top of the zone was that the sand was wet in the lower part of it.

According to our log calculations, the well has a gas/water contact at 10,806 in this well, or -7148 which is just below where their perforations are.

I'd also point out that this gas/water contact is bourne out by the fact that they did subsequently produce substantial quantities of water.

The ARCO State NV No. 1 was completed 6-15-78 with a calculated open flow of 61-million per day.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

April, 1980's production was 301,281 Mcf of gas, 4,181 barrels of condensate, and 220 barrels of water. Cumulative production as of 5-1-80, rounding off, is 7.2 Bcf.

Referring to ARCO's State BV Com No. 2, this well was completed 12-5-79 for a COAF of 40 MMCF a day.

April, 1980 production, 215,351 Mcf of gas, 3,745 barrels of condensate, and no water. Cumulative production as of 5-1-80 is .7 Bcf.

The COAF's on these wells would indicate a very high permeable channel. Our calculations of the permeability in the Morrow section in the State [illegible] No. 1 is 50 millidarcies.

Q. Okay, I was just going to ask you, what is the average permeability in your opinion of the average Morrow well?

A. Generally the average Morrow well will have a permeability in the neighborhood of .53 millidarcies. As you can see here, it would be -- we're dealing with a formation that's considerably higher in permeability than the average Morrow well.

Q. Now I'd refer you to Exhibit Number Three and ask you to describe it.

A. Okay. Exhibit Number Three is a southwest/northeast cross section, going from Amoco's Empire South Deep Unit No. 19 to their No. 5 and up to the HEYCO operated Empire

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

South Deep Unit No. 13.

Q All right, Jerry, I think you're sort of blocking the Examiner and he's the one that has to see the story.

A Here again, this shows -- I might add that our Exhibit Two was hung on a subsea datum at -6923.

Our Exhibit Three is hung on the top of Cycle Two and does not reflect any structure.

Here again it does show the sand development in the three wells. Again, the Empire South Deep Unit No. 19, they had a very tight sand in the bottom of Cycle Two. This well, as previously testified, or this particular interval, was perforated 10,828 to 46, and tested and was found to be nonproductive. I think it certainly establishes productive limits of this Morrow channel in this area.

There again, Empire South Deep Unit No. 5 had a very thick sand section; however, it was wet except in the very top.

And going to Empire South Deep Unit No. 13, the well operated by HEYCO, they did not encounter any Morrow sand in Cycle Two.

I think this cross section demonstrates the narrowness of the channel in the southwest/northeast direction in this particular area.

Q Now I'd refer you to Exhibit Number Four

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

and ask you to describe it.

MR. BUELL: May it please the Examiner, I am going to object to Exhibit Four. Looking at a subsequent exhibit, it appears obvious that ARCO intends to use Exhibit Four as the basis for allocation of gas production in this pool.

I think it's grossly unfair at this time to go into a net pay map, one, before our well is drilled, and reveal what it actually, net pay is; two, all the interest owners in this pool have not been notified that we were in effect going to have, at this unorthodox location application, a hearing to adopt an allocation formula for this pool.

So for all these reasons, Mr. Examiner, this is premature. I would not object one bit if they would call an application for a hearing after our well is drilled, assuming the Oil Conservation Division approves. But at this time I think it is premature. All the interested parties have not had notice. We have an active development program going on in this pool, as your hearing of June 5 so vividly pointed out, so for all these reasons I object to the admission of the Exhibit Four or any testimony related thereto.

MR. STAMETS: Denied. proceed.

A. Exhibit Number Four represents a net sand Isopach on the Morrow Cycle Two sand. This shows a net sand development, as I said, in Cycle Two. The net was picked

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

from logs with -- with that part of the sand that had greater than 5 percent porosity; had gas effect on the density neutron, clean sand based on the gamma ray, and less than 40 percent salt water saturation, based on log calculations.

This shows the preponderance of the reservoir being contained in Section 25. Only a small portion lies in the east half of Section 36. There is good well control in this area for the construction of the map. Note the Empire South Deep Unit No. 19 with no pay, and as previously testified to, this well was tested in the Cycle Two Morrow and was nonproductive.

Also, note the Empire South Deep Unit No. 5. Here again in Exhibit One we showed 78 feet of gross sand; however, all but 10 feet of that was below a gas/water contact and has only 10 feet of net sand that contains hydrocarbons.

Similarly, while I have this map out, if you'll indulge me, I might refer to Amoco's Exhibit Four. Based upon the gas/water contact as testified as being at a -7148, all of the southeast quarter of Section 36 would find Cycle Two below the gas/water contact.

Q Do you want to say anything about the Empire South Deep No. 7 Well in Section 30 in connection with this exhibit?

A Well, referring to the Empire South Deep Unit No. 13, I think, as shown on our cross section, that well

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

encountered no sand development in Cycle Two. Similarly, the Empire South Deep Unit No. 7 was dry in Cycle Two.

Q All right.

A. The wells farther --- the well in the north half of Section 30, Empire South Deep Unit No. 18, we think encountered a different cycle trend and does produce in Cycle Two.

I would like to point out, while I have this map here, that if Amoco's location is allowed as proposed with no penalty, it would certainly encourage similar applications in Section 31 and in Section 30, and possibly also in the northern end of the channel.

Such wells would, in my conclusions, would flagrantly violate ARCO Oil and Gas Company's correlative rights.

Q Now I'd refer you to what has been marked as Exhibit Number Five, and ask you to explain it.

A. Okay. I would like to keep this exhibit out while I talk about the others, if I may.

Exhibit Number Five lists the pressure, bottom hole pressures tests that were taken on the wells of interest.

On 11-25-74 a bottom hole pressure test was run on Empire South Deep Unit No. 5. At that time the well had a bottom hole pressure of 4,293 pounds. We would

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

consider that to be normal reservoir pressure for a Morrow well at this depth.

Q This is the southernmost --

A. Yes.

Q -- BV well, as Mr. Buell describes it?

A. Yes, Empire South Deep Unit No. 5 in Section 31.

Q. Okay.

A. On 6-19-78, when the State BV No. 1 was completed, a bottom hole pressure test was taken on that well. At that time the reservoir pressure was 4037 pounds. This indicated that the subsequent production from the Empire South Deep Unit No. 5 had reduced the reservoir pressure in this area. It had had some effect on the overall -- on the reservoir pressure in the vicinity of the State BV No. 1, approximately 250 pounds.

On 3-5-79 we took another bottom hole reservoir pressure on the State BV No. 1. At that time the reservoir pressure was 3603 pounds.

On 12-6-79 the State BV No. 2 was drilled and we took a bottom hole reservoir pressure. The pressure at that time was 3171 pounds, which indicated that it had -- its reservoir pressure had been affected by the subsequent production from the Empire South Deep Unit No. 5 and the State BV No. 1.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

To determine just in how good communication the State BV No. 1 and 2 were in, we then turned around and in 12-19-79, thirteen days later, we shut in the State BV No. 1 and took a reservoir pressure.

We found the reservoir pressure at that time to be 3154 pounds in the State BV No. 1. If my subtraction is correct, that's 17 pounds different than the bottom hole pressure found in the State BV No. 2 on 12-6-79. 12-6-79 no substantial production had been taken out of the State BV No. 2.

This pressure history indicates very good communication along this very permeable channel and it shows graphically just how much effect the production of one well, the State BV No. 1, some 2050 feet away, had on the State BV No. 2; however, they propose to drill a well 660 feet from our lease line, and based upon this pressure analysis and the high permeability in this reservoir, we would -- we think the preponderance of evidence indicates that it would certainly drain our acreage if not restricted on production.

Q Now I'd refer you to what has been marked as Exhibit Number Six and ask you to explain it.

A Exhibit Number Six is our calculation, or planimetered calculation, of the acre feet underlying the south half of Section 25 and the acre feet underlying the east half of Section 36.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Section 25 --- the south half of Section 25 has some 16,519 acre feet of pay.

The east half of Section 36 has some 1630 acre feet of pay.

The ratio of those two is .099, or 9.9 percent. In other words, the east half of Section 36 has 9.9 percent as much acre feet as does the south half of Section 25. We think that a fair allowable restriction would be to restrict their production to 9.9 percent of their deliverability. Deliverability tests should be taken every six months and witnessed.

One other possible procedure to restrict allowable is suggested. If the Commission considers this too complicated, a procedure that we would -- another procedure that we would suggest, would be a simpler one.

Our State BV No. 1 averaged 10,156 Mcf a day for February, March, and April of 1980. 9.9 percent of this rate would be 1005 Mcf per day. Therefore, I would propose a maximum allowable for the Amoco proposed well of 1005 Mcf per day.

This has a couple of advantages besides being simpler. One being, I believe, that their witness testified that sometimes deliverabilities may not be exactly proportional to amount of net pay, and this is true and I agree with it. This formula would circumvent that and would

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

similarly give them a productive rate that would -- that would not drain our acreage, in that it would be 9.9 percent of our productive rate.

Q Is it also your opinion that the reservoir by continued production would continue to be depleted and this latter formula that you've suggested, as I understand it, would not also be subject to some sort of decline formula? Why do you think that would be fair?

A Well, it is true that once the reservoir starts depleting, they would still have a limit of 1005 Mcf per day and they could get -- and they would, in all likelihood, get to the point to where their productive rate was more than 9.9 percent of our productive rate.

But I think it's the best formula based on simplicity and also that it does not encounter the deliverability problem.

Also, there has been some production taken out of -- obviously out of the reservoir prior to their drilling the well. Of course they were free to drill it at any time. But this would in some manner compensate previous production.

And that's why we were willing to agree to it, even though at this time that formula would result, probably, in slightly more than 9 -- than them recovering more than 9.9 percent.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q And as I understand your testimony, this formula and this restriction that you're proposing would only affect any production from the zone two that we've been discussing. If their well indeed was productive in zone three, what would your feelings be in that respect?

A There again, we are just interested in protecting our correlative rights in Cycle Two, and as I've previously testified, the reasoning being it's a very highly permeable reservoir and the drilling of a well 660 feet from our -- south of our line, would certainly affect our acreage and cause drainage.

Now, Cycle Three is more in line, based on the open flow potentials and the productive history of wells in this area in Cycle Three, permeability in it is more like an average well, .5 to 3 millidarcies, and very little, if any, drainage would occur as a result of producing that well in Cycle Three. Therefor, if they produce only in Cycle Three, we would not recommend any -- any restriction.

However, since Cycle Two is the most permeable zone, if they produced in both zones, we would still recommend the restriction as previously outlined.

Just -- I would like to just briefly say that, again, I've pointed out several times that we have a reservoir here that has an average permeability of 50 millidarcies compared to .53 millidarcies in the average Morrow

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

well.

We're not normally opposed to non-standard locations, because when you have these low permeable reservoirs we don't feel that non-standard locations violate correlative rights, or don't generally violate correlative rights; however, this is not the case here. To allow a non-standard location in a high permeable area such as the BV channel in Section 25 as proposed by Amoco without an allowable restriction, would cause uncompensated drainage and violate our correlative rights.

Q Am I to conclude that it is your opinion that the granting of Amoco's application in this case without a severe allowable restriction would be in the -- to contravene the prevention of waste and the protection of correlative rights?

A That is correct.

Q Were Exhibits One through Six prepared by you or under your supervision?

A Yes, they were. I would like to make one other statement.

We did calculate the reserves under the east half of Section 36 in our Cycle Two channel, and the current reserves we estimate -- or current gas in place that we estimate, excuse me, is 1.4 Bcf.

Q Okay. Anything further?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A No, except the exhibits were prepared by and under my supervision.

MR. LOPEZ: I would move the introduction of ARCO's Exhibits One through Six.

MR. STAMETS: These exhibits will be admitted.

MR. BUELL: Would you note my exception to the admission of Exhibit Four and Exhibit Six, please, Mr. Examiner?

MR. STAMETS: We will note this, Mr. Buell; however, the Examiner feels that we can't consider this case in a vacuum, and he needs all the information he can get.

A May I make --

MR. BUELL: May I take Mr. Tweed now?

A Can I make one other statement?

MR. STAMETS: I don't think that he's quite through yet.

MR. BUELL: Oh, I thought he rested, I'm sorry.

A Well, just one brief one. I would point out, I'm not here to instruct Amoco on how to -- how to conduct themselves, but we -- this -- this Isopach map was constructed, we think, with good well data and we feel confident of the accuracy of it.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

In the event that Amoco drilled that well and found something substantially different than what we anticipate that they would find, I think either they or we would have recourse to ask for a re-hearing and open it back up based on new evidence. And we certainly don't -- don't see anything wrong with that, that so the partners -- Amoco owns, as I think I testified, some 32.8 percent of this unit, and as one of the working interest owners in this unit, we would request that the Commission establish on what premise that Amoco is going to get to produce this well so we could figure or not figure the economics of whether or not we want to join on it; to base our decision.

Q And what was your interest, ARCO's interest in that?

A Ours was very minor; just 3.1 percent; however, the other partners in Section 25 also have an interest in the Empire South Deep Unit.

Q Okay.

MR. STAMETS: Does that conclude your direct testimony?

A Yes, sir.

MR. STAMETS: Mr. Buell wishes to ask you some questions.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

CROSS EXAMINATION

BY MR. BUELL:

Q. Mr. Tweedy, to your knowledge has the Commission established a Morrow Cycle Two gas pool?

A. No, sir.

Q. To your knowledge has the Oil Conservation Division established a Morrow Cycle Three gas pool?

A. No, sir.

Q. There must be a Cycle One in your scheme of things somewhere --

A. And also a --

Q. -- and you're not starting off with Two.

A. Also a Cycle Four.

Q. But Cycle One doesn't appear anywhere on your exhibits here, does it?

A. No, sir. As pointed out by your witness, you intend to attempt to drill a well to encounter the BV channel, which we call Cycle Two, and our concern is protecting our correlative rights in this sand channel. And that's what we've presented evidence on.

Q. And I believe in your closing remarks, they weren't in response to a question from Mr. Lopez, but you said you realize that your net pay sand could be wrong and that our 21 Well could come in quite differently from what you're predicting.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. No, I wouldn't agree that that's what I said. I said --

Q. Well, what did you say?

A. I said that I feel that the net sand map is quite accurate and it's based on good well control; that should your well come in a lot differently, that I think we -- than what is anticipated at this time, that we would both have recourse to re-apply to the Commission for redress.

Q. Do you think that would be more fair a way than us drilling the well and then if you thought your correlative rights were being violated by the amount of net pay or the lack of net pay, for you to call a hearing?

A. There -- I don't completely understand your question, but --

Q. Well, I'll restate it --

A. Okay.

Q. -- so that you can.

What you're recommending is that we go ahead and drill this well under a penalty.

A. Uh-huh.

Q. And if we get more net pay than you predicted, about what have you predicted here? I don't want to refer to your Exhibit Four any more than I have to, but --

A. Okay, it's slightly over 30 foot of net pay.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q About 33 feet?

A No, I would say in the neighborhood of 33, 34 feet.

Q All right, what if it comes in with 100 feet?

A If -- we're playing a what if game. There again, I think --

Q You're playing a what if game with your Exhibit Four --

A No, sir.

Q -- where you're saying what our net pay will be, aren't --

A There again --

Q -- you?

A There again I'd point out control points. Your Empire South Deep Unit No. 19, which had zero net pay. The Yates Empire South Deep No. 13 that had zero pay in the channel. The Empire South Deep No. 5 that had 10 feet, and our State BV No. 1, that had 104 feet. With that much control and in that much of an area, it is my conclusion that that map's not going to change substantialy. I just threw that out just in case it does, I think that's a redress.

Q Yes, sir.

A I don't think it's going to change sub-

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

stantially.

Q I realize you just threw it out and anything you just throw out is subject to cross examination.

A Yeah.

Q So really what you're recommending is this well be drilled under a penalty.

A. Yes, sir.

Q And that if we have more net pay than you predicted, then we could call a hearing and have an adjustment.

A. I think that would be a --

Q Do you think that would be more fair than us drilling the well and if we have an amount of net pay that you think would violate your correlative rights in 25, you calling a hearing?

A. Yes, sir, I think it would be.

Q Why would it be?

A. Well, there's a number of things that are left out. First of all, what would be your allowable in the interval? If you're allowed to produce that well at an unrestricted allowable, we would suffer drainage in the interim time in between the time that time that the well was drilled and completed until a new hearing was called and an order was issued by the Commission.

Q All right, I'll --

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. That I would wish to avoid.

Q. I realize that could happen, but you know the Oil Conservation Division is pretty quick with setting a hearing and pretty quick on acting.

A. Sir --

Q. Let me ask you this. Let's assume -- I'm going to have to ask you a question about Exhibit Four.

A. Okay.

Q. Do you consider Exhibit Four, particularly in the area of the northeast portion of Section 36 is highly interpretive?

A. No, I don't consider it highly interpretive with the amount of control that we have in the area.

Q. Well --

A. No, I don't consider it.

Q. Well, do you even think it's interpretive?

A. All -- all net pay maps are to some degree interpretive.

Q. Yes, sir. Let's just march through your exhibits one by one.

Your Exhibit Number One, which is a copy of your Exhibit Eight, is that not correct?

A. It's similar to Exhibit Eight. It does not have the shaded areas of Exhibit Eight had on it.

MR. LOPEZ: For the record, Exhibit Eight

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

in the Hartman hearing.

Q And Amoco's Exhibit Four. The only difference in this and Exhibit Eight as introduced at the June 5th hearing is that you didn't shade in green within the -- up structure of the 40-foot contour of the BV channel, right?

A I think also -- I don't believe that we showed the boundary of the Empire South Deep Unit on the Exhibit Eight.

Q Let me ask you this. Is it an accurate presentation of our Exhibit Four at this hearing and your Exhibit Eight at the June 5th hearing with regard to Section 36 and 25?

A Yes, sir.

Q What about Section 31?

A Now you said is it an accurate --

Q Yes, it's identical to our Exhibit Four and your Exhibit Eight.

A Yeah, it's identical in those sections.

Q All right, what about the southwest portion of Section 30?

A Yes, sir.

MR. LOPEZ: Mr. Examiner, I thought Mr. Buell said it was late in the evening. We said this is the identical map as Exhibit Eight and Exhibit Four. I don't --

MR. BUELL: He said it was the identical

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

map and then he starts crawfishing away from that position and I just wanted to pin him down, Mr. Examiner, in our area of interest.

MR. STAMETS: I think you're -- you're doing fine. Let's get to the area of interest.

MR. BUELL: All right, sir. I wanted to pin that down.

Q Now let's go to your Exhibit Two, your cross section. I believe you said it was no material difference from our cross section.

A Except that it does include one lower well that your cross section didn't include.

Q A dry hole.

A Yes, sir.

Q All right, sir, now your Exhibit Three, you said it was similar to our Exhibit Three, did you not?

A Yes, sir. There again, I said it's similar. I don't recall what wells your Exhibit Three had in it. I do know that they had these two wells.

There again, ours had the Empire South Deep Unit No. 19, No. 5, and No. 13.

Q All right, sir, nothing material on either of your cross sections that contradict or contravene our direct case?

A And I'd say vice versa.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q All right. Go to your cross section and tell me how they in any way contravene or contradict anything we put on direct.

MR. LOPEZ: The comment, Mr. Buell, was vice versa. Yours support ours; ours support yours; they are the same.

MR. BUELL: That's what I'm trying to get him to say.

Q All right, sir, now I'm going to jump -- so far we have no areas of contradiction or contravention.

A I would mention one point. In your -- in your witness' direct testimony, in his direct testimony he did not point out the fact that the -- that the lower part of the sand in the Empire South Deep Unit No. 5 was wet, which I did in my direct testimony.

But the two exhibits were the -- were similar.

Q I think that was covered, if not on direct, on cross.

A It was.

Q All right, sir, I'm going to jump now into your Exhibit Five, jumping Exhibit Four.

A Okay.

Q Let's talk about pressures for a minute.

A We can do that.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q I believe you made a point of the fact that your initial pressure on your State BV No. 1 was some 250 pounds lower than the initial pressure on our Empire South Deep Unit 5.

A Yes, sir.

Q That bottom hole pressure you're reporting of 4037, what kind of a pressure was that, Mr. Tweed?

A It was a build-up reservoir pressure. Due to the permeability in this reservoir, these pressures have built up in less than an hour and stabilized.

Q Was that pressure taken through a drill stem?

A This one was a drill stem test.

Q Yes, your 4037 was a drill stem test?

A Yes, it was a drill stem test.

Q Do you as a reservoir engineer have a great deal of confidence in a drill stem test pressure?

A I do in this one. There are drill stem test pressures that I don't. It depends upon whether you have problems or don't have problems in a drill stem test pressure.

I might add that this was confirmed by our reservoir pressure when we took a 4-point test of this well.

Q Confirmed by what pressure?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. By our -- when we took a 4-point test on the well, calculated absolute open flow, we shut the well in and took a build-up reservoir pressure, and it was within 15 pounds of what this is.

Q. Had your well produced before you took your 4-point pressure?

A. A minor amount of gas. We blew it to a pit to clean it up, then shut the well in, hooked it into a gas line and then took our 4-point test.

Q. Why didn't you have that 4-point pressure on your Exhibit Number Five?

A. I'd be happy to furnish the Commission with it, if they so desire. I don't have any objection to furnishing it.

Q. Will you just do this for me and then we'll move on? Would you go over and look at your cross section and look at your log on your State BV No. 1, and look at the caliper log, and tell me whether or not in the pay interval you have a pretty good mud cake?

A. Yes, we do have -- I can't qualify your pretty good size, but we do have a mud cake build-up.

Q. Could that mud cake build-up result in your drill stem test pressure being some 250 pounds below the original pressure on our No. 5?

A. May I take my seat again?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q Yes, sir, please, I'm through with the cross section.

A No, sir, it would not. When you lose fluids into a reservoir, such as mud filtrate, which causes your mud cake to build up, if it distorts your pressure at all, what it does is tend to give you a slightly higher pressure than you would normally anticipate; not a lower pressure.

Q Could you explain that a little for me?

A Okay. It's -- it's simple that when you put fluids into a formation, that you build the pressure of that formation. When you take them out of a formation you reduce the pressure.

When you drill a well, you subject the formation to mud. Some of the mud filters out into the formation and you get a mud cake build up. That's what causes your mud cake buildup. That liquid that filters in sometimes causes a slightly higher pressure right around your wellbore, and sometimes you will get a slightly higher pressure than actual reservoir pressure.

Q Don't we have a log that tells us how much of the formation has been penetrated by filtrate?

A Not -- I wouldn't say accurately. We have -- we have logs that do indicate zones that are -- whose resistivity are affected by mud filtrate.

So you can get an idea. It's not --

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q Mr. Tweedy, in your opinion, the mud cake of the magnitude that you saw on your log when you looked at it, would not in any way block or impede the flow of reservoir pressure into your bomb in your drill stem?

A Here again I'm quoting from memory, and I can get the exact facts if it's of interest. But in this particular case, when we drill stem tested that well it flowed at a rate of 25-million cubic feet a day, and we had something like 70 pounds drawdown between buildup pressure and flow pressure at the bottom of the hole. The rest of the pressure was due to friction of the drill pipe. That is an extremely high flow rate and it indicates a very, extremely permeable formation, which is the reason that I don't think that the mud filtrate -- mud filtrate or the mud cake had any effect on the test or the pressures.

MR. BUELL: I'm going to state for the record that I'm doing this without prejudice to my objection. I don't know how much weight that is, but let me at least clear my own skirts by making that statement, and I realize the hour is late and I'm going to be as brief as possible.

Q Mr. Tweedy, one general impression I got from your Exhibit Number Four --

MR. LOPEZ: It's Mr. Tweed, Mr. Buell.

MR. BUELL: What's the matter?

MR. LOPEZ: Mr. Tweed.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. BUELL: Believe me, that -- I apologize.

A. You're excused.

Q. Jerry, one general impression I got from your Exhibit Four, and I'd like for you to take -- I believe it's more readily discernable if you would look at our Exhibit Four at this hearing for this question I'm going to ask you. I might ask the Examiner to do the same thing.

I couldn't help but make the general observation that you very closely, with your zero net pay line, followed the 40-foot contour interval on our Exhibit Four in the area of Section 25.

But then when I looked down into the east half of 36, and the west half, for that matter, and I looked down into Section 31, I notice you had parted --

A. Yes, sir.

Q. -- from that, and there is a great variance between your zero Isopach line in the east half of 36 and 31.

A. Yes, sir.

Q. Could you explain that, please?

A. Yes, I'd be happy to.

As I previously testified, a net pay Isopach map is an Isopach map of the gas-bearing sand, and there again, in the Empire South Deep Unit No. 5 all but the top 10 feet of that sand was water-bearing.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone: (505) 455-7409

And as I previously testified, in the south half of 36 all of that sand is below -- if any exists in that channel -- is below the gas/water contact.

Q All right, now we're going to have to take this bit by bit, I can see that. I was hoping we wouldn't have to.

I'm going to direct your attention to Section 25 on your Exhibit Four --

A Okay.

Q -- and Section 25 on our Exhibit Four.

A Okay.

Q Do your zero Isopach lines very closely follow the 40-foot contour line on our Exhibit Four?

A They -- they closely do. They don't precisely follow it, but they're --

Q All right, sir. Now let's go down to Section 31.

A Okay.

Q And I'm going to ask you to just look at the north half of Section 31.

A Okay.

Q The zero Isopach line on your Exhibit Four, and the 40-foot contour line on our Exhibit Four.

A Yeah.

Q Just in the north half, now, would that

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

not put me above any gas/water contact?

A No, sir, there in the north half of that section, a great -- the preponderance of that sand is below the gas/water contact. There is some sand above the gas/water contact, as shown by the net pay map, but the preponderance of it is below the gas/water contact.

Q All right. Jerry, let me ask you this. Are you making the gas/water contact follow the 40-foot contour interval on our Exhibit Four and the zero Isopach contour on your Exhibit Four?

Is that what you're doing?

A No, not precisely. There again, I'd point out that there is no such thing as pay below the water table. There is no pay below the water table.

Q Is there --

A Any sand that exists below that water table is not shown on net pay, and that was taken into account in drawing this Isopach.

Q If there's one thing this poor old lawyer knows, he knows that.

A Okay.

Q Now I'm asking you --

A That seems to be the bone of contention.

Q I'm asking you, how did you orient your gas/water contact in Cycle Two in Section 31?

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. How do I orient the gas -- based on structure.

Q. Does --

A. -- and it's encounter of the sand bed.

Q. The structure -- you're familiar with the structure of this. I'll introduce an exhibit, if you'd like me to.

A. Oh, I've got one.

Q. Does structure of the Morrow sand bear any relationship to your Isopach of Cycle Two?

A. Structure was taken into account in drawing the Isopach in those --

Q. How?

A. In those parts where the sand was below the gas/water contact.

Q. I'm sorry, Mr. Examiner.

MR. STAMETS: That's all right. I had some questions along this same line. In Section 31 on the old ARCO Exhibit Eight --

A. Yeah.

MR. STAMETS: Amoco Exhibit Four, that --

A. 78 feet.

MR. STAMETS: That area between the contours is a wide band and yet -- and you sort of follow the contours in Section 25, in Section 31 you narrow that in

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

quite a bit. You don't follow the outer boundaries of that band. I know that I wonder why and I assume that you wonder why.

A. Okay. It's due to two reasons, the best I can explain it. One is that you do, when you go down structure you do have part of the sand below the gas/water contact and part of it above it, and therefor you wouldn't expect that we would follow the 40-foot gross sand because some of that 40-foot gross sand is below water.

Okay, the other reason being it at least attempts to follow a known -- known point, such as Empire South Deep Unit No. 19, which has a zero pay in it as net pay is indicated by their -- by their production tests.

MR. STAMETS: Well, that's another thing that concerned me. You've got zero pay there but you don't draw your zero contact line through that.

A. Well, okay. You -- I think that you realize -- I'd point, to explain that, to Empire South Deep Unit No. 13. You note that we got a zero point there and also on No. 7?

MR. STAMETS: Uh-huh.

A. You can have a wide area of zero line that you wouldn't -- and you wouldn't draw a zero point through all of them because that --

MR. STAMETS: I think that would be true

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

under normal circumstances but would you think that is the case with as wide a channel as you've drawn in Section 25?

A. There again I think this -- this was not only below the gas/water contact, the sand that was encountered in Empire South Deep Unit No. 19 was non-permeable. Based on that I would think that you would have to give some distance from that point before you would encounter permeable sand above the gas/water contact, any permeable sand at all. And that's all my contour map shows.

To draw it right next to the well would imply that you could go 10 or 15 feet away from this well and hit net pay, and I don't believe that that's the case.

MR. STAMETS: Is it possible?

A. It is possible and that is one point that is somewhat interpretive, but I believe that it would only change your volume very little if you adjusted those lines that way.

MR. BUELL: Would you identify this as Amoco's Exhibit Number Five in this case.

(The reporter marked Amoco's Exhibit Number Five for identification.)

MR. LOPEZ: Are we going to introduce that from our witness? What are we doing?

MR. STAMETS: We'll find out whether we

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

are or not. Nothing's happened yet.

MR. BUELL: Off the record.

(There followed a discussion off the record.)

MR. STAMETS: Mr. Buell, I believe you're ready to do something here.

MR. BUELL: Yes, sir.

Q Jerry, I've handed you a copy of a structure map that's been identified as Amoco's Exhibit Number Five.

A Uh-huh.

Q And to cover identify it for you, I will tell you that it is an exact copy of the Exhibit Number One introduced by Hartman in Case 6927 on June 5th, '80, that was a companion case to your Case 6928, which we're referred to many times here today, and do you know a Mr. Lindquist with ARCO?

A Yes, sir, I do.

Q Is he a geologist?

A Yes, sir, he is.

Q In order to be completely fair, let me hand you a copy of the transcript of Case 6927 and Case 6928, where Mr. Lindquist's testimony starts. He is qualified

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

starting on page 101, and you can start reading there, if you want to. Then on to 102, and I will direct your attention to the upper portion of page 103, where Mr. Lindquist says that his structure map is essentially the same as Mr. Hartman's, and he's referring to Exhibit Number One.

MR. LOPEZ: Mr. Examiner, again I think the record speaks for itself and --

MR. BUELL: I want your witness to be satisfied that he's not doing Mr. Lindquist an injustice, Mr. Lopez. It won't take him a second to read it and that will eliminate all arguments, and if your witness has any questions but what Mr. Lindquist adopted that, he can so state.

A He does say it's essentially the same as Mr. Hartman's.

Q All right, sir, would you -- Mr. Lopez, would like for me to get the file on this case so that you can be satisfied?

MR. LOPEZ: No, no, Mr. Buell. I'll be glad to --

Q All right, sir --

MR. LOPEZ: -- raise any objections I have to its introduction.

MR. BUELL: I haven't offered it yet. I've just identified it.

MR. LOPEZ: I assume that's why you were

marking it.

MR. BUELL: I'm going to introduce it.

MR. LOPEZ: Okay.

MR. BUELL: I always go through an exhibit so people can think of their objections to it.

MR. LOPEZ: I was waiving any in advance.

Q. Jerry, let's look at three exhibits now, Amoco's Exhibit Five --

A. In reference -- I would say one thing in reference to this contour map just -- just looking at it. The basic form of the contour there again is substantially the same as I would draw it. I have no way of knowing where he picked the top of the Cycle Two or where he picked the Middle Morrow, so I couldn't -- couldn't comment on the exactness of where the contour lines are.

Q. Do you have a copy of your structure map before you right now?

A. Yes, sir, I do.

Q. Is that a structure map of Cycle Two?

A. Yes, sir.

Q. May I substitute that for Amoco's Exhibit Five?

A. That would be fine. I don't have any objection.

MR. BUELL: I would submit this to the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone: (505) 455-7409

Examiner and withdraw Hartman Exhibit One, and substitute a contour map, structure map, on the top of Cycle Two prepared by this witness, may I do that?

MR. STAMETS: Yes, Mr. Buell.

(The reporter marked Amoco Exhibit Five for identification.)

MR. BUELL: This will be Number Five. I'm substituting this witness' contour map -- structure map contoured on top of Cycle Two for the previously identified Hartman Exhibit Number One.

Q. All right, sir, let's look now at Amoco's substituted Exhibit Five, identified as Amoco's Exhibit Five, your Exhibit Four and our Exhibit Four at this hearing here today.

A. Okay.

Q. And I want you, while you're looking at this structure map contoured on top of Cycle Two, to tell me how you can eliminate in the north half of Section 31 the contour interval on our Exhibit Number Four, 40-foot contour --

A. I think I understand what you're getting at now.

If you look at the 40-foot contour line,

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

looking at your Exhibit -- what is it Four or Five -- if you look at the 40-foot contour line that goes through Section 31 and on into 36, do you see that?

Q Yes, sir.

A Okay. Essentially, if you connect that with the one that crosses the corner of Section 40, that would then correspond to my net Isopach map, do you follow that?

MR. LOPEZ: You mean Section 25?

A Yeah, the 40-foot contour line that crosses the southwest corner of Section 25.

Q Well, I think you're getting a little ahead of me, Jerry. What I'm trying to determine is how you have made the gas/water contact in the north half of 31 conform to your zero contour line on your Isopach on Exhibit Four?

A Okay, I think I can explain that again. There again, if you connect those two then you essentially get a control, the type of control point that I used in the net Isopach map.

You'll note that on the gross sand in Section 36 that the line that splits Section 36 in half, running north/south, that the gross goes from 40 to 60 to 40 through there. It is my considered opinion, based on what evidence that I've seen, that there is no commercial net sand

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone: (505) 455-7409

in that interval.

Now, if Amoco or somebody else would wish to drill in that interval and prove me otherwise, we certainly wouldn't object to a location --

Q Are you talking about the interval colored in green in the east half of Section 36, or the interval in the east half of 36 that looks like a nose coming in that's uncolored?

A I'm -- I'm referring to the interval in the east half of 36 that's the, I guess you could best refer to it as the west half of the east half.

Q Are you impeaching Mr. Johnston's exhibit introduced at the June 5th, 1980, hearing?

A No, sir, I certainly am not.

Q You just don't choose to follow it, then.

A No, sir, I am following it. He picked 60 feet of gross sand in there, and his testimony was that up in the northwest part of this channel he thought that you had to have in excess of 40 feet of sand to get a commercial well.

As my testimony has shown, down in the southeastern part of the channel some of that gross sand is below water and you could -- you could encounter a gross sand thickness bigger than 40 feet and not encounter productive sand.

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Similarly, it is my interpretation that that area on the --- essentially the west half of the east half of Section 36 does not contain commercial sand. There again, we would not object to a location in that area. I'd say it looks like it would be at least 1320 feet from our lease line and I'd say 660 from the center line, in there some place. We wouldn't object to a location in there --

Q Yes, sir, I think we've gone into that and let's get back to your gas/water contact.

A Okay.

Q I'm going to ask you to draw on my copy of your Exhibit Four at this hearing a line across Section 31 in the compass direction and at the -- whatever elevation you think you could make a completely water-free completion in the Cycle Two zone.

A I might state -- state one problem with that and then we'll get on. I hate to be this picky, but I stated in my testimony that the original gas/oil -- or gas/water contact was at a -7148 in the sand. I also stated that that well is now making substantial amounts of water above that interval.

I can draw the initial gas/water contact in there but I could not tell you precisely at this time where the present gas/water contact is.

Q All right, would you draw, again on my

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

copy of your Exhibit Four at this hearing the compass direction and the angle that you think the original gas/water contact traversed Section 31?

A. I'd like to point out that in Amoco's Empire South Deep Unit No. 5 the top of the sand is some 60 feet below the top of Cycle Two. The contour map is drawn on the top of Cycle Two.

Now, that interval will vary somewhat in between each well, so all I'm going to draw is just a general line, and this may take a minute or two.

Q. Take your time. I think it's extremely critical to your Isopach. I want you to be satisfied that you're doing it the way you want to do it.

A. Our -- let me understand your question again. Did you say that we could make a water-free completion in Cycle Two?

Q. Yes, sir. But you said you couldn't do that so I'm asking you now to do what you said you could do, and that is show the compass direction across Section 31 of the original gas/water contact which you've identified as --

A. Okay, you said the compass direction across there.

Q. Yeah.

A. Okay. There again, I'd like to point out that in this interval the gas/water contact traverses the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

sand in some areas, so there's some sand above it and some below it. Whether you could get a water-free completion might depend on your completion method.

Q Well, you've already said you couldn't do that, and I've accepted that you couldn't do it. Now let's get back to what you can do.

A I have -- there again, I have two problems with this. I guess I'm going to have to check one other thing before I draw it.

Q I don't think you will if you'll look at our Exhibit Five, your structure map.

A I pointed out that there were 60 feet interval between the top of Cycle Two and the top of the sand in the Empire South 5 shown on the cross section. The Empire South Deep No. 19 there's 124 feet in between the top of Cycle Two and the top of the first sand interval. I think -- I believe the Commission can see my problem there. The interval in between those wells, in between the top of the sand and the top of Cycle Two is thickening, so to draw -- all I can do is just draw a very vague general direction, because you have both things occurring. The interval in between there is thickening and your -- and your structure of Cycle Two is occurring. If I'd known this was going to be a problem I guess I could have drawn one on the top of Cycle Two sand, which would have been a little more dependable, but with that

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

in mind, I would just draw the general direction. I guess that's along strike. The dip is this direction. This lower end --

MR. LOPEZ: Dip in what direction?

A. Down dip is being to the southeast and up dip to the northwest, or north/northwest, generally, and along strike being south/southeast -- or south/southwest, excuse me, -- west/southwest, excuse me, to east/northeast.

Q. Could we --

A. There again, it's just very general.

Q. And to make it a little more simple, looking at our Exhibit Number Five, your contour on top of the Cycle Two --

A. Yes, sir.

Q. -- your structure map, assuming that there is no change in dip, angle, or anything else if we go through on structure, from that 60 feet, the top of Cycle Two, to the top of the BV channel in our Well No. 5, assuming that to be the case, that structure on the top of the BV channel is the same as structure on top of Cycle Two, some 60 feet above it, normally you don't have many rapid structural changes over a 60-foot interval, do you?

A. Well, I just testified that between the Empire South Deep Unit No. 5 and the No. 19 that the interval went from 60 feet to 124 feet, so you've got that much of an

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

interval change in that distance.

Q. The fact that you have a difference between the top of the BV channel and the top of the Cycle Two doesn't necessarily mean you've got a lot of change in structure, does it?

A. Well, the contour -- well, you'd have that much -- it depends on what you're contouring. If you're contouring the top of the sand, you'd have that much change in structure on the sand body.

We -- this particular map is contoured on the top of Cycle Two interval.

Q. All right, I want to be completely fair to you, and I'm going to ask you to look at your contour map on top of Cycle Two structure.

A. Yeah.

Q. Our Exhibit Number Five, and assume for the purpose of this question that there is no change in structure ~~contours during~~ that 60 feet, and following your contour, your structural contour across Section 31, show me the attitude that the gas/water contact would take across the southwest portion of Section 31.

A. Well, that's a fair amount of assumption. If you make those assumptions, which I don't agree with are in the case here, the gas/water contact follows your contour line, and if -- had we contoured on the top of the sand, the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
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gas/water contact would precisely follow the contour line.

Q We don't have such a map so we've got to make do with the best we have.

A Yes.

Q And I'm asking you to assume, and I believe you stated you do not agree with the assumption, but it's perfectly permissible to ask an expert witness, such as you, to assume.

A Yes, sir.

Q Assume there is no structural change in that 60-foot interval from the top of Cycle Two to the top of the BV channel in our No. 5, and looking at our Exhibit Number Five show me the compass angle that the gas/water contact would be found across the southwest portion of Section 31.

A If that were the case, it would fall at a contour line, it would go along the contour line, and the contour lines on this map run in a general northeast/southwest direction.

Q All right, and at a very short angle, does it not?

A Yeah.

Q So would you approximate for me on my copy of Exhibit Four the -- is there such a thing as a compass angle? I guess there is. The angle that gas/water contact, original gas/water contact would be at through the southwest

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

quarter of Section 31.

A Northeast/southwest direction.

Q All right. Now that is the double-headed arrow you've drawn on my copy of Exhibit Four in the southwest quarter of Section 31?

A Yes, sir, that's true.

Q Does a gas/water contact, if one is present, does it follow structure or a net pay Isopach?

A It follows structure.

Q So your Exhibit Four -- your Exhibit Four doesn't necessarily -- the contours on your Exhibit Four, that doesn't necessarily show us in any way where a gas/water contact would fall either in Section 31 or Section 36 to the west.

A That's true. And also in other parts of it, Section 26 we show zero sand, and all of that section is above where a gas/water contact would exist. There just doesn't happen to be a net pay section in parts of that section.

Q And looking at your contour map, our Exhibit Five, on the top of Cycle Two, and it's Cycle Two we've been talking about, don't throughout Sections 31, 36, 25, 26, aren't your contours generally in a northeast/southwest direction?

A Yes, sir, they are.

Q And I'll hand you now --

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Rt. 1 Box 193-B
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Phone (505) 455-7409

A. I've got a copy of it, if that's what you want.

Q. I don't think I'm even going to identify this. I'm just going to ask you --

A. What -- could you for my edification tell me what his dotted lines on -- heavey dotted lines on there represent?

Q. That's where they swung the BV channel up into Section 24.

A. Is that where they're saying the limits of the BV channel are?

Q. That's what the record reflects they said.

A. Okay, I would also point out that they show a very limited -- if you extend that line in a logical direction, they'd show a very limited amount of sand in Section 36.

Q. Yes, sir, they sure do. They show a very narrow BV channel.

A. I might add that I have been quite a bit more generous in my net Isopach map than they are in this.

Q. Yes, sir, I'll agree with you. There's only one thing that worries me, you've been even more generous in Section 25.

A. Than they have.

Q. Yes, sir.

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Rt. 1 Box 193-B
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Phone (505) 455-7409

A. According to my interpretation that sand's thicker there and it's thicker on your acreage.

Q. If you want to adopt the Hartman interpretation right here now, I'll adopt it with you gladly. If you'll take it in Section 25, I'll take it in 31 and 36.

A. I'll tell you what I will do --

Q. Let's make a deal.

A. I'll tell you what kind of deal I'm willing to make. You questioned whether or not my Isopach is correct. If you encounter sand, net pay sand, if you'll agree to use that formula and you encounter a net -- and take a penalty of 9.9 percent if you encounter 33 feet or less, we'll agree to that, and if you encounter more, we'll agree to adjust it by more. I've got that much confidence in my --

Q. Yes, sir, well, I know you're full of confidence. We're going to get to something along that order in just a minute. You're just rusing things a little with that.

A. All right.

Q. But I think there are others to consider, Jerry, in this Cycle Two pool other than Amoco and ARCO.

A. Yes, sir.

Q. Will you agree with me that Hartman Exhibit One introduced at the June 5th hearing, that his contours on top of the Lower Morrow are not the top of Cycle Two, top of the Lower Morrow, generally run in a northwest -- northeast/

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

southwest direction, like yours do on our Exhibit Five?

A. They generally run that way. They're a little steeper than ours, though, but they generally run --

Q. They look steeper.

A. Yes, they're steeper than ours.

Q. Okay, sir. Now I think we've agreed now that the gas/water contact would follow structure and not a net pay Isopach or a gross pay Isopach, and looking again at your arrow --

A. Uh-huh.

Q. -- and at your Exhibit Number Four, and let's assume the structure continues -- I'm asking you to assume again -- right on up into Section 36 at the same compass direction northeast/southwest, with that assumption would not more of Section 36 be above water than your zero contour Isopach on your Exhibit Four shows?

A. I think in trying to clarify this, I've stated again that the reason I drew that zero line in there is it is my conclusion that there is -- that there is no net pay southwest of that line. There again, if it's Amoco's conclusion that there is, based on their map, we would have no objection to them drilling, say, 1320 feet or more from our lease line along the west edge of their lease if it's their conclusion that there's net pay over there and that you can get a commercial well over there.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q That's at least the fifth time you've said that.

A Yeah.

Q I think it's well in the record and well in the Examiner's mind, and that wasn't the question I asked you.

A All right. I would -- I would point out just two things to that question.

Q Why don't you wait till I ask you a question.

A All right. I thought you wanted an answer to that first one.

Q I'm going to ask you upon what specific data you honored the 40-foot contour interval on our Exhibit Number Four to this hearing, and what specific data prevailed upon you to ignore the 40-foot contour in the area of 36 and 31. Now earlier you said this was due to the gas/water contact. I think we've blown that out of the tub. Now what other data do you have?

A I would like -- I'd like to clarify what I said before. I also pointed out that when you get in the south half of 36 that gas/water contact does cut across there and you would cut out part of that due to the gas/water contact. You wouldn't cut it all out.

Q All right, what --

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. And I --

Q. What data do you have that you can show the Examiner and this Oil Conservation Division, that the gas/water contact cuts across Section 36?

A. Okay. This takes time; I guess we've got it.

I would pick the top of the sand interval 10,828 in the Empire South Deep Unit No. 19.

But that gives me a top of the sand at a -7169. I testified, based on the log calculations and the well history of the No. 5, that the gas/water contact was -7148, so the Empire South Deep Unit No. 19, the top of the sand is some 21 feet below the gas/water contact.

Okay, you asked for a point in the north half of Section 36, I believe, where the gas/water contact was in the sand, and that's one.

Q. What did our completion test of the interval you're talking about in Well No. 19, that's the same interval that we showed as tested on our Exhibit Number Three, wasn't it?

A. According to your witness' testimony that no hydrocarbons were produced from that interval, and he also testified that -- I looked in our records and as a working interest owner we got the records. Our records did not show any water volumes, whether they were -- they just

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
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omitted any.

He testified that the well did not make any water; therefor, that test would indicate that it's tight, and based on that test it doesn't give you any additional information as to where the gas/water contact was.

Q It sure doesn't does it?

A. No, sir.

Q It didn't give up anything.

A. Didn't give up anything; it just indicates that the zone is tight and that there's no pay at that particular point.

Q That's right. Now I want you to tell me once again how Well No. 19 on a test of the BV channel zone, we're in agreement on that, aren't we?

A. Uh --

Q Well, no, let me finish my question. Are we in agreement that we tested through perforations in the casing the BV channel zone that you've been referring to on your exhibit Three -- Jerry --

A. Yeah, I would conclude that based on my analysis, that the gross sand does -- is continuous from your No. 19 up to the BV channel. Now, that well tested noncommercial in all hydrocarbons; had zero net pay.

Q And you agree with me that it gave up nothing?

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. Yes, sir.

Q. And I'm asking you, how does that prove to you that the gas/water contact is through Section 36 in the area of the Empire South Deep Unit No. 19?

A. I -- in this permeable sand it would be my conclusion that the gas/water contact would be found at a constant elevation. I based the estimate of where the gas/water contact would be, based upon a log analysis and well history of the Empire South Deep Unit No. 5. I did not use the No. 19. I was merely pointing out, based upon my calculation of where the gas/water contact is, that that sand in No. 19 is below it.

Q. Let's look back at our Exhibit Five, your contact on top of the Cycle Two structure.

A. Okay.

Q. And let's look at the arrow you drew for me on my copy of Exhibit Four in the southwest quarter of Section 31, and I want you to explain to this Examiner how the gas/water contact in the area of our Empire South Deep Unit 19, how the gas/water contact could be above it?

A. I believe I explained that before; that this Exhibit Five was contoured on the top of Cycle Two, and the No. -- Empire South Deep Unit No. 5 is 60 feet from the top of the Cycle Two to the top of the sand. In the Empire South Deep Unit No. 19 it's 104 feet from the top of Cycle

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Two to the top of the sand.

Although this well, I believe, is structurally higher than the top of Cycle Two, it is structurally lower on the top of the sand.

And we just calculated the structural position of the top of the sand.

Q All right, let's go back again. Assume for me for the purpose of my question with relation to Empire South Deep Unit No. 19, that the structure on our Exhibit Five, your contour of top of structure on Cycle Two, is accurately reflecting structure of the BV sand in the area of Well No. 19. Now I'm asking you to make that assumption.

Would not that put the gas/water contact way below the interval we tested in the BV channel zone on the No. 19 Well?

A Well, I -- there again, I think your question, I wouldn't agree with the wordinggoe it, but the reason that sand is below the gas/water contact is you gained interval. There is a portion of Cycle Two which is shale that is above the gas/water contact. Had you encountered sand in that portion, it would have been above the gas/water contact.

Q Jerry, maybe we can get at this this way. I realize you're trying to be responsive and I'm not trying to be difficult. The hour is late.

A The gas/water contact does cut through

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

the Cycle Two interval.

Q. Let me ask you this. Do you have any other evidence to present for the reason you did not honor the contour interval on our Exhibit Number Four in Section 36 and 31, as opposed to almost following it religiously in Section 25, other than the fact that you feel the gas/water contact in the BV channel zone is way high in Section 36 and apparently way high in Section 31?

A. Well, again, to answer that, in your Empire South Deep Unit No. 19 you encountered the sand in the lower part of the interval. Now, I anticipate that that's going to continue for awhile going back north and north and east, or due north. If it doesn't continue for awhile, then you'd have to assume that you have different sands, and it was -- the two weren't connected.

Also, as I said, it is my contention and my interpretation that in that interval between the two 40-foot contour lines in the center of Section 36, that no net pay exists. I'm referring to Amoco's Exhibit Four. There again this is based on channel trends. We see with our control that -- that the channels trend northwest/southeast and based upon Exhibit -- I believe that's Exhibit Three, cross section B-B', that the channel is quite narrow through that interval. We would not see it thickening out as much as would be necessary to encompass 40-foot contour lines across a

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

boundary between Section -- or across, say, the upper half of Section 36. It is somewhat interpretive, I'll admit it, but it's my conclusion that -- that there is no net pay sand there, down in that area. I think it would violate the general depositional trends.

Q So to that extent you're disagreeing with my interpretation of Mr. Johnston's comments on his Exhibit Eight at the June 5th hearing?

A Yes, sir.

Q So you're disagreeing with him, if I am interpreting what he said is correct?

A That is correct.

Q All right, sir, will you -- I'm sure you will agree with this, because your Exhibit Six, I believe it was, certainly shows it.

Would you agree with me that the way you have run your zero Isopach across 36 and 31 greatly -- greatly come in, by in I mean shrink in from the 40-foot contour of Mr. Johnston on our Exhibit Four?

A You could honor -- if you honored that 40-foot contour line everywhere, you would draw more net pay, if you so constructed your --

Q So to that extent when you have varied from this 40-foot contour interval, you have shrunk the net pay in 36 and 31.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A. I have also varied to some extent in Section 35 where I've shrunk the --

Q. Yes, sir, I'm coming up to Section 25 now.

A. -- net pay.

Q. And looking at our Exhibit Four here today, and your Exhibit Four here today, it would appear that the shrinkage that occurred in Section 25 is only in the southwest quarter of Section 25 and to a very small degree, is that correct?

A. It's only in the southwest quarter. I'd categorize it a little more than a very small degree.

Q. Well, it's obvious to the naked eye and it won't do any good for you and I to belabor the point. The Examiner can look at it and make his own judgment.

And if followed it religiously, almost identically, in the northeast portion of Section 25.

A. Yes.

Q. With little variance at all.

A. That's correct.

Q. And by honoring it to the degree you have in Section 25, you have increased your net pay, just like by not honoring it in Sections 36 and 31 you have diminished our net pay.

A. That is correct. I would state that I drew this contour map prior to knowledge of Amoco's hearing.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

I'd also state that Amoco's witness testified that this was the only place he could get a commercial well, if I interpret him right. There again, if Amoco thinks they can get a commercial well down in the southeast part of that section, we would have no objection to them drilling there.

Q Yes, sir. And now let's go to your Exhibit Six.

The only area covered by your Exhibit Four that is calculated or planimetered or whatever you did to it, and reflected on Exhibit Six, is the south half of Section 25 and the east half of Section 36, is that correct?

A That's correct.

Q Are there -- does your Exhibit Four show Cycle Two ownership in any other areas, other than the east half of 36 and the south half of Section 25?

A Does it show ownership?

Q Uh-huh.

A I don't believe the map really shows ownership. It shows operators.

Q All right, operators.

A It shows the operators of the State BV No. 2 and the BV 1, and a number of other wells. I think it shows the operators of all the wells on the lease.

Q And it also shows net pay up in the south-

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

west quarter of Section 24.

A Yes, sir, that's correct.

Q And on into the southeast quarter of Section 23?

A Yes, we and the contour lines in that general direction but --

Q You haven't closed them. You just left them open.

A Yes.

Q And in the northeast quarter of Section 26, that's ARCO ownership, isn't it?

A The ownership in Section 26 is identical to the ownership in Section 25, both royalty owners and operators.

Q And you also show net pay in Cycle Two in the southwest quarter of Section 30.

A Yes, sir.

Q You also show to a degree, net pay -- strike that to a degree. You also show some net pay in a small portion of Section 31.

A Yes, sir.

Q Then you introduce Exhibit Six and say if the Oil Conservation Division will follow your recommendation here and limit Well No. 21 to a million a day, that Well No. 21 will not confiscate any of ARCO's gas out of the south

half of Section 25.

A. Yes.

Q. Jerry, you talked a lot when you were talking about the pressure data on your Exhibit Five, of how dynamic a reservoir this was and how you almost had instant communication just like in a bathtub at home.

A. Yes, sir, I testified how good it was.

Q. So what goes on between the northeast quarter of Section 36 and the south half of Section 25 is not necessarily going to control and govern what migration trends are established and occur in this Cycle Two reservoir, is that not correct?

A. At the current time there are only two producing wells in that reservoir. If you drill your well, then certainly those three wells would control what happens in that channel.

Q. Do you think that all you'd have to look at is the relationship between our 21 and your No. 1 in the south half of 25?

A. Yes, sir, to protect our correlative rights between the two proration units.

Q. But what you want to do is protect equitably, protect correlative rights in this Cycle Two reservoir.

A. Yes, sir.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q Do you think that that alone will do it? That's what I'm asking you. Looking at all this vast area that you've shown as net pay in our Cycle Two reservoir, do you think just limiting our 31 to a million a day is going to protect everyone's correlative rights?

A. Well, there are other things to be considered, yes, sir. I don't -- and should be considered. I don't know how germane they are.

Our witness has testified that a drilling of a well 660 and 660 from our lease line up in Section 24 would violate our correlative rights.

I also think if -- if a well were drilled in Section 30, and Section 31, and not restricted that it would also affect the correlative rights.

Q. Really, you would like ideally for everyone just to produce their fair share of the reserves of the original gas in place, is that not true?

A. Well, I guess part of this gets into theory. I don't really know. We're not trying to get any more than our share.

There is two points here. One of them is the original gas in place and the other is current gas in place, and I have a difficult time, you know, like I said, Amoco has produced a well in that channel in Section 31 for a number of years before we drilled. So they have gotten some

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

production already.

Our intent is to protect the correlative rights and I guess the Commission would have to answer whether it's current gas in place or original gas in place.

We are certainly not -- our intent is not to take advantage of anybody over the current gas in place.

Q All right, sir, let me ask you this. Will applying a penalty to our well in the northeast corner of Section 21 of a million a day, as you recommended, will that in any way preclude or prohibit the gas currently in place, current reserves in the southwest quarter of Section 30, from migrating in the direction of your No. 1 well in the south half of Section 25?

A There are recoverable reserves, some recoverable reserves, I don't know if they're economically recoverable reserves, in Section 30, and as that reservoir is produced they will migrate somewhat.

Q Now in which direction would you think they would migrate, looking at your cumulative production from your No. 1 State BV Well?

A Certainly -- certainly they are going to migrate. At one time, there again, the Empire South Deep Well No. 5 was producing. At that time I'm sure they tended to migrate towards that well.

Now that we have these wells there, the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

entire pressure in the reservoir is declining, and I would assume that the predominance of the gas that's leaving that area is going towards ours.

Q So penalizing our well is not going to preclude gas migrating from the southwest quarter of 30 to your No. 1 Well.

A No, sir, it's not.

Q Will penalizing our well a million a day in any way keep gas from migrating out of Section 23 and Section 24 that you show as having net pay on your Exhibit Four in the direction of your well No. 2?

A I'm sorry, I'd like to get that question again.

Q All right, sir, looking at your Exhibit Four --

A Yeah.

Q -- and the net pay you show for the southwest quarter of 24, extending on up into the southeast quarter of 23, and looking at the northeast quarter of 26, even though you say it's the same ownership, is there any way a penalty on our well of million a day allowable permitted producing rate, will preclude gas from migrating in those areas in 24, 23, and 26, in the direction of your No. 2 Well?

A Or also in the direction -- the gas will migrate towards the area of production, and also some of it

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

would migrate towards -- towards the Empire South Deep Unit with your 19 producing -- or with your new well producing, it could migrate to your No. 5 producing.

I might add that according to our best analysis, the south -- the east half of Section 23 has substantial sand in it. I might also add that we have not hindered anybody from drilling a standard location on any of these tracts. It's up the operator to drill his wells and protect his correlative rights.

Q. Like we did our No. 5 that you referred to at least ten times in your testimony that we drilled it before you drilled your 1 and 2.

A. That's right. That is correct.

Q. Do you know what the cumulative was when our No. 5 Well, the discovery well that you referred to so often, was at the first of this year?

A. Yeah, 1.6 billion.

Q. And do you know what the cumulative was in your two wells?

A. I'd have to look that back up. It was .7 of a billion from our No. 2 Well and on the No. 1 Well, as I previously testified, some 7.2 billion.

Q. Quite a difference there.

A. Yes, there's quite a difference in net pay in those.

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Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Q Oh, I realize those, according to your Exhibit Four.

A And according to my best analysis.

Q So can you look at the Examiner and tell him when we look at all of the offsetting areas to your Section 25 that are shown to be productive by your Exhibit Number Four that you stand by and almost guarantee as to accuracy, could you tell the Examiner that unless our 21 is limited to a million day rate from its inception, that Section 25, ARCO's property, is going to suffer net uncompensated drainage?

A To the best of my knowledge that is the magnitude of the restriction that's necessary to prevent us from suffering uncompensated drainage.

Q Have you made a study to determine the amount of gas that is currently migrating from Section 31, from Section 30, from Section 24, from Section 23, from Section 26 into Section 25?

A No, sir, I have not.

Q Then how can you say that 25 will suffer net uncompensated drainage unless our 21 Well is limited to a million a day from the offset?

A Sir, if your well is drilled without a substantial allowable penalty, then it would set a precedent which would allow somebody to drill at a similar location in Section 31, Section 30, Section 24, 26, and 23, and such

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

wells would certainly result in flagrant violation of our correlative rights.

Q That did not answer my question.

A Well, I understand what you're getting at and I don't want to be -- if this was the only well involved I -- yes, and if Amoco is proposing that this is the only well they drill in their unit in this BV channel, we could certainly calculate what based on this Isopach map, what a reasonable productive rate would be to protect the correlative rights with that being the only well.

But I have not seen Amoco propose that that be the only well. They have -- they have produced another well in the channel and I assume that they would have recourse to recommend other wells in the channel, and to do so without a severe restriction would crassly violate our correlative rights.

Q What --

A Now --

Q Excuse me, go ahead.

A And so assuming -- I did make the assumption that there is a possibility that these other wells will be proposed, and I tried to propose a formula which would be equitable towards all locations.

Q What well is the Oil Conservation Division and this Examiner considering at this hearing today?

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

A They're considering that one right there, but if we consider just that proration unit and just ours which offsets it to the north, the formula which I proposed protects equity.

Q Yes, sir, I realize that, but I'm going to the facts of this case and not some wells that you're proposing and have no authority to propose or not propose.

MR. LOPEZ: Mr. Examiner, if I may interrupt Mr. Buell, it seems to me that he wants his cake and eat it, too.

Once he wants to talk about the offsetting correlative rights between the north half of 36 and the south half of 25, and then in computing what -- how our correlative rights are going to be damaged, he wants us to consider what benefit we might be getting from draining all the other offsetting sections.

It seems to me we can't go both ways; it's either one way or the other.

MR. BUELL: May it please the Examiner, I can answer that very simply.

The classic and legal definition of violation of correlative rights is for a property to suffer net uncompensated drainage.

The classical statutory and legal definition of net uncompensated drainage is drainage to one property

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

from a property that isn't compensated by drainage to another.

You have to have net uncompensated drainage to have violation of correlative rights or confiscation of property.

MR. LOPEZ: If I may respond to that, Mr. Examiner, it seems to me that the rules of the Commission and the statutes of New Mexico provide the opportunity for all offset operators to drill whatever wells they want to within the rules and regulations of the Commission.

MR. STAMETS: I agree with everybody so far and I don't understand what the argument is.

A. Well sir, I might add that it would be my conclusion if this well were produced without a restrictive allowable regardless of any other drainage in the area, that our correlative rights would be violated.

Q. Upon what study do you base that conclusion? You've already admitted you haven't made a study to determine the gas that's migrating to 25 from the southwest of 30; you have not made a study to determine the volume of gas --

MR. STAMETS: MR. Buell, I thought a second ago you told the witness you wanted him only to consider this one well.

MR. BUELL: Yes, sir.

MR. STAMETS: And I believe that

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

his answer is perfectly obvious when you consider this one well only, and you're not talking about -- now if you want to talk about this whole area, we're going to talk about the whole area. If we're going to talk about this one well, we're going to talk about this one well.

Now you decide which one way you're going to go.

MR. BUELL: Mr. Examiner, you misunderstood, and perhaps it's my fault for not being clear, but what he was saying, that this well by itself and no other, producing at its potential ability would probably not violate ARCO's correlative rights in Section 25.

What he was concerned about was a well being drilled in the northwest quarter of 31, the southwest quarter of 30, and that's when I said the only well we're looking at being drilled now is our 21 in the northeast of Section 36.

MR. LOPEZ: Mr. Buell, I think either the witness misspoke or was misunderstood.

Let's hear his answer to that question.

A. Well, there again it is my contention an unrestricted well in Section 36, as proposed by Amoco, would violate our correlative rights and would cause uncompensated drainage, regardless of what occurs in the surrounding area.

MR. BUELL: And that's when I asked him

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

how he could -- upon what data he based that conclusion as he had already testified he had not made a study to determine the incoming migration to Section 25 from the other areas outside 25 that he shows on Exhibit Four to have net pay.

MR. LOPEZ: And, Mr. Examiner, I would respond to Mr. Buell's comment in the fact that there's no point in considering the drainage from the other offsetting sections, because again we're going into all the other offsetting sections and the other offsetting operators rights to drill or not to drill, and that's not the issue before this Division today.

MR. STAMETS: I agree with you, Mr. Lopez. We've got to look at this thing as it is, plus whatever well you're proposing here, and not go beyond that boundary.

MR. BUELL: Mr. Stamets, I think I've made my points in the record for the purpose of which I wanted to, so I am now through with this witness.

MR. STAMETS: Very good.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Tweed.

A. Yes, sir.

Q. Looking at all this, I believe you've drawn this to show that there are only three wells completed

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

there in the BV channel, is that right?

A. Yes, sir, that is correct.

Q. Okay. Also looking at the lines, at the amount of acreage within the zero contour line, as you've drawn it on your Exhibit Number Four, and acreage which is within the Empire South Deep Unit, just eyeballing it, I'd say that there's maybe 320 acres in there.

A. Yeah, you mean in between the two of them?

Q. Between the three of them. I'm talking about Section 30, 31, of 17, 29, and 36 of --

A. Oh, okay, yeah, I follow you.

Q. -- 17, 20.

A. That would be a reasonable estimate.

Q. If Amoco had one well completed in that acreage and only one well, would you object to the well at the present location?

A. Before I -- they have recovered some gas. I would just have to calculate it, Mr. Stamets, to know whether we would object. Due to the fact that we have a thicker sand interval under our location than they have got under theirs, and the fact that have produced some gas out of that channel, I think we would probably still ask for a restriction. It certainly would not be as severe, but we would ask for a restriction on the same basis as we ask for one this time. In other words, we'd compare -- we'd then be comparing

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

our net pay in the south half of 25 to their total net pay in the three sections, and I --

Q What you would be asking for is a proration formula based on amount of net pay in a pool and that formula would have to be rejiggered every time a new well was completed in that pool.

A Unfortunately I don't -- I didn't see a way around doing something similar to this in order to protect correlative rights.

Q Is that practical or technically possible?

A It is certainly difficult.

Q Well, that's not what I asked.

A Okay.

Q Is it technically possible? Are we going to be able to draw these contours -- for example, in Section 25, I don't see a way in the world of drawing the final contour lines to the west because there are no wells upon which to base a contour line.

A Are you talking about Section 26 or --

Q Section 25.

A Oh, the west end of Section 25?

Q As you move to the west and southwest of where you've drawn your contour lines.

A Okay. Well, I think in Section 25, 36, generally in the south half of the channel, I think that the

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 435-7409

control at this time is adequate enough to draw a reasonable net pay map.

If people drill additional wells we'll have additional data, which I think will certainly be adequate enough to draw; it would certainly improve it.

Q What would you have, a pool committee which would consider this material and redraw the lines every time a well was completed and re-establish the allowable for all the individual wells you'd have regardless of the date of first production?

A I don't know. I hadn't really thought through it to that degree.

It is a cumbersome procedure. My main concern was between the north half of Section 36 and the south half of 25, at this hearing.

MR. LOPEZ: Mr. Examiner, if I might interject, I think the Examiner is asking the witness to come up with a response that perhaps the Commission can respond to, and the problem I have is that with every one drilled at the standard location in accordance with the rules and regulations of the Commission, we wouldn't be here today. What we're talking about is crowding production, and that's when we get into complexities and how to resolve those complexities, I don't know if any of us is here to answer. We've come up with one proposal which we think is fair and equitable.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

MR. STAMETS: I'm afrain that ARCO has proposed a process here which is totally unmanageable and could be very wasteful of human fiscal effort.

A Sir, I understand your concern and it's a real concern.

As I testified to, I think in the normal Morrow producing area, the permeability is such that you don't get the kind of drainage that you do in this BV channel. I think this particular sand channel is an exception and that you won't have this kind of case in every pool or I can't think of another -- of another Morrow reservoir where you would have this problem, because most of them don't have this high a permeability where they are -- where they do affect the offset wells to the degree that you do on this channel.

MR. STAMETS: A couple of years ago the Division adopted a formula for the allocation of production to wells and the allowable restricted because of locations in nonprorated pools. I don't know if you're familiar with that or not. I believe --

A No, sir.

MR. STAMETS: -- it was based upon the degree of unorthodox location, the amount of pay which was expected, and this came up with a porcentage which was applied against the well's deliverability which was calculated every six months, and set a minimum allowable of 1 million

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

a day.

Would you find that an acceptable formula to be applied to the well in this circumstance?

A. It -- I'm not familiar with the formula, but it sounds reasonable.

Q. Now, we've only been talking about one pay zone. Suppose that Amoco finds a different pay in their well. Will these maps that have been drawn here provide us any direction at all should that be the case, or are you concerned about any other pay zones?

A. Okay. I believe previously I've testified that if the well was completed in Cycle Two by itself, or either in conjunction with other zones, I would recommend the kind of penalty that we propose.

If it were -- if it were completed outside of Cycle Two, due to the normal low permeability in zones outside of Cycle Two, we would not recommend any penalty at all.

Q. Okay, so no penalty, and we're not talking -- are we talking Cycle Two or are we talking BV channel?

A. I'm talking Cycle Two. That BV channel could be located any place in that cycle, and still be connected with our main channel stringer.

Q. How do these cycles that you've got compare with the nomenclature for the cross sections adopted by the nomenclature committee that the Commission formed a number

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 435-7409

of years ago to establish formation tops in the Pennsylvanian in Southeast New Mexico?

A I'm sorry I didn't review that before I came to the hearing.

Q Are they pretty well -- are they easily seen in this area?

A Yes, sir. Cycle Two and Cycle Three, the tops and the bottoms are easily seen. Cycle One and Cycle Four are not quite that -- that definitive.

Q Is it conceivable that Amoco could get a well in Cycle Two which would not be connected to the BV channel?

A It is quite remote but it certainly could happen. I would say it would be remote.

I believe they testified that their sand that they encountered in their No. 19 well was part of the -- part of the Cycle Two -- or part of the BV channel. Certainly if that was part of the BV channel and they move north, it would just be moving thoward a thicker part of the channel.

Q Does anyone know why whoever drew this exhibit of ARCO's, which Amoco has introduced as their Exhibit Number Four, why this thicker sand was drawn through the center of Section 36? Was that another projected channel? Was that a divergence of the BV channel?

A These -- it was -- it was drawn, I believe,

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

on the gross pay map. It would appear to be a divergence. On our gross sand map, not gross pay, excuse me. It would appear to be a divergence. I certainly have some question as to whether there's any net pay in that divergence stream.

Q That was going to be my next question. You've said that you felt there was no pay between those two --

A Yes, sir, yes, sir.

Q On what basis?

A I'll readily admit that the information is quite skimpy there and there's a possibility there could be some but in my estimation there isn't.

Generally, based on a northwest/southeast trend of the sand development. To have that divergence you would go essentially south and would diverge some -- divert somewhat from the normal Morrow depositional trend, and for that reason I felt like that the odds favored it not being there. There is some possibility that there could be some there, and that's a portion of the map where we have very little control, or no control, I should say.

Q I wouldn't appear to me that the drilling of the Amoco well in question would add a whole lot of information relative to that part of the section.

A No, sir, it would not.

Q All right.

MR. STAMETS: Any other questions of this

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

witness? Mr. Buell?

MR. BUELL: Mr. Examiner, I have one that I intended to ask him.

RECROSS EXAMINATION

BY MR. BUELL:

Q. We've been talking about Cycle Two, Mr. Tweed, all the way through here. Did you give credit to any well pay in Cycle Two that was outside of what we've all recognized as the BV channel?

A. You mean on my net Isopach map?

Q. Yes, on your Exhibit Four?

A. Yes, sir. If you refer to Exhibit Four, I do show two channel systems, one running through the northeast part of Section 24, Section 19, and Section 30, and I have concluded based on pressure analysis and depositional analysis that these are separate channels.

Q. You didn't understand my question.

A. Okay.

Q. We're not worried about that channel to the north because we agree with you --

A. Yes, okay.

Q. -- it's a separate channel.

I'm saying in your BV channel, the south channel on your Exhibit Four, did you give any well, your

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

No. 2 Well, your No. 1 Well, or the No. 5 Well, credit for any pay that was not in what we have identified and have been calling the BV channel on all our cross sections?

A No, sir, to the best of my ability; I'm pretty sure.

Q I only noticed for the first time down in the southwest quarter of Section 31 immediately below our -- south and west of our No. 5, isn't that colored green, the same colore as No. 5?

A Yes, sir.

Q Is it in the BV channel?

A Not to my -- it's my conclusion that it is not in the BV channel.

Q But it's in the Cycle Two; it has Cycle Two pay.

A Yes, sir, it does.

Q And you have added that pay to your Wells Nos. 1 and 2, have you not?

A Well, it's the same problem we've got up in Section 19. I think the two channels, that the -- that the depositional channels are separated. I don't think that Well No. 3 is connected to the BV channel, in my -- my analysis.

Q Well, do you think that the pay you gave credit to your No. 1 Well and your No. 2 Well is connected

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

to the BV channel?

A Yes, sir.

Q Come over here and show me just how it's connected.

A I don't follow your line of reasoning. There is the sand body for the State BV No. 2 and there's the sand body for the State BV No. 1.

Q We've all been calling that the BV channel.

A Yes, sir.

Q Did you give in your No. 1 Well any credit for the pay of this well above the BV channel? That was my question.

A No, sir.

Q So all really what you have done, you have Isopached what we've all admitted is the BV channel on your Exhibit Four.

A But I didn't see any pay above the top of what we're calling the BV sands.

MR. BUELL: I should have cleared that up earlier, Mr. Examiner, but in the heat I got -- overlooked it.

Q So what really then on Exhibit Four with regard to the south channel --

A Yes, sir.

Q -- all you have Isopached is the BV chan-

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

nel itself.

A That is correct.

MR. BUELL: Thank you, that's all I have, Mr. Examiner.

MR. STAMETS: Are there any other questions of this witness? He may be excused.

Does anyone have anything they wish to add further?

MR. BUELL: Mr. Examiner, I would like to formally offer Amoco's Exhibit Five, a contour map on top of the Cycle Two structure, which Mr Tweed was generous enough to furnish us for an exhibit.

MR. STAMETS: Exhibit Five will be admitted.

I'm also going to leave in for the record this Doyle Hartman exhibit which was discussed but not admitted.

MR. BUELL: Would you like me to offer it as our Exhibit Six, Mr. Examiner?

MR. STAMETS: I think that would be a good idea.

MR. BUELL: Could I have this marked?

MR. STAMETS: And it will be admitted.

If there is nothing further, the case will be taken under advisement.

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing and attached Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

_____

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____ heard by me on _____ 19__.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Memo

From

R. L. STAMETS
Technical
Support Chief

To

Planimeter of Arco's
Exhibit 3 shows
17% or 54 acres productive
vs Amoco's Exhibit 4
showing 61% or 195 acres
productive.

OIL CONSERVATION DIVISION SANTA FE

3-E

R-2

on Corp
Mex. CY St. No.1
3705

Pennzoil United
Aid-State No.1
EL. 3727 KB
TD. 10796

General Am. Oil
Green "B" No. 9
EL. 3698
TD. 10,870

Pennzoil
Aid-State-Com. No. 1
EL. 3710 KB
TD. 10812

Continental Oil
State 19 Com. No. 1
EL. 3647 GL
TD 10880

ARCO
State "BV" No 2
EL. 3671 GL
TD. 10929

Yates, H.E.
Empire So. Deep No. 13
EL. 3661 KB
TD. 11060

ARCO
State "BV" No 1
EL. 3688 GL
TD. 10860

Amoco
Empire So. Deep No. 7
EL. 3652 KB
TD. 10982

Amoco
Empire So. Deep No. 5
EL. 3658 KB
TD. 10568

Midwest
So. Empire Deep No. 3
EL. 3667 KB
TD. 10925

23 24 19 6 25 30 5 36 31

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
Amoco EXHIBIT NO. 4
CASE NO. 6930
Submitted by Amoco Prod. Co.
Hearing Date 6-25-80

(Arco's X-8 Case #6928 6-5-80)

LEGEND

MORROW CYCLE 3 WELL

3-E

R-2

on Corp
Mex. CY St. No.1
3705

Pennzoil United
Aid-State No.1
EL. 3727 KB
TD. 10796

General Am. Oil
Green "B" No. 9
EL. 3698
TD. 10,870

Pennzoil
Aid-State-Com. No. 1
EL. 3710 KB
TD. 10812

Continental Oil
State 19 Com. No. 1
EL. 3647 GL
TD 10880

ARCO
State "BV" No 2
EL. 3671 GL
TD. 10929

Yates, H.E.
Empire So. Deep No. 13
EL. 3661 KB
TD. 11060

Amoco
Empire So. Deep No. 7
EL. 3652 KB
TD. 10982

ARCO
State "BV" No 1
EL. 3688 GL
TD. 10860

Amoco
Empire So. Deep No. 9
EL. 3691 KB
TD. 11204

Amoco
Empire So. Deep No. 5
EL. 3658 KB
TD. 10864

Midwest
So. Empire Deep No. 3
EL. 3667 KB
TD. 10925

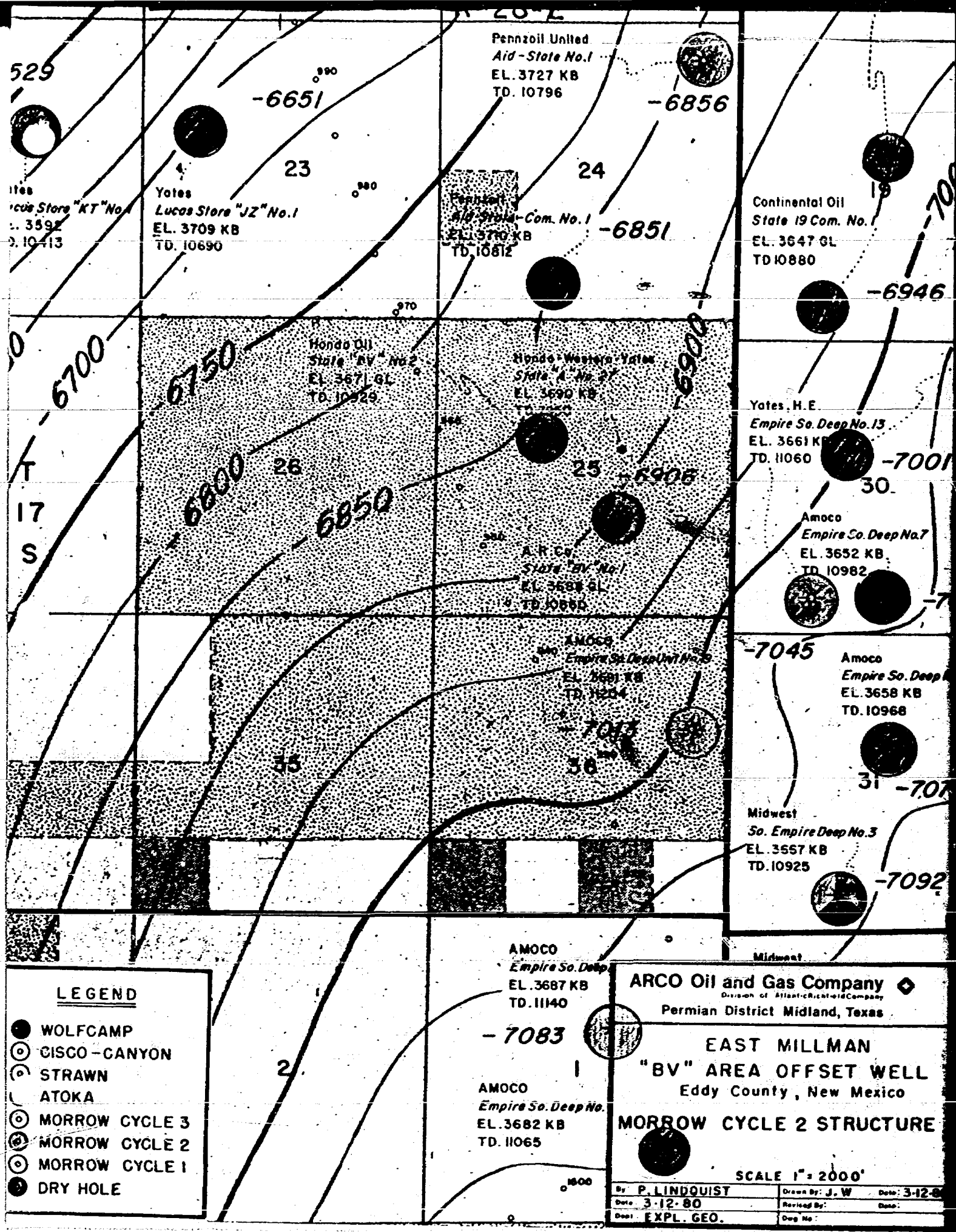
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BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
Amoco EXHIBIT NO. 4
CASE NO. 6930
Submitted by Amoco Prod. Co.
Hearing Date 6-25-80

LEGEND
MORROW CYCLE 3 WELL

Top of sd 21 below gas water contact (Tweed)

(ARCO's X-8 Case #6928 6-5-80)


Pennzoil United
Aid-State No.1
EL. 3727 KB
TD. 10796
-6856
Yates
Lucas Store "JZ" No.1
EL. 3709 KB
TD. 10690
-6651
Pennzoil
Aid-State-Com. No.1
EL. 3710 KB
TD. 10812
-6851
Continental Oil
State 19 Com. No.
EL. 3647 GL
TD 10880
-6946
Hondo Oil
State "BV" No.2
EL. 3671 GL
TD. 10929
Hondo-Western-Yates
State "A" No.27
EL. 3690 KB
TD. 11060
Yates, H.E.
Empire So. Deep No.13
EL. 3661 KB
TD. 11060
-7001
Amoco
Empire So. Deep No.7
EL. 3652 KB
TD. 10982
A.R.Co.
State "BV" No.1
EL. 3688 GL
TD. 10850
AMOCO
Empire So. Deep Unit No.3
EL. 3691 KB
TD. 11204
-7045
Amoco
Empire So. Deep
EL. 3658 KB
TD. 10968
Midwest
So. Empire Deep No.3
EL. 3657 KB
TD. 10925
-7092
AMOCO
Empire So. Deep
EL. 3687 KB
TD. 11140
-7083
AMOCO
Empire So. Deep No.
EL. 3682 KB
TD. 11065
-6700
-6750
-6800
-6850
-6900
-7000
-7100
23
24
25
26
30
31
35
36
2
1
T
17
S
LEGEND
WOLFCAMP
CISCO-CANYON
STRAWN
ATOKA
MORROW CYCLE 3
MORROW CYCLE 2
MORROW CYCLE 1
DRY HOLE
ARCO Oil and Gas Company
Division of Atlantic Richfield Company
Permian District Midland, Texas
EAST MILLMAN
"BV" AREA OFFSET WELL
Eddy County, New Mexico
MORROW CYCLE 2 STRUCTURE
SCALE 1" = 2000'
By P. LINDQUIST
Drawn By: J. W
Date: 3-12-80
Revised By:
Dept EXPL. GEO.
Dwg No:

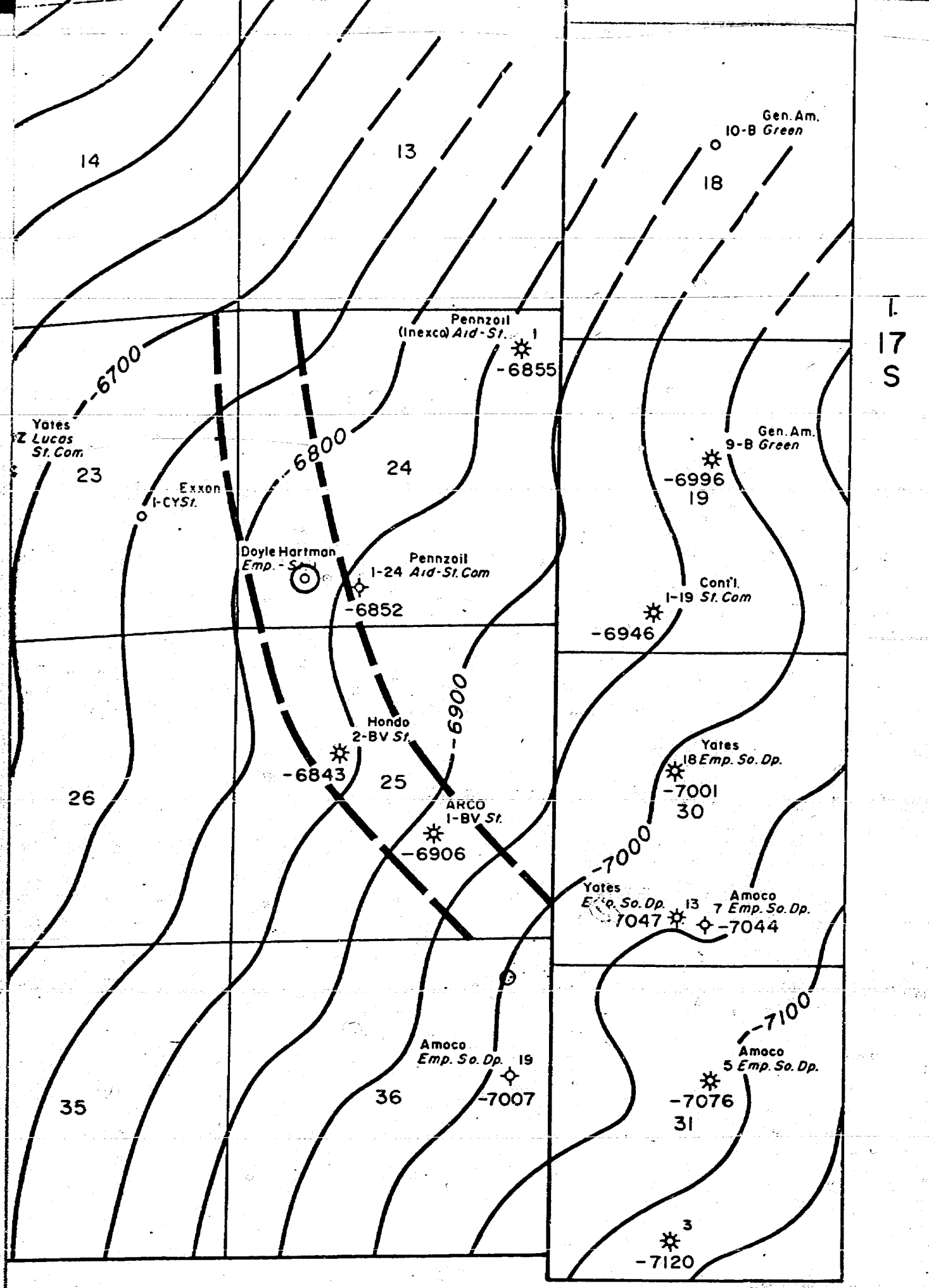


EXHIBIT NO.

DOYLE HARTMAN

STRUCTURE

TOP OF LOWER MORROW

C.I. = 50'

SOUTH EMPIRE AREA
EDDY COUNTY, NEW MEXICO

May '80 D.C.W.

ALLOWABLE REDUCTION FORMULA

FOR ESDU No. 21

1. Acre-feet under S/2 Section 25 - 16519
2. Acre-feet under E/2 Section 36 - 1630

Ratio of productive acre-feet = 2./1.

= 1630/16519

= 9.9%

Average daily rate, State BV No. 1 = 10156 MCF/D
(from 2-1-80 to 5-1-80)

Recommended allowable for ESDU No. 21 = 0.099 (10156)

= 1005 MCF/D

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO.
CASE NO.
Submitted by
Hearing Date

MW
6/20/80

Exhibit No. 6

RESERVOIR PRESSURE DATA

BV Channel

Date	Well	Reservoir Pressure @ - 7025 Psi
11-25-74	ESDU No. 5	4293
6-19-78	St. BV No. 1	4037
3-5-79	St. BV. No. 1	3603
12-6-79	St. BV. No. 2	3171
12-19-79	St. BV No. 1	3154

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
Arco EXHIBIT NO. 5
CASE NO. 6930
Submitted by Tweed
Hearing Date 6-25-80

Exhibit No. 5

RESERVOIR PRESSURE DATA

BV Channel

Date	Well	Reservoir Pressure @ - 7025 Psi
11-25-74	ESDU No. 5	4293
6-19-78	St. BV No. 1	4037
3-5-79	St. BV. No. 1	3603
12-6-79	St. BV. No. 2	3171
12-19-79	St. BV No. 1	3154

Exhibit No. 5

3-E

R-2

on Corp
Mex. CY St. No.1
3705

Pennzoil United
Aid-State No.1
EL. 3727 KB
TD. 10796

General Am. Oil
Green "B" No. 9
EL. 3698
TD. 10,870

Pennzoil
Aid-State-Com. No. 1
EL. 3710 KB
TD. 10812

Continental Oil
State 19 Com. No. 1
EL. 3647 GL
TD 10880

ARCO
State "BV" No 2
EL. 3671 GL
TD. 10929

Yates, H.E.
Empire So. Deep No. 13
EL. 3661 KB
TD. 11060

Amoco
Empire So. Deep No.7
EL. 3652 KB
TD. 10982

ARCO
State "BV" No 1
EL. 3688 GL
TD. 10860

Amoco
Empire So. Deep No.5
EL. 3658 KB
TD. 10966

Midwest
So. Empire Deep No. 3
EL. 3667 KB
TD. 10925

23 24 19 6 25 30 5 31

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
Amoco EXHIBIT NO. 4
CASE NO. 6930
Submitted by Amoco Prod. Co.
Hearing Date 6-25-80

(ARCO's X-8 Case # 6928 6-5-80)

LEGEND

MORROW CYCLE 3 WELL

ALLOWABLE REDUCTION FORMULA

FOR ESDU No. 21

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(from 2-1-80 to 5-1-80)

Recommended allowable for ESDU No. 21 = 0.099 (10156)

= 1005 MCF/D

MW
6/20/80

Exhibit No. 6

Telegram western union

Case 6930

RECEIVED
JUN 26 1980
OIL CONSERVATION DIVISION
SANTA FE

WU SANTA FE
A89P MDT
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ICS IPMBNGZ CSP
3032926960 TDBN DENVER CO 95 06-23 0454P EST
PMS OIL CONSERVATION COMMISSION, N.M. ENERGY/MINERAL DEPT, LAND
OFFICE BLDG, DLR
SANTA FE NM 87503
RE: CASE #6938
GENTLEMEN: DEPCO INC OWNS A 6.31486 PERCENT W.I. IN THE EMPIRE SOUTH DEEP UNIT, EDDY COUNTY, NEW MEXICO. DEPCO ALSO OWNS A 15.97222 PERCENT W.I. IN SEC. 25-T17S-R28E, EDDY COUNTY, NEW MEXICO. AMOCO PRODUCTION CO HAS APPLIED FOR AN UNORTHDOX MORROW LOCATION IN SEC. 36-T17S-R28E, EDDY COUNTY, NEW MEXICO. SINCE THE ESDU WELL #19, A MORROW DRY HOLE ALREADY EXIST ON THE 320 ACRE SPACING UNIT (E/2 SEC. 36) ANY COMMISSION APROVAL OF THE UNORTHODOX LOCATION MUST INCORPORATE A STRINGENT ALLOWABLE RESTRICTION IF CORRELATIVE RIGHTS ARE TO BE PROTECTED. YOURS VERY TRULY,

RLL

C. D. CRUMP, DEPCO INC

ATWOOD, MALONE, MANN & COOTER
A PROFESSIONAL ASSOCIATION
LAWYERS

JEFF D. ATWOOD [1883-1960]
ROSS L. MALONE [1910-1974]

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JUN 24 1980
OIL CONSERVATION DIVISION
SANTA FE

P. O. DRAWER 700
SECURITY NATIONAL BANK BUILDING
ROSWELL, NEW MEXICO 88201
[505] 622-6221

CHARLES F. MALONE
RUSSELL D. MANN
PAUL A. COOTER
BOB F. TURNER
JOHN W. BASSETT
ROBERT E. SABIN
BRIAN W. COPPLE

RANDAL W. ROBERTS
STEVEN L. BELL
WILLIAM P. LYNCH

June 23, 1980

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

Re: Examiner hearing June 25, 1980

Dear Mr. Ramey:

Please find enclosed our Entry of Appearance in Case #6930.

Thank you and with regards,

Very truly yours,

Charles F. Malone

CFM:dh
Enclosure
cc: Guy D. Buell, Esquire (w/encl.)

IN THE OIL CONSERVATION DIVISION

STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF AMOCO PRODUCTION COMPANY for UNORTHODOX LOCATION EMPIRE SOUTH DEEP UNIT, WELL #21 Section 36, Township 17S., Range 28 E.	))))))	No. 6930

ENTRY OF APPEARANCE

The undersigned Atwood, Malone, Mann & Cooter, P.A., enter their appearance herein for Amoco Production Company with Guy Buell of Houston, Texas.

ATWOOD, MALONE, MANN & COOTER, P.A.

By Charles F. Malone

Charles F. Malone
P. O. Drawer 700
Roswell, New Mexico 88201

Dockets Nos. 20-80 and 21-80 are tentatively set for July 9 and 23, 1980. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - JUNE 25, 1980

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 6891: (Readvertised)

In the matter of the hearing called by the Oil Conservation Division on its own motion to permit Midwest Refining Company, United States Fidelity & Guaranty Company, and all other interested parties to appear and show cause why the State Well No. 1 located in Unit A of Section 16, Township 33 South, Range 14 West, Hidalgo County, should not be plugged and abandoned in accordance with a Division-approved plugging program.

CASE 6929: Application of Consolidated Oil & Gas, Inc. for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Blanco Mesaverde and Basin-Dakota production in the wellbore of its NCRA Well No. 1-E located in Unit G of Section 22, Township 26 North, Range 7 West, by using the Dakota gas for gas lift of Mesaverde liquids after metering on the surface.

CASE 6930: Application of Amoco Production Company for an unorthodox well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its Empire South Deep Unit Well No. 21 to be drilled 660 feet from the North and East lines of Section 36, Township 17 South, Range 28 East, the E/2 of said Section 36 to be dedicated to the well.

CASE 6931: Application of H. L. Harvey for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Aztec-Fruitland and Bloomfield-Farmington production in the wellbore of his Jones Well No. 3 located in Unit B of Section 13, Township 29 North, Range 11 West.

CASE 6917: (Continued from June 4, 1980, Examiner Hearing)

Application of Yates Petroleum Corporation for an NGPA determination, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks a new onshore reservoir determination for its Goat Roper "LP" Com. Well No. 1 located in Unit P of Section 30, Township 17 South, Range 26 East.

CASE 6932: Application of Yates Petroleum Corporation for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its State "JM" Well No. 2, a Morrow test to be drilled 660 feet from the South and East lines of Section 25, Township 18 South, Range 24 East, the S/2 of said Section 25 to be dedicated to the well.

CASE 6933: Application of Yates Petroleum Corporation for two compulsory poolings, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Morrow formation underlying two 320-acre proration units, being the N/2 and the S/2 of Section 2, Township 19 South, Range 25 East, each to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said wells and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the wells, and a charge for risk involved in drilling said wells.

CASE 6934: Application of Coronado Exploration Corporation for three compulsory poolings, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres formation underlying three 40-acre proration units, being the NW/4 SE/4 of Section 6, the NE/4 SE/4 of Section 28, and the SW/4 NW/4 of Section 33, all in Township 11 South, Range 28 East, each to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said wells and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the wells, and a charge for risk involved in drilling said wells.

CASE 6901: (Continued from May 21, 1980, Examiner Hearing)

Application of Harvey E. Yates Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp thru Mississippian formations underlying the E/2 of Section 19, Township 14 South, Range 36 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

Amoco Production Company
Houston Region
600 Jefferson Building
Post Office Box 3092
Houston, Texas 77001

J. R. Barnett
Regional Engineering
Manager

June 2, 1980

RECEIVED
JUN - 3 1980
OIL CONSERVATION DIVISION
SANTA FE

File: JCA-986.51NM-2445

Re: Application for Hearing
Unorthodox Location
Empire South Deep Unit
Eddy County, New Mexico

Case 6930

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

Attention: Mr. Joe D. Ramey

Gentlemen:

Amoco Production Company requests a hearing for obtaining approval of an unorthodox location for our Empire South Deep Unit Well No. 21. The well location is to be 660' FNL and 660' FEL of Section 36, Township 17 South, Range 28 East, Eddy County, New Mexico. The east half of Section 36 will be assigned to this well.

Please place this item on the Examiner Hearing Docket of June 25, 1980. A map of the area and a list of offset operators are attached. Please direct any questions to either Mr. Jim Allen (713-652-5497) or Mr. Mike Brown (713-652-7238).

Yours very truly,

J. R. Barnett
HMB

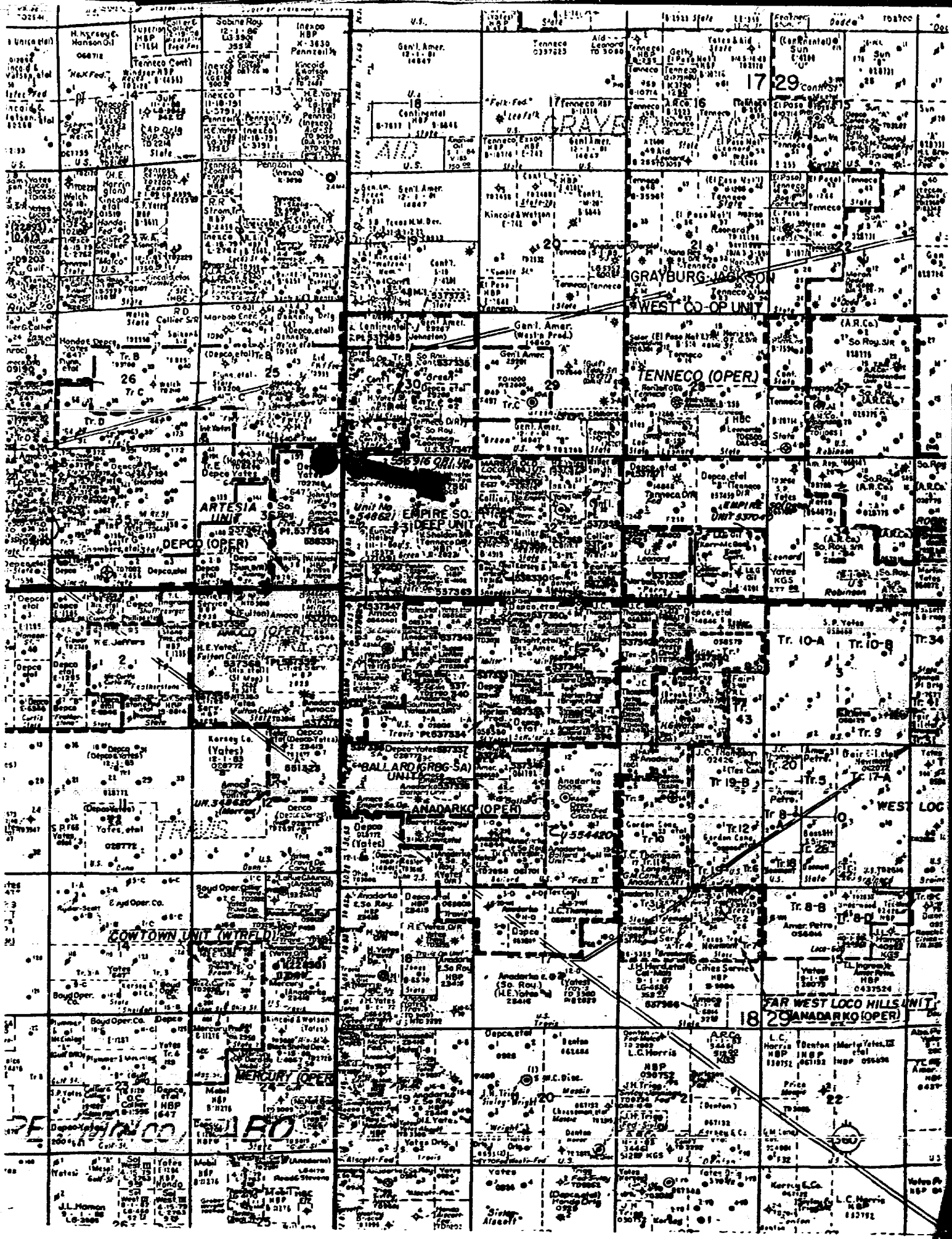
HMB/rw
Attachments

EMPIRE SOUTH DEEP UNIT WELL NO. 21

OFFSET OPERATORS

ARCO Box 1610 Midland, TX 79701	Section 25, T-17-S, R-28-E
Harvey E. Yates Company Box 1933 Roswell, NM 88201	Section 30, T-17-S, R-29-E
Depco, Inc. Western United Building Suite 402 Midland, TX 79701	W/2 Section 36, T-17-S, R-28-E

This well is offset on all other sides by the Empire South Deep Unit operated by Amoco Production Company.


GRAYBURG-JACKSON
GRAYBURG-JACKSON
WEST CO-OP UNIT
TENNECO (OPER)
ARTESIA UNIT
DEPCO (OPER)
EMPIRE SO. DEEP UNIT
BALLARD (GRBG-SA) UNIT
ANADARKO (OPER)
COWTOWN UNIT (WTRFLD)
MERCURY (OPER)
FAR WEST LOCO HILLS UNIT
ANADARKO (OPER)
WEST LOC

Amoco Production Company
Houston Region
500 Jefferson Building
Post Office Box 3092
Houston, Texas 77001

J. R. Barnett
Regional Engineering
Manager

June 2, 1980

RECEIVED
JUN - 3 1980
OIL CONSERVATION DIVISION
SANTA FE

Case 6930

File: JCA-986.51NM-2445

Re: Application for Hearing
Unorthodox Location
Empire South Deep Unit
Eddy County, New Mexico

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

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J. R. Barnett
HMB

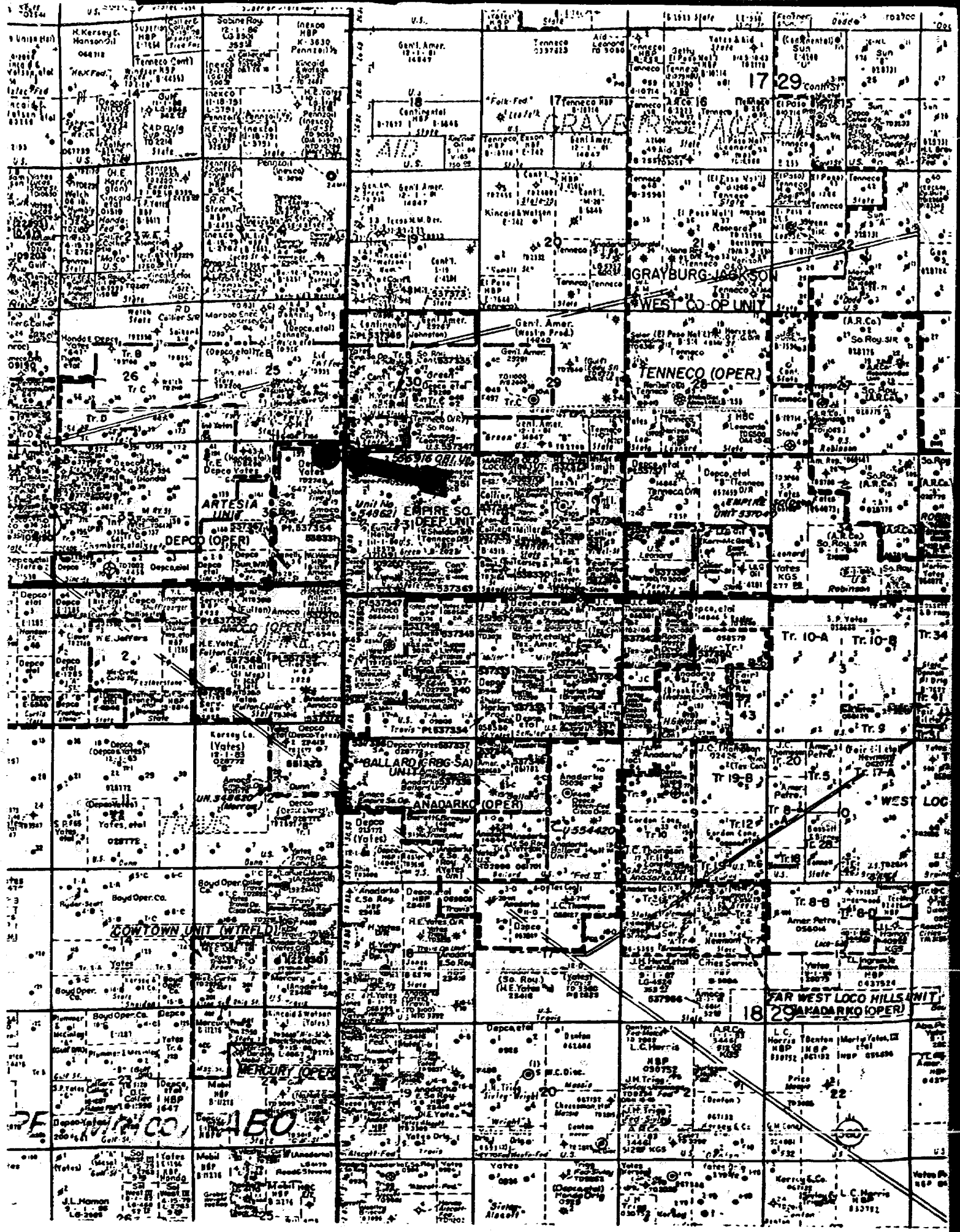
HMB/rw
Attachments

EMPIRE SOUTH DEEP UNIT WELL NO. 21

OFFSET OPERATORS

ARCO Box 1610 Midland, TX 79701	Section 25, T-17-S, R-28-E
Harvey E. Yates Company Box 1933 Roswell, NM 88201	Section 30, T-17-S, R-29-E
Depco, Inc. Western United Building Suite 402 Midland, TX 79701	W/2 Section 36, T-17-S, R-28-E

This well is offset on all other sides by the Empire South Deep Unit operated by Amoco Production Company.


GRAYBURG-JACKSON
WEST CO-OP UNIT
TENNECO (OPER.)
EMPIRE SO. DEEP UNIT
ARTESIA UNIT
DEPCO (OPER)
AMOCO (OPER)
BALLARD (PRBG-SA) UNIT
ANADARKO (OPER)
COWTOWN UNIT (WTRFLD)
MERCURY (OPER)
FAR WEST LOCO HILLS UNIT
ANADARKO (OPER)
WEST LOC
Tr. 10-A
Tr. 10-B
Tr. 8-B
Tr. 8-C
Tr. 19-B
Tr. 17-A
Tr. 34
Tr. 43
Tr. 20
Tr. 5
Tr. 9
Tr. 12
Tr. 6
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Tr. 4
Tr. 3
Tr. 1
Tr. 7
Tr. 11
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Tr. 30
Tr. 31
Tr. 32
Tr. 33
Tr. 35
Tr. 36
Tr. A
Tr. B
Tr. C
Tr. D
Tr. E
Tr. F
Tr. G
Unit No. 548621
Unit No. 548630
U554420
U537347
U537348
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Amoco Production Company
Houston Region
500 Jefferson Building
Post Office Box 3092
Houston, Texas 77001

J. R. Barnett
Regional Engineering
Manager

June 2, 1980

RECEIVED
JUN - 3 1980
OIL CONSERVATION DIVISION
SANTA FE

Case 6930

File: JCA-986.51NM-2445

Re: Application for Hearing
~~Unorthodox Location~~
Empire South Deep Unit
Eddy County, New Mexico

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

Attention: Mr. Joe D. Ramey

Gentlemen:

Amoco Production Company requests a hearing for obtaining approval of an unorthodox location for our Empire South Deep Unit Well No. 21. The well location is to be 660' FNL and 660' FEL of Section 36, Township 17 South, Range 28 East, Eddy County, New Mexico. The east half of Section 36 will be assigned to this well.

Please place this item on the Examiner Hearing Docket of June 25, 1980. A map of the area and a list of offset operators are attached. Please direct any questions to either Mr. Jim Allen (713-652-5497) or Mr. Mike Brown (713-652-7238).

Yours very truly,

J. R. Barnett

HMC/lw
Attachments

EMPIRE SOUTH DEEP UNIT WELL NO. 21

OFFSET OPERATORS

ARCO
Box 1610
Midland, TX 79701

Section 25, T-17-S, R-28-E

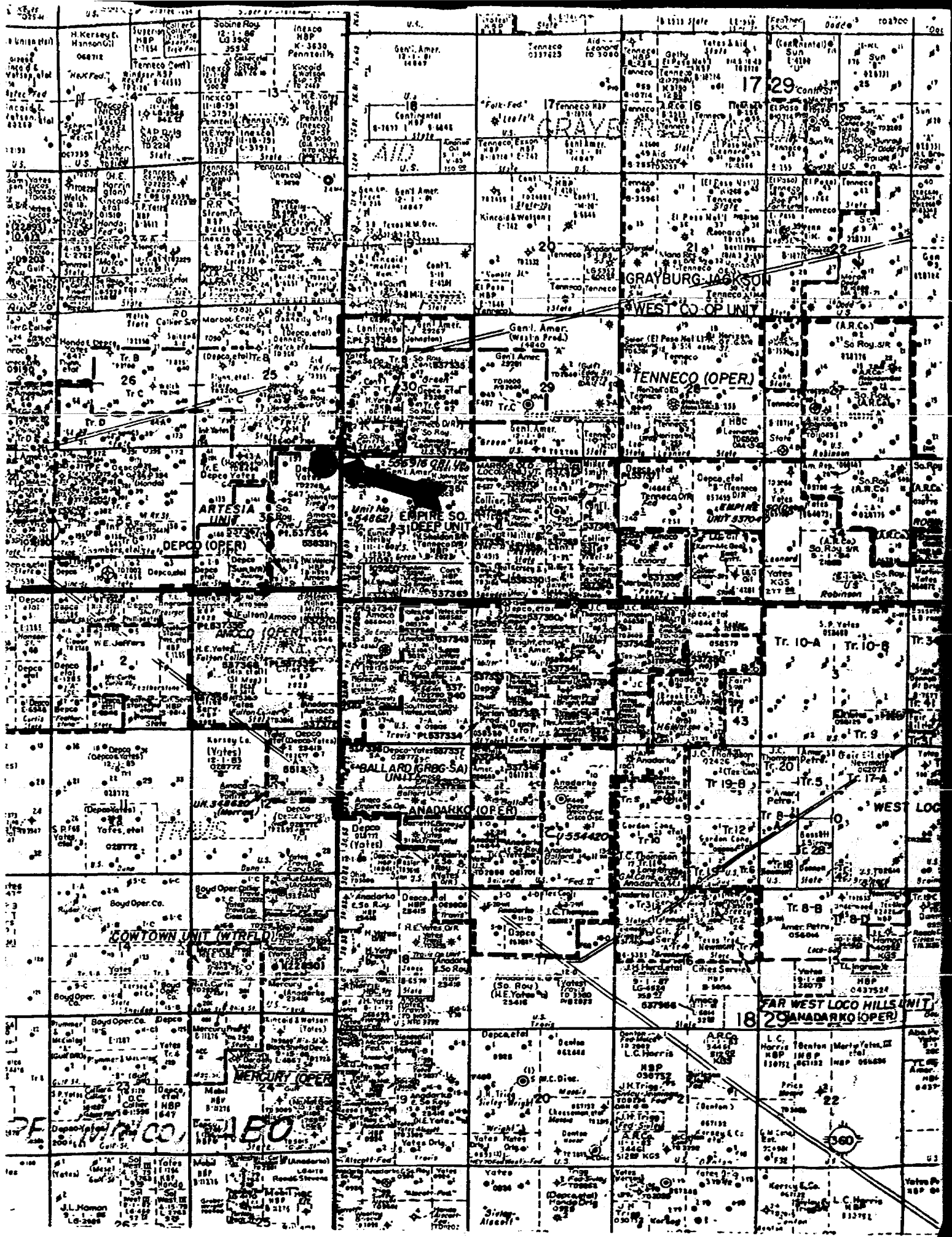
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Gen'l. Amer.
Tenneco
Sinclair
Continental
Texaco
Gulf
Amoco
Depco, etal
Yates
Seven Rivers
Queen
Grayburg
San Andres
Glorieta
Paddock
Blinebry
Tubb
Drinkard
Abo
Wolfcamp
Penn
Devonian
Ellenburger