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

18 February 1987

EXAMINER HEARING

IN THE MATTER OF:

Application of BTA Oil Producers to contract the horizontal limits of the West Osudo-Wolfcamp Pool and the concomitant creation of a new gas pool with special pool rules, Lea County, New Mexico. CASE 9078

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Commission: Jeff Taylor
Legal Counsel for the Division
Oil Conservation Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

MR. CATANACH: Call next Case Number 9078.

MR. TAYLOR: Application of BTA Oil Producers to contract the horizontal limits of the West Osudo-Wolfcamp Pool and the concomitant creation of a new gas pool with special pool rules, Lea County, New Mexico.

MR. CATANACH: At the request of the applicant this case will be continued to the Examiner Hearing scheduled for March 4, 1987.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of this portion of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9078, heard by me on February 19 1987.

David R. Catanach, Examiner
Oil Conservation Division

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 9078

CASE 9846

CASE 9847

CASE 9812

CASE 9813

CASE 9850

EXAMINER HEARING

TRANSCRIPT OF PROCEEDINGS

CONTINUED AND DISMISSED CASES

BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

December 27, 1989

CUMBRE COURT REPORTING
(505) 984-2244

HEARING EXAMINER: This hearing will come to order. I'm Michael E. Stogner, appointed Examiner for today's docket. Note today's date, December 27, 1989.

What I'll do first is call all the continued and dismissed cases. So, we'll start by calling Case No. 9078, which is in the matter of case number 9078 being reopened pursuant to the provisions of Division Order Nos. R-8450.

This case will be continued to the Examiner's hearing scheduled for January 10, 1990.

* * * * *

HEARING EXAMINER: Call next case, No. 9846, which is the application of Yates Petroleum Corporation for compulsory pooling, Eddy County, New Mexico.

At the Applicant's request, this case will be continued to the Examiner's hearing scheduled for January 10, 1990.

* * * * *

HEARING EXAMINER: Call next case, No. 9847, which is the application of Yates Petroleum Corporation for an unorthodoxed oil well location, Lea County, New Mexico.

At the Applicant's request, this case will

be dismissed.

* * * * *

HEARING EXAMINER: Over to the next page, I'll call next case, No. 9812, which is the application of Meridian Oil, Incorporated, on behalf of El Paso Natural Gas Company, for an unorthodox coal gas well location, Rio Arriba County, New Mexico.

At the Applicant's request, this case is dismissed.

* * * * *

HEARING EXAMINER: Call next case, No. 9813, which is the application of Meridian Oil Incorporated, on behalf of El Paso Natural Gas Company, for an unorthodox coal gas well location, Rio Arriba County, New Mexico.

At the Applicant's request, this case is also continued to the Examiner's hearing scheduled for January 10, 1990.

* * * * *

HEARING EXAMINER: Well, we're on the last page, on page 6, Case No. 9850, which is in the matter of the hearing called by the Oil Conservation Division on its own motion for an order extending certain existing pools in Rio Arriba and San Juan Counties, New Mexico.

This case is also continued to the Examiner's hearing scheduled for January 10, 1990.

* * * * *

CERTIFICATE OF REPORTER

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

I, Carla Diane Rodriguez Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL December 29, 1989.

Carla Diane Rodriguez
CARLA DIANE RODRIGUEZ
CSR No. 91

My commission expires: May 25, 1991

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case Nos. 9078, 9846, 9847, 9812, 9813 and 9850 heard by me on 27 December 1989.

Michael E. Stogner, Examiner
Oil Conservation Division

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

4 March, 1987

EXAMINER HEARING

IN THE MATTER OF:

Application of BTA Oil Producers to contract the horizontal limits of the West Osudo-Wolfcamp Pool and the concomitant creation of a new gas pool with special pool rules, Lea County, New Mexico. CASE 9078

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Commission: Jeff Taylor
Legal Counsel for the Division
Oil Conservation Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For BTA Oil Producers: W. Thomas Kellahin
Attorney at Law
KELLAHIN, KELLAHIN, & AUBREY
P. O. Box 2265
Santa Fe, New Mexico 87501

For Amoco Production: William F. Carr
Attorney at Law
CAMPBELL & BLACK P.A.
P. O. Box 2208
Santa Fe, New Mexico 87501

I N D E X

E X H I B I T S

MR. STOGNER: Call next Case Number 9078.

MR. TAYLOR: The application of BTA Oil Producers to contract the horizontal limits of the West Osudo-Wolfcamp Pool and the concomitant creation of a new gas pool with special pool rules, Lea County, New Mexico.

MR. STOGNER: Call for -- call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of the applicant.

I understand from Mr. Carr this morning that he has some concerns and potential objections in our case. I would estimate it will take us about an hour to present this case.

If you'd like us to wait and take a shorter case, we'd be happy to do so, but I believe some of the issues involved in this case may be disputed.

MR. STOGNER: Mr. Carr, who do you represent?

MR. CARR: I represent Amoco Production Company.

I also represent Ronald J. Byers, a mineral interest owner under the east half of the

east half of Section 23, which includes half the acreage which is the subject of Mr. Kellahin's application.

MR. STOGNER: Do you have any witnesses?

MR. CARR: No, I do not.

MR. STOGNER: Let's go off the record for a second, Sally.

(Thereupon a discussion was had off the record.)

MR. STOGNER: We'll take a little, short recess and call this case back later on the docket.

(Thereupon a recess was taken.)

MR. STOGNER: This hearing will come to order.

We'll come back and continue with Case Number 9078. I believe we called for appearances and Mr. Kellahin had entered an appearance and Mr. Bill Carr had entered an appearance.

Have we sworn the witness yet?

MR. KELLAHIN: No, sir. I have one witness to present on behalf of my client.

MR. STOGNER: And, Mr. Carr, do you have any witnesses?

MR. CARR: I will not call a witness.

MR. STOGNER: Okay, will the witness please stand at this time to be sworn.

(Witness sworn.)

MR. STOGNER: Mr. Kellahin.

MR. KELLAHIN: Thank you, Mr. Examiner.

Mr. Examiner, I want to introduce at this time what we have marked as BTA's Exhibit Number Thirteen. This is a package of notices to the various

parties that were interested in the application. I'll submit that to you as a separtate exhibit, Mr. Examiner.

The case was originally filed for hearing on February 18th, 1987, and at the time that application was filed, and the first page of Exhibit Thirteen is in fact the application, if you'll turn to the attachment to the application on the third page, you will find that when we file the application we sent notices to the operators in the pool and within a half mile of the pool that we though might be affected by what we were doing.

Thereafter, just prior to the February 18th hearing, on February 13th I received a phone call from Mr. Ron Byers who is a mineral owner underneath the east half of the northeast corner of 23, and Mr. Byers' interest is held by BTA as the operator.

Mr. Byers, as an interest owner, was concerned about the change in designation of this area as a gas pool.

Under the notice rules we normally do not notify the mineral owners under our own tracts of a spacing case, but because of Mr. Byers' call to me, we then went forward with a supplemental notice, continued our case, and sent notice to Mr. Byers and to all the other people that are indicated in the package of exhibits, as well as those operators that we had previously notified, advising

them that the case was now continued to the March 4th hearing, to give all those parties additional time and an opportunity to come forward.

I understand that some of those individuals wrote letters to the Commission.

Of those that we've notified, I believe Mr. Byers, through Mr. Carr, is the only party that's appeared at today's hearing.

With that explanation of the notices, then, I would propose to submit to you Mr. Steve Salmon, who is our reservoir engineer, petroleum engineer, to discuss with you the technical reasons that we believe support our application.

MR. CARR: I have only one comment in response. I'm also appearing on behalf of Amoco Production Company and Mr. Byers does own interest under the property as defined by Mr. Kellahin. He also has interest in the property underlying the Heller Well, which is the east offset to the subject well and a well operated by Amoco.

STEVE SALMON,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Salmon, let's begin, -- if that's acceptable, Mr. Stogner?

MR. STOGNER: Please.

Q Mr. Salmon, for the record would you please state your name and occupation?

A Yes. My name is Steve Salmon. I'm currently employed by BTA Oil Producers as the Manager of Exploitation and Reservoir Engineering.

Q Mr. Salmon, have you previously testified before the Oil Conservation Division as a petroleum engineer?

A Yes, I have.

Q And pursuant to your employment by BTA Oil Producers, have you made a study of the facts available to you surrounding this application?

A Yes.

Q And pursuant to that study have you prepared certain exhibits or caused those exhibits to be prepared under your supervision and direction?

A Yes, I have.

MR. KELLAHIN: We tender at this time Mr. Salmon as an expert petroleum engineer.

MR. STOGNER: Mr. Salmon is so qualified.

Q Let me direct your attention first of all, if you please, to Exhibit Number One and let you identify Exhibit One for us and help locate us as to where the property is that is the subject of this application.

A Yes. Exhibit One is an insert from the Midland Map Company Producing Zone Map. This map is on a scale of one inch equals six miles. It is prepared to locate the Byers in relation to the regional geology.

The approximate area of the Osudo West Wolfcamp and the Lea Southeast Wolfcamp Field is colored in blue, which is the small blue area just to the right of center of the map.

These fields are located approximately 17 miles northwest of Eunice and 19 miles southwest of Hobbs.

The fields are located in a transition area between the Northwest Shelf to the west and the Central Basin Platform to the east. The approximate dividing line is shown on this map between the geological areas is that dashed line just to the west of the blue area.

Q Let's turn to a plat that specifically shows the area that I have before me, Exhibit Number Two, Mr. Salmon, which, before you describe that exhibit, would

you simply identify it for us?

A Yes. This is an exhibit showing the Wolfcamp production data, the wells that have tested the Wolfcamp in the area, and a color code for the various leases, or the various fields in the area.

Q Before we describe the content of the exhibit, would you locate for the Examiner the well that is the subject of the case?

A Yes. This is the BTA Byers 8605 JV-P Byers Well No. 1. It's indicated by the double circle colored in red close to the center of the map. It's located in the northeast quarter of Section 23, Township 20 South, Range 35 East.

Q Based upon your studies as an engineer, Mr. Salmon, what are you recommending to the Examiner with regards to this application?

A Our application is to get a field discovery for our well, is -- what we are wanting to do is to get a gas well classification for the BTA well. We initially filed this well to be completed in the Lea Southeast Wolfcamp Gas Pool. This filing was rejected by the Conservation Division and -- however, we still think that this is a proper filing for the well. If this is not a proper filing, we still have a gas well. We will attempt to prove today that the -- it is separated from the Amoco Heller No. 1

and that these two wells should be in separate fields.

Q Let's identify for the Examiner the pools in the area, the Wolfcamp pools in the area that are spaced upon 160-acre spacing.

A Okay, at the top of the map there is a well colored orange. The orange color indicates this is in the Lea Wolfcamp Field.

This well is classified as a gas well. It actually has 320-acre spacing.

At the south end of the map, or at the bottom, there are two wells colored in green. These two wells are in the Lea Wolfcamp Southeast Field. This is a gas field on 160-acre spacing.

Q When we look at Section 24, which is the section adjoining your well, and look at the Amoco Heller Well, Mr. Salmon, that well has been designated and classified in what pool?

A It is in the Osudo-Wolfcamp West Field, which is an oil field on 40-acre spacing.

Q Because of the proximity of your well to the Amoco well, the District Office has recommended that your well be classified as an oil well?

A Yes.

Q And in the -- in the West Osudo Field.

A Yes.

Q When we look at the well to the west of the BTA well, there's an Amoco well, the Amoco Bass Com No. 1 Well?

A Yes. What is the status of that well?

A It is a P & A'd producer. It did produce in the Osudo Wolfcamp West Field.

Q If the Examiner approved 160-acre gas spacing for your well, what acreage would you dedicate to the well?

A It would be the northeast quarter section of Section 23.

Q Can you summarize for us, Mr. Salmon, your opinion as to whether or not the BTA well in 23 is separate from the Amoco Heller oil well in Section 24?

A Yes, I think it is separate from the Amoco Heller oil well.

Q If the Examiner decides not to designate a new gas pool and assign your well a discovery allowable, how would you recommend to the Examiner that he handle the BTA well in 23 in terms of its spacing?

A An alternate to giving us a discovery well would be to approve our original filing, which was to put the well in the Lea Wolfcamp Southeast Field.

Q Identify for us, and I don't think you have to go through the specific details of it, identify for

us the type of information that's available to the Examiner on Exhibit Number Two.

A The type of information on the Wolfcamp producing wells is general completion data information in an A, B, C, D, E nomenclature.

Opposite the A for each well is the perforated interval.

Opposite the B is the field that the well is completed in.

Opposite the C is the initial potential for the well.

Opposite D is the September of 1986 monthly rate.

And opposite E is the cumulative production through September of 1986.

Two wells that have not produced in the Wolfcamp but have tested the Wolfcamp have the test data shown. One of these wells is the Amoco Best Com No. 2, located in the southeast quarter section of Section 23.

This well was perforated in the Wolfcamp. The last fifteen hours it swabbed 7-1/2 barrels of oil, 12 barrels of water with a slight show of gas, and was plugged back to the Bone Spring. It's currently a plugged well.

The other well that tested the Wolfcamp that has not produced is the Lea Southeast -- or the Petro

Lewis Southeast Lea Unit Well No. 3 in the northeast quarter of Section 26.

This well drill stem tested gas too small to measure, reversed six barrels of oil.

There are quite a few gas wells shown on here that are not producing from the Wolfcamp. These wells are producing mainly from the Osudo Morrow.

Q When we look at the Southeast Lea Wolfcamp, the one where Petro Lewis has their wells in 26 and 25 --

A Yes.

Q -- summarize for us or characterize the kind of gas pool we have in that area in terms of its gas/oil ratio, the kinds of characteristics youre discovering in that type of gas pool.

A Okay, the Lea Southest -- Southeast Lea Unit Well No. 1 is an excellent well in terms of recovery. It has made 3005-million cubic feet of gas plus 357,000 barrels of condensate.

It had an excellent initial potential, 15-million cubic feet per day with a GOR of 4000 cubic feet per barrel of oil.

The adjacent well over in Section --

Q I'm sorry, I missed the number. The gas/oil ratio in that pool is about 4000-to-1?

A Yes. The American Trading Company -- or these were originally drilled by American Trading but the Southeast Lea Unit Well No. 2, just to the east of this well is a tight well looking at the logs. It's calculated absolute open flow was 1.1-million cubic feet per day with a 14,500 cubic foot per barrel of oil ratio.

It has been on production a long time but it has only recovered 285-million cubic feet and 25,000 barrels of condensate.

Q If we look at the gas pool in the north, the Lea Wolfcamp Pool, where TXO has their well, is that also a gas pool that has a low gas/oil ratio?

A Yes. This is a gas pool and on its potential it had a GOR of 8,571 cubic foot per barrel of oil.

Q Let's turn to Exhibit Number Three now, Mr. Salmon, and have you identify that exhibit for us.

A Exhibit Number Three is a structure map. The scale is one inch equals 2000 feet, which is the same as the previous map; covers the same area as the previous map. It is contoured on the Third Bone Springs Sand, which is a correlation marker above the Wolfcamp that we feel is a consistent correlation marker in the area.

The map shows that the structure in the area is an east to west dipping anticline. We do have a

small bump or a small ridge in the south end of the map around the Petro Lewis Southeast Lea Unit Well No. 1.

The trapping mechanism will be stratigraphic rather than structural.

Q Do you have an opinion as to what the drive mechanism is for the reservoir?

A It is essentially gas expansion. I think that the Amoco Bass does show that you have some water encroachment, but the main drive mechanism would be gas expansion.

Q Would you identify for us the kinds of factors that you would utilize as a petroleum engineer to satisfy yourself that you are dealing with either a gas or an oil reservoir?

A Well, you look at the GOR. If it's got a high GOR, obviously you have a gas well. If it has a low GOR, obviously you have an oil well. In between these two extremes you can run pvt tests on your wells and determine the state of the hydrocarbon in the formation.

Q Does the gravity of the liquids produced give you any indication or help in deciding whether or not you're dealing with a gas or an oil reservoir?

A Yes, a low gravity would generally go with oil wells, 40 gravity and below; 50 gravity and above, you're generally dealing with either a volatile oil or a gas

condensate reservoir.

Q What are the types of liquid gravity ranges that you're discovering in the gas pools immediately adjacent to your wells?

A The gravities are generally above 50 gravity.

Q When you have a well that produces in a gas/oil ratio such as you're seeing in this area, you've indicated to us that an engineer will cause pvt data to be developed and fluid studies to be made of the reservoir.

A Yes.

Q What is the purpose of doing that, Mr. Salmon?

A The purpose of that is to determine what type of reservoir you're dealing with, which helps determine your spacing; it helps determine how hard you're going to pull the well, and you run it for your knowledge to help you more efficiently deplete the field.

Q Have you caused such studies to be made of the BTA well?

A Yes, we have.

Q Before we look at that information, Mr. Salmon, can you give us what your opinion is with regards to whether or not this is a gas or an oil pool surrounding this well?

A Well, I don't think it takes an opinion. The data shows that at reservoir conditions the hydrocarbons are in the gaseous phase.

Q All right. Let's turn to that information and have you identify for us Exhibit Number Four.

A Yes. Exhibit Number Four is the report by Tefteller, who collected the samples for a recombined pvt study. It shows the shut-in bottom hole pressures. It shows their recommendations on GOR's for the pvt study. It shows a 4-point test and the stabilization prior to collecting samples.

The first sheet on this is strictly a cover sheet from Tefteller.

The second sheet starts showing the 4-point pressure data. On the extreme right part of the second sheet, the one labeled page 1 of 8 up at the top, shows that the bottom hole pressure at 11,434 feet is 4,526 pounds on the shut-in pressure. This is a 13-day shut-in.

The pages labeled 1, 2, and 3 of 8 in the upper righthand corner record te 4-point test and a 3-day stabilization period prior to collecting the sample for the reservoir fluid work.

I would like to point out that during the 4-point test the lowest pressure recorded is on page 2 of 8. It's while the well was producing at about 3-million cubic

feet per day. The lowest bottom hole presure that we encountered is 4,230 pounds.

This is approximately a 300-pound drawdown at 3-million cubic feet per day, which indicates an excellent deliverability for the well.

At the bottom of the page, labeled 4 of 8, Tefteller recommends that for the recombination work that 7,183 standard cubic feet per barrel be used for the recombined sample. This ratio represents the cumulative gas/oil ratio for the most stable part of the test, which is the last 24 hours.

The next sheet of this shows the gradient shut-in pressure survey prior to the test. Again the shut-in pressure is up in the upper lefthand corner. The shut-in pressure is 4,526 pounds.

Just to the right of the pressure are the pressure gradients. These range from .122 to .192, which would be consistent with a gas condensate type of fluid in the tubing.

The next page is a flowing pressure and flowing gradient test. These gradients, gradients which range from .161 to .180, are again consistent with a gas/condensate gradient.

The next two sheets show the log log plot for the 4-point test and the multipoint forms of gas wells

filled out by Tefteller. The calculated absolute open flow was 21-million cubic feet per day.

Q With the data collected did -- by Tefteller, what then does an engineer do to satisfy himself that at reservoir conditions he is dealing with a gas reservoir?

A Well, Tefteller delivered the samples to CORE Lab, who ran a pvt analysis on the hydrocarbons.

Q Is that pvt analysis shown as Exhibit Number Five?

A Yes, it is.

Q All right, let me direct your attention to Exhibit Number Five and have you discuss and describe its contents.

A Okay. The heart of this report is on page 3 of 5. That's really the fifth sheet. The previous sheets are the data and assumptions that we used in the collection or in the analysis.

This is a tabulation of pressure versus relative volume. It shows that on the top third of the pressure which they reported, they've shown that at 4,539 pounds the dew point of the hydrocarbon fluid is achieved. This means that above the 4,539 pounds the hydrocarbons would exist as 100 percent gas.

When you reach 4,539 pounds you begin to get some condensate turning to liquid and as the pressures

decrease, you get more condensate.

Q Based upon the studies by CORE Lab, then, the magic point for this particular reservoir, using the specific reservoir data, is that a dew point exists at 4539 pounds --

A Yes.

Q -- psig.

A Yes.

Q And above that point, then, if we find reservoir pressure above that point, the hydrocarbons in the reservoir are in a gas stage.

A Yes.

Q All right.

The current pressure in the BTA Byers, according to our shut-in pressure, is 4,526. This is just slightly below the dew point. We are at the point to where some condensate will begin to be turning to liquid. The original reservoir presssure, as we'll see when we get to the pressures, was higher than this and at the initial reservoir conditions you were 100 percent gas.

If you'll turn over two more pages to the graph that's labeled page 5 of 5, this is a graph of the retrograde liquid volume as a percent of hydrocarbon pore space on the vertical scale going from zero percent to 100 percent versus pressure on the horizontal scale.

Again, if you're above 4,539 pounds, you have no liquid. At the point at which 4,539 pounds is reached, you start getting some liquid. From there, as the graph going up shows, the condensate as a liquid does increase in the reservoir up to a maximum of 22 percent of the hydrocarbon pore space.

At that point, when you reach a pressure a little below 2000 pounds, some of the condensate will start going back into the gaseous phase. This is a typical graph on a retrograde gas/condensate reservoir.

Q Do you have an opinion as to whether a retrograde condensate reservoir such as this ought to have applied to it the state gas pool rules?

A Yes, I think it should.

Q Do you have a recommendation with regards to the spacing to be established for the pool?

A I think that our well can drain 160 acres and with the field to the south being 160-acre spacing, I recommend that we use this spacing.

There is a tight well in the southeast quarter of our Section 23. I might have trouble showing the Commission that we could drain the southeast quarter or that that area is commercially productive of hydrocarbons.

Q So rather than going to a 320-acre gas spacing it appears to you at this point that 160-acre spac-

ing is appropriate.

A Yes, I would think it would be.

Q All right. Let's turn to an analysis of the relationship between the BTA Byers Well and the offsetting Amoco Heller Well, which I understand your opinion is that that well ought to be left on 40-acre oil spacing.

A Yes.

Q All right, let's turn to that analysis and let me have you use for that discussion Exhibit Number Six, which is cross section A-A'.

A Exhibit Number Six is a west to east, as you go from left to right on the cross section, cross section.

The leftmost well is the Amoco Bass Com No. 1. The center well is the BTA Byers No. 1, and the rightmost well is the Amoco Heller No. 1.

On this cross section, as well as on the next cross section that we'll show, the well names and completion data are shown below the log. The drill stem tests are shown beside the log to the right. The perforations are shown by the rectangles with circles in them in the center tract and the subsea depths of the top and bottom perf on the initial completion is shown out to the right of the log.

The neutron porosity where we have the neutron curve, porosity greater than 5 percent is colored in

green. On the next cross section we will have some sonic logs and on that the sonic porosity greater than 5 percent is colored in green.

The top correlation line shown on the cross section is the Third Bone Spring Sand. This is the point that we mapped on because it is a nice, consistent, correlative interval from well to well.

The middle line is the top of the Wolfcamp lime or carbonate, and the bottom line is the base of the Wolfcamp lime or carbonate. The productive interval is between the top and base of the Wolfcamp lime, usually towards the top of the interval.

Q I know you're going to get to more details about the differences between the Heller Well and the BTA Byers Well in terms of your opinion that one is in a gas reservoir and the other is in an oil reservoir, but now might be a helpful time to explain to the Examiner, using this exhibit, what are some of the reasons that have caused you to conclude that the two are in different types of reservoirs?

A The GOR of the Amoco Heller initially was 2459 cubic feet per barrel of oil.

The GOR for the Amoco Byers was 6,284 -- no -- yeah, I've got that mislabeled. I notice that should be cubic feet per barrel of oil instead of MCF per day.

The GOR of the BTA well was 7,212 cubic foot per barrel of oil as noted on the potential test; on the stabilization it was 17,083.

The Amoco Heller well is up-structure from both of the other two wells and it has an initial GOR of less than half of what they are, and a -- this shouldn't happen if these wells are in communication.

We will look at a performance curve in a little bit and the Amoco Heller has a typical limited reservoir oil decline curve.

Q While we're using this exhibit, let's also discuss the well to the west of the Byers No. 1 Well, the Amoco Best Com 1 Well, to have you describe for us whether or not that Best Well has depleted the production in the Wolfcamp to such an extent that some portion or all of that 40-acre tract ought to be excluded from being assigned a portion of the allowable from the BTA Byers Well.

A No, I don't think it has. This well was perforated -- well, first of all, it has excellent porosity and permeability development; had a good deliverability; porosities up in the range of 20 percent. It has a nice, solid block of porosity. It looks like an excellent well. They perforated from the base of the porosity up almost to the top of the porosity initially as shown by the perforations on the left side of the middle tract. These are

labeled 4-1-83.

The well did start making water fairly soon after its completion and the performance became very erratic. They did try two plugback attempts as shown by the perforations on the left side of the inside tract and ones sown to the left of the log. These were not successful.

Q Mr. Salmon, please discuss Exhibit Seven.

A Exhibit Seven is a production graph on this well. As you can see, the -- this is a 3-cycle 5-year graph. The barrels of oil per month, barrels of water per month, and MCF per month are shown on the lefthand scale from 100 to 100,000 barrels or MCF per month.

The GOR is shown on the righthand side of the scale from 10 to 10,000 cubic feet per barrel of oil.

The well came in initially with an excellent rate. The oil rate was between 4-and-5000 barrels of oil per month for the first three months.

The gas was over 20-million cubic feet per month with one month being up around 90-million cubic feet.

The GOR kind of jumped around there. One month it dropped down, but it was generally 3500 cubic foot per barrel of oil in place.

It started out real high; it did drop down to 4500.

In January the well started making a lot of water. In January it reported over 12,000, January of 1984, it reported 12,000 barrels of water per month. As you can see, from then on the performance became very erratic and the oil and gas production both dropped off drastically.

I think that this well watered out and had some channeling problems and they just couldn't get the water shut off.

Q In your opinion did the Best Well deplete the Wolfcamp reservoir?

A No, and I think we'll have to look at the BTA Well before we can get to the reasons as to why I think that.

The center well on our cross section, going back to it, is the BTA 8605 JV-P Byers No. 1. This well also had excellent porosity development as shown by the amount of green colored in. It wasn't quite as high as on the Amoco well, but it's excellent porosity.

However, there are major differences between the porosity on the two wells.

The porosity on the Amoco well, and this is the Best Com when I'm saying the Amoco well, occurred 25 feet below the top of the Wolfcamp Lime, while the porosity in the Byers occurred 90 feet down into the Wolfcamp Lime, so there's a big difference in where the porosity occurred

in the interval.

Also, in the Byers you have a 90 feet -- no, you have about, roughly, 60 feet of porosity development. You don't see any real tight intervals. It looks like it's all one zone.

The porosity in the BTA well occurs over 122-foot gross interval. It does have tight streaks separating it into various porosity zones, so you can see that there, even though they both are good, they do have, do show that between the wells it's a very heterogeneous reservoir.

The two lower perforated intervals in the BTA well that are shown in the center tract, the perforations with the arrows marked through them, were perforated, both zones swabbed water, and the well was plugged back to the top perforations shown from 11,430 to 11, 440 feet.

In looking at where the water is in the Byers Well, the BTA well, it has to be somewhere between the top set of perfs and the middle set. Looking at how this ties in with the Amoco Best Com, the top perf in the middle set is the minus subsea of 7785. The subsea of the base of the porosity on the Amoco well is -7785.

So on that basis, on our way you could say that the potential's there for the rest of that to have hydrocarbons in it.

If you take the more pessimistic outlook

and say that the water is right at the base of the top set of perfs, that would be a subsea of -7749.

If you take that subsea over to the Amoco well you would still have 33 feet of porosity above that interval, and I think on this basis you can say that the Amoco well's problems were probably largely due to a channeling of water from the bottom and that they have not adequately depleted the reservoir in that area.

I might point out the Amoco well made its initial potential natural; the BTA well producing first, then acidized with 200 gallons.

Okay, that's all I have on those two wells right now.

Q Let's see, we're looking at exhibit -- the information on the --

A Exhibit Six.

Q -- Exhibit Six?

A Right. The third well on this cross section is the Amoco Heller No. 1. This well was perforated over a gross interval from 11,326 to 11,436; however, the only porosity over 5 percent on the neutron curve is over the interval from 11,414 to 11,422 feet. The porosity is less than 10 percent and it's only an 8-foot interval.

The extreme deterioration in porosity from the other two wells is obvious just from the appearance

of the cross section.

The Amoco Heller Well was fraced with 12,500 gallons, which I think confirms that initially it was probably tight. It did potential for 379 barrels of oil, 5 barrels of load water, and a GOR to 2,459 cubic feet per barrel of oil, and in looking at the cross section it's obvious most of the perforations are above any perforations in the Amoco Best Com or in the BTA Byers No. 1.

Q In your opinion is the Amoco Heller Well producing in the same reservoir as the other two wells on the cross section?

A No.

Q Let's turn to Exhibit Number Eight, which I think is the production information on the Heller Well.

A Yes. This is a production graph on the Amoco Heller No. 1. The oil and gas scales and the symbols used are the same as on the previous graph. It's again on 3-cycle 5-year paper. The GOR scale again is on the right-hand side of the graph. The scale is different in that it goes from 1000 cubic feet per barrel of oil at the bottom to 1-million cubic feet per barrel of oil at the top.

The oil, which is shown by the solid curve on this cross section, is on a very steep decline.

The gas, which is shown by the x's is declining but not as steeply.

The initial GOR, which is shown by the broken line, started at less than 3000 cubic foot per barrel of oil, at about 2600 to 2800 cubic feet per barrel of oil. It has climbed rapidly and it is currently over 8000 cubic feet per barrel of oil.

Now this well during this period was flowing. It has been put on pump recently. I talked with Steve White, an engineer in Amoco's Hobbs Office. He said it was currently making 30 to 40 barrels of oil per day and approximately 250 MCF per day on pump.

Q How would you characterize the performance --

A That's in the first part of February.

Q How woudl you characterize the peformance of this well?

A Well, it's a typical limited reservoir oil well, probably volatile oil since its oil gravity is up over 50 gravity.

The pressure on the BTA Byers, and we'll look at the pressures later, showed very little depletion or difference between it and the Amoco Best Com No. 1. It would be hard to rationalize the BTA Byers with a high deliverability and high pressure being in communication with a limited reservoir oil well.

Q Let's turn now, Mr. Salmon, to a consid-

eration of the relationship of the BTA Byers Well to the Petro Lewis wells in the Southeast Lea Wolfcamp Gas Pool, and as an aid to that presentation, let me direct your attention to Exhibit Nine, which is the B-B' cross section.

A Yes. Cross Section B-B' is a north to south trending cross section. On the lefthand side it starts on the north, about two miles north of the BTA well, on the TXO Jordan No. 2-B. A trace of the cross section is shown on the map on the inset.

It then proceeds to the south through the BTA Byers Well; then to the south offset of this well, the Amoco Best Com No. 2; then to the south offset of that well to the Southeast Lea Unit No. 3; then to the south well from that, the Southeast Lea Unit Well No. 1. All these wells appear to -- the producers appear to be completed in the same carbonate bank.

The leftmost well on this cross section, as I said, is the TXO Production Corporation Jordan B Well No. 2. This well is completed as a gas well. It potentialed for 2.4-million cubic feet per day; GOR of 6875 cubic feet per barrel of condensate.

As shown by the lack of green color, it again is a tight well; does have a few feet colored black there in the perforations from 11,440-to-50 feet.

Just to the right of that well is the BTA

Byers No. 1, which we looked at on the previous cross section and again the extreme heterogeneity of the reservoir is shown by the differences in the porosity development.

The third well, or the middle well going to the right, is the Amoco Best Well No. 2. This is the south offset to the BTA Byers.

Again there's a total lack of neutron porosity over 5 percent. Right around 11,400 feet the density does get up over that and cross plotting those wells, those two curves would probably result in a porosity of about 7 percent over 4 to 5 feet.

It was perforated, as shown on the center track. It was acidized with 6,500 gallons and it swabbed noncommercial oil and water.

Again the extreme heterogeneity of the reservoir is shown by the differences in the porosity development between the two wells.

The next well going to the right is the Petro Lewis Southeast Lea Unit Well No. 3.

This well has a remnant of the porosity development. It has about six feet of porosity over 5 percent and the well was drill stem tested, flowed gas to surface too small to measure and it did reverse out 6 barrels of oil.

The pressures on this test, the initial

shut-in, 3,992; the final shut-in, 5,289, does indicate that the pressures in this tight test aren't adequately built up.

The last well on the right is the Petro Lewis Southeast Lea Unit Well No. 1. This is the best producer in the area from the Wolfcamp. As I said, it made 2 BCF, 357 barrels of condensate, and as shown by the amount of green shown on the sonic log, we would expect it to be a good well.

It was perforated initially from 11,400 to 500 and the perfs below there from 11,4 -- no, the initial perfs were 11, 400 to 470. The perforations from 11,470 to 11,500 feet were added in 1974.

Q Do you have a production graph of the performance of the Petro Lewis well --

A Yes.

Q -- that you've been discussing? Is that Exhibit Number Ten?

A Yes, that's Exhibit Number Ten. Now this graph is on 3-cycle 20-year semilog paper. The GOR is indicated byl the blue curve and the scale is shown on the left side of the graph, going from 1 to 1000 MCF per barrel.

The monthly gas production is indicated by the red curve and this scale is on the righthand side.

As you can see, the well for the first six months had an excellent deliverability, up in the range

of 70-million cubic feet and higher.

It then declined rapidly to a little bit over 10-million cubic feet per month where the decline flattened out; been on production since 1968 and it's been an excellent well.

The GOR for this well has bounced around quite a bit. It's ranged from 4000 cubic foot per barrel to generally less than 10,000 cubic feet per barrel.

In 1980 through 1983 the GOR appeared to be gradually creeping up and since that time the production has been very erratic.

This well also was initially completed natural.

The one producing well that we don't have on our cross sections is the well immediately to the right of this well, the Petro Lewis Southeast Lea Unit Well No. 2. This well appears to be tight on the logs. It was fraced with 21,000 gallons, and it did flow on test 384 MCF per day. I think the potential, if I remember, was .1 -- calculated open flow with 1.1-million cubic feet per day.

It also has produced since 1968 but its cumulative is only 285-million cubic feet plus 25,000 barrels of condensate.

Q Have you made a study of the pressure data available for the Wolfcamp wells in this area?

A Yes.

Q And have you presented that study in forms of a tabulation and a -- of the data, and a graph of that data?

A Yes. Exhibit Eleven is the graph of the data with the pressure on the lefthand side of the graph in thousands of psi and the date being on the horizontal scale.

Exhibit Twelve is this same data presented in a table format.

Q What's the reason that you have made a study of the pressure data, Mr. Salmon?

A This is to try to determine the pressure relationship between the BTA well and the other gas producers in the area and the Amoco Heller.

Q And what have you concluded about the pressure relationship among those wells?

A Well, it appears that the Amoco Byers, or the Amoco Best Com No. 1, very possibly had some pressure depletion from the Southeast Lea Unit well. Pressure on the BTA well is close to the pressure that the Best Com No. 1 had. I did get a pressure from Mr. Zinsmeister with Amoco on the Heller. When he gave it to me he told me it was a single dip-in point, that it wasn't built up, and I think that the data shows that it is not a built-up pressure and is inadequate for making any conclusion as to -- just on the

pressure data -- whether it's in the same field as we are.

Q That's only insofar as the Heller Well goes.

A As the Heller, yes.

Q All right. Using the pressure information available to you, what have you concluded about the relationship of the Best Com Well and the BTA well versus the Wolfcamp wells to the south? In the Southeast Lea?

A I think that both of the Amoco Best Com and the BTA Byers do show pressure depletion from that, from the production to the south.

The TXO Well two miles ot the north also could be showing some pressure depletion from that production.

Going over the --

Q Does it change your opinion with regards to the pressure depletion in the northeast quarter of 23 that Amoco drilled the Best Com No. 2 Well in the southeast of the southeast of 23?

A No, as I said, this is a very heterogeneous reservoir. It could very easily be trending in a north/south direction over a fairly thin streak and could bend around between those two wells, or between the Best Com No. 2 and the Southeast Lea Unit Well No. 3.

You can't prove this geologically but I

think the pressure data indicates it's a definite possibility.

Q What have you concluded with regards to the pressure depletion in the area insofar as that information is useful to reach a conclusion about spacing patterns?

A I think that the pressure is transmitted very well over an area where the porosity carries.

Going over the pressure data in detail, the first pressures we have available are 1968 on the Southeast Lea Unit Well No. 1. This well was DST'd twice. The pressures on one DST at 11,430 feet were 6,502 pounds.

On the second DST the pressures were 6,616 pounds.

Now, closely behind that, in June of 1968, the Southeast Lea Unit Well No. 2 was drill stem tested. The initial shut-in on that was 6,791 pounds.

The final shut-in was 5,336, indicating an insufficient build-up on the test or depletion during the test.

But these tests established an initial reservoir pressure for the Wolfcamp carbonate to be between 6,500 and 6,800 pounds, in that range.

The Southeast Lea Unit Well No. 3 is the next pressures available. It was DST'd in 1982. Again I think the pressures are not adequately built-up in a tight

well, and are very little help in determining anything, but the pressures on the initial shut-in were 3,992 and on the final shut-in were 5,389.

Following this the Amoco Best Com No. 1 was drilled in 1983. In April of 1983 they had a 12-day shut-in where the pressure was 4,717 pounds. The following month they had a 3-day shut-in of 4,654 pounds.

Looking at the excellent porosity on the well, the good permeability, I think in 12 days that well would probably build-up and that would be a good pressure for the area at that time.

The Amoco Heller was drilled in 1985. Its pressure was 4,140 pounds. As I mentioned before, it's a one point dip in pressure. The Amoco personnel that I talked to, Mr. Zinsmeister, didn't think it was built-up, since the well took such a big frac to turn it into a producer, and I think just from that data alone you can think that it may not be built-up.

The later pressure on the TXO Jordan B No. 2 and the BTA Byers No. 1, that are higher than this pressure, confirms that the pressure in that well probably wasn't built-up.

The TXO Well, which is two miles north of the BTA Byers, had a 63-hour shut-in pressure of 4,683 pounds. I got this data out of the Commission files. The

pressure was flat for the last 48 hours of the shut-in and I think that that indicates it's a good pressure.

On the BTA Byers the DST pressure was 4,531 pounds. The test chart was flat. They had a 13-day shut-in of 4,526 pounds. I think those are good pressures.

Now there are two possible interpretations from this data.

One interpretation would be, and I think that it's the most probably correct, is that the the Southeast Lea Unit Well No. 1 and 2 have depleted the area for -- around the Amoco Best No. 1, the Byers No. 1, prior to their completion and maybe even as far north as the TXO Jordan No. 2-B.

The other interpretation would be that the original pressure around the Amoco Best Com No. 1 is 1,785 pounds -- at least 1,785 pounds lower than the initial pressure in the Lea Southeast Unit well, and if that is the interpretation, then the Amoco Best No. 1, the TXO Jordan B No. 2, and the BTA Byers are seeing close to virgin reservoir pressure.

Since good pressure data is not available on the Heller, the pressure is of no help in determining the status of that well.

Q Let me have you summarize, Mr. Salmon, your opinions on the various issues and then have you iden-

tify some of the factors that you've utilized to support those opinions.

Starting off, first of all, with your study to determine whether or not you have an opinion that the Byers No. 1 Well is a gas well producing from a gas reservoir.

A The Byers No. 1 in my opinion it's definitely a gas well producing from a retrograde gas condensate reservoir.

Q Do you base that opinion in part upon your analysis of the information received from CORE Lab, the pvt study --

A Yes.

Q -- and the fluid information?

A Yes.

Q Is that a typical study that is done by individuals in your profession and relied upon by you as engineers --

A Yes, it is.

Q -- and is it typically used to determine that the hydrocarbons in reservoir conditions are either gas or oil?

A Yes, it is.

Q With regards to the opinion that you've expressed that the Amoco Heller Well to the east of your lo-

cation is an oil well and is separated from the BTA gas well in Section 23, summarize for us the factors that make up or include that opinion?

A The factors there are the, of course, the initial GOR on the potential, the initial producing GOR, which I think placed this well as an oil well up structure two wells that appear to be gas wells.

The second factor is the decline curve on the well which is typical for a limited reservoir oil well. You generally don't have oil wells in the same reservoir up structure of gas wells.

Q Let me ask you your opinion with regards to the spacing pattern and the efficiency of dedicating the northeast quarter of Section 23 to the BTA well.

A Well, a gas well with excellent permeability as evidenced by the deliverability of the BTA Byers Well, as evidenced by a drill stem test that we have where the pressure just broke flat, which indicates an excellent permeability, the well can drain 160 acres. If the reservoir extends 320 acres I think it could drain that and I think that the New Mexico Conservation Commission pretty well accepts that a well can drain -- a gas well can drain 320 acres.

Q Would a 160-acre gas spacing be cnsistent with the other Wolfcamp gas spacing in the area?

A It would be consistent with the Lea Southeast Wolfcamp. To the north you do have a field with 320-acre spacing.

Q Do you have an opinion as to whether or not the spacing was less than 160 you as an operator would be forced to drill an unnecessary well?

A We would eventually be forced to drill additional wells to protect and hold our acreage and keep other operators from picking up the leases after the primary terms and drilling the leases, yes.

Q In your opinion is that expense of additional wells necessary in this reservoir?

A No, I think the well that we have will drain the reservoir.

Q Additional wells in the northeast quarter, in your opinion at this time based upon available information, would not produce reserves that would otherwise be produced by the -- not otherwise be produced by the Byers Well No. 1?

A No.

Q You concluded for us earlier that the Best Com No. 1 Well did not have an impact, or a significant impact, on the ability of the west half of the northeast quarter to contribute productive acreage to the Byers Well.

A Right.

Q And that opinion was based on the fact that that well watered out before it was pressure depleted?

A Right.

Q And the fact it watered out was attributable to the low perforations that Amoco placed in that well?

A Yes.

Q And those low perforations led, then, to the water channeling and the drowning out of the production.

A Yes.

Q As opposed to having the west half of that quarter section being depleted of reserves.

A Right.

Q Do you have an opinion, Mr. Salmon, as to whether the -- Mr. Salmon, for this particular reservoir do you have an opinion as to whether it is rate sensitive? In other words, must the producing rates of the wells in this gas reservoir be controlled in some fashion in order to maximize the ultimate recovery?

A No, I don't think so. The small drawdown in pressure in the BTA Well, I think indicates it's not rate sensitive. You wouldn't expect it to be rate sensitive, no.

Q In your opinion, Mr. Salmon, will approval of this application, the establishment of 160-acre gas pool under statewide rules for 160-acre gas well be the

optimum method to handle the production and spacing for this reservoir?

A Yes, I think it will.

MR. KELLAHIN: That concludes my examination of Mr. Salmon, Mr. Stogner, and we would move the introduction of his Exhibits One through Twelve.

MR. CARR: No objection.

MR. STOGNER: No objection? Exhibits One through -- what did you say?

MR. KELLAHIN: Twelve.

MR. STOGNER: Exhibits One through Twelve will be admitted into evidence.

Mr. Carr, your witness.

CROSS EXAMINATION

BY MR. CARR:

Q Mr. Salmon, if I understand BTA's application, what you're seeking is either the contraction of the West Osudo Wolfcamp Pool, deleting the northeast quarter of 23 and making that a separte new gas pool, or extending the Southeast Lea Wolfcamp Pool up to and including the northeast quarter of Section 23.

A Yes.

Q And in either event you would have a 160-acre unit dedicated to a gas well.

A Yes.

Q If either of those are approved by the Division, BTA will be able to produce substantially greater quantities of oil and gas from that well than under present rules, is that not true?

A Yes.

Q And you'll be able to also hold the acreage without drilling additional wells.

A We will hold the full northeast quarter. We would, I think, lose the southeast quarter after the primary term of the leases --

Q But you would hold the entire northeast quarter without additional drilling there.

A Right.

Q If the rules stay as they are, there would be -- you would need to drill additional wells on 40 to hold that acreage.

A Yes, past the primary term.

Q Now if I understand your testimony, we don't have a dispute here today that the gas/oil ratio for the BTA well in the northeast of Section 23 is such that it would be classified an oil well if we adjusted the gas/oil ratio.

A I don't think we -- there is a set cutoff in the New Mexico rules, but --

Q Is that --

A -- I think it is low enough to where, in a lot of cases, it would be classified as an oil pool, yes.

Q It has a gas/oil ratio below or less than 100,000 cubic feet of gas per barrel of oil, does it not?

A Yes.

Q So then if that is the cutoff, it would be classified as an oil well.

A Yes, if that's the cutoff.

Q Okay. So looking at the gas/oil ratio you don't feel you have an accurate reading on this particular well, is that correct?

A If that's the only piece of data you looked at, correct.

Q And you've concluded that one of the things that signalled that you might look at the situation in the reservoir was the gravity of the oil.

A Yes.

Q And the gravity of the oil was somewhere in the neighborhood of, what, 50 degrees?

A Yes, it was up -- the gravity -- it's above 50. It's in the 53 to 55 gravity range.

Q And that would indicate to you that you might have a volatile reservoir situation?

A Yes, it could indicate a possible vola-

tile oil type reservoir or it could indicate a retrograde gas condensate reservoir, either one.

Q And when you get over 40 that -- degrees, that's what that sort of tells you?

A Oh, you have oilfields, you know, that 40 to 45 degrees are generally oil fields. When you get up over 50, then you start getting into the volatile oil and the retrograde gas condensate.

Q And the gravity of the oil in the Heller Well, the Amoco well, is also over 50, is it not?

A Yes.

Q Now, if we declare this a gas well, would this be a proration gas well? Or do you know? I don't.

A I don't know right offhand. I don't think it would be.

Q All right, do you have any idea what -- at what rates this well would be permitted to produce the hydrocarbons under it?

A As far as the Conservation Division rules, I don't think that there is a limit.

As far as practical rules on deliverability -- delivering gas into the pipeline, these days I think it would probably be in the 3-to-6-million cubic feet a day range.

Q And that is in excess of what it could

now as an oil well.

A Maximum. Yes, as an oil well it would have 2000 times 365 barrels of oil and 730 MCF a day.

Q Okay, and if you -- if this is classified as a gas well, how much of the oil will you be able to produce?

A We'd be able -- you mean over the life of the well or --

Q No, I mean daily. Will you be able to produce more than a 365 barrel depth bracket allowable?

A It's conceivable that if you produce -- yes, it's conceivable that you could.

Q So that is the real benefit that BTA would derive, is it not?

A Yes. BTA would derive a benefit from a higher producing rate.

Q Now, to establish that you had a retrograde condensate reservoir, you ran a pvt test.

A Yes.

Q And from that you were able to conclude that at a reservoir pressure, that the hydrocarbons were in a gaseous state, is that correct?

A Yes.

Q Were you able to make a similar computation for the reservoir under the Amoco well?

A No.

Q You don't have pressure data that --

A You mean under the Amoco Byers or the Heller --

Q I'm sorry, the Heller Well.

A Under the Heller Well, no.

Q You don't have really sufficient pressure data to do a lot with the Heller Well, isn't that fair to say?

A Well, we don't have sufficient pressure data and you can't at this time go back to the initial producing conditions for the well. You -- at this point you can't get that.

Q So that's something we don't know about that well.

A Right.

Q Now if we take a look at -- I'll work backward through these, your Exhibit Number Nine, which is the cross section, the north/south cross section, one of your proposals, I understand, is to extend the Southeast Lea Wolfcamp Pool to the north, is that correct? Is that not right?

A That is one of the options that would be acceptable to us, yes.

Q And to that you would have take in the

Petro Lewis well that was incapable of commercial production, is that not right? It lies between the existing Southeast Lea and the BTA Byers No. 1?

A The No. 3 Well did DST gas. It's currently a Morrow producer. It's possible that with large stimulation it could be turned into a producer.

Q In the Wolfcamp?

A The No. 2 Well, yes.

Q And that's the well that's the second well from the right on your cross section that has just a very small portion of the log shaded in green.

A Right.

Q And that's what you called, I think, a remnant of porosity.

A Yes.

Q If you look at this whole cross section, I believe it was your testimony that they're all in the same carbonate reservoir.

A Carbonate bank, yes.

Q Do you think they're all in the same pool?

A I think with the probable exception of the Heller, yes.

I think that the area right immediately around the Southeast Lea Unit No. 3 is probably so tight

that you probably won't see any depletion of that area.

Q So what you're seeking is a possible extension of this pool to the north and you have a well that was wet in it and well that had only a remnant of porosity in it.

A Well was wet, which well is that?

Q Isn't that the Amoco well immediately north, the Best Com No. 2?

A The Best Com No. 2 was tight. It did swab oil and water at low rates.

Q It was never able to -- made into a commercial producer, was it?

A This is correct.

Q And as to the Petro Lewis Well immediately south of that, was it ever a commercial producer?

A The No. 3 Well?

Q Yes, sir.

A It's a commercial producer in the Morrow.

Q But not in the Wolfcamp.

A Not in the Wolfcamp.

Q And never in the Wolfcamp.

A Never in the Wolfcamp.

Q And you're proposing --

A It (not clearly understood.)

Q And you're proposing to extend the South-

east Lea to include the acreage on which both of those wells are located.

A Yes.

Q Now, if we look at the Petro Lewis No. 3, you believe this is in the same reservoir as the BTA Byers No. 1.

A The No. 3?

Q Yes, sir.

A The porosity -- well, you're in the same carbonate bank. At that location, no, I don't -- that well is a tight well. It could respond to stimulation and end up making a well.

Q And if it did, it's your opinion that that would be in the same pool?

A If it did, yes, I think it would probably be in the same pool.

Q If we look at your cross section that's Exhibit Number Six and we look at the Heller No. 1 it also has a very small section shaded in green. Isn't it possible that what we have there is also just a remnant of porosity?

A I think it is a remnant of porosity, yes.

Q Okay, so if we go from your Byers Well south to the Petro Lewis No. 3, the remnant of porosity in your opinion would be in the same pool but if we go to the Amoco Heller to the east it is not.

A Yes.

Q Now if we look at these zones on the cross section, Six, there is a small shaded area on the Amoco Heller Well. That shaded area is the producing interval, is it not, in that well?

A The entire perforated interval is the producing interval.

Q All right, and --

A It was fraced with 12 -- hold it, are you talking about which well?

Q I'm sorry, I'm talking about the Heller Well, the one on the right.

A Okay, yes, it's perforated over approximately a 100-foot interval.

Q Okay, now the green shaded area on this log section shows what?

A The green section shows porosity.

Q Porosity, so is it fair to assume that that is where the production is coming from in the Heller Well?

A It could be, yes. It most -- the well was fraced with 12,500 gallons. When you frac a well you can break into zones that don't show up on the log --

Q So there may be vertical communication.

A -- so there may be vertical communica-

tion. The porosity zone that you see there is probably the most likely zone.

Q And that zone would correlate with part of the producing interval in the BTA Byers Well, would it not?

A Yes, it would.

MR. CARR: I have nothing further.

MR. STOGNER: Mr. Kellahin, any redirect?

MR. KELLAHIN: No, sir.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Salmon, as far as the Heller Well goes, do you know what the gravity of oil coming out of that well is?

A It's between 53 and 55; gravity of that well is about the same as it is in our well. They're both in the 53 to 55 range; depending on where you catch your sample you'll get a range in there somewhere.

MR. STOGNER: I have no further questions of this witness.

Are there any other questions of Mr. Salmon?

MR. KELLAHIN: No, sir.

MR. STOGNER: He may be excused.

Do you all have any closing statements?

MR. CARR: Very brief.

MR. STOGNER: Mr. Carr.

MR. CARR: May it please the Examiner, BTA is before you today having drilled a well in the West Osudo Wolfcamp Pool classified as an oil well. It's a very good well and they're interested in producing it at higher rates than permitted under existing rules, so they seek to do one of two things, either create a new pool for this well becaue it's a good well, or extend the Southeast Lea Wolfcamp Pool to include it.

I submit to you that, first of all, in regard to extension of the Southeast Lea Wolfcamp, this was not included within the call of the case. It would require readvertisement.

That aside, it is asking you to extend a pool over an area in which there are two noncommercial wells and I don't believe anything in the record would justify doing that from an engineering point of view.

If either of the alternatives sought by BTA are granted, we will have a gas well. The gas

well will be nonprorated and their purpose will be -- their purposes will have been achieved in that they'll be able to produce at a higher rate and they won't have to do the drilling that would be required to develop the oil pool.

Amoco is here today, as is Mr. Byers, in opposition to this application. We believe that the evidence shows that these are the same reservoir. We may have a smaller portion of it but the data BTA has presented I think is woefully inadequate in certain respects.

First of all, they talk about the well that Petro Lewis operates to the south that has a small porosity shelf and they'll stand here before you and claim that this would be in the same reservoir and that the reservoir does extend to the south.

They admit that the zones correlate between their Byers Well and the Amoco Heller Well to the east.

They talk about having and have presented pvt information that they have prepared which would tend to show, perhaps, a retrograde condensate condition in the reservoir. They were directed or pointed this way because of the gravity of the oil in their Byers Well, and yet if we look at it, the gravity of the oil in the Amoco Well would certainly indicate that the oil is the same and there's no pvt information on that. Simply showing what

they have in their well, it seems to me, and breaking it and calling it a separate pool, is an inadequate presentation and if you accept their argument, we submit that you'll be authorizing drainage which will have two sets of rules in the same reservoir, and we therefore request that the application be denied.

MR. STOGNER: Thank you, Mr. Carr.

Mr. Kellahin?

MR. KELLAHIN: Mr. Examiner, it's undisputed that Mr. Salmon has used the best available information, using standard engineering practices, to tell you under reservoir conditions what type of well he has.

It is undisputed that that testimony shows that this is a gas reservoir and that the BTA well produces from a gas reservoir.

What Amoco wants to do with their acreage is certainly up to them. If they want to be in our pool, that's fine; if they don't, why, that's fine with us. If they want to stay on forties, that's all right, too. If they want to stay on 160's, the gas -- that's fine with us, too.

They have not provided you any information to demonstrate what ought to be done with the Heller Well. It is undisputed that Mr. Salmon has told you

that in his opinion, and it's the only opinion you have before you, that that is in a separate reservoir. You're stuck with a gas well and you've got to be able to do with it, one of the logical things to do is simply extend the closest gas pool that you have.

I mean you can do that. The District Office can simply extend it and it's done. It does not matter that there are wells in the area that don't produce commercial Wolfcamp; the testimony is that it was pressure depleted from Wolfcamp gas wells. It shows in the evidence that this is a gas well.

You cannot ignore the information Mr. Salmon has given you but it does not preclude you from a number of options.

The option is that you can space this on 160 acres and let Amoco come in with their own presentation to demonstrate with their own pvt study what they well is or is not. If Mr. Carr wants to argue it's an oil well, let him bring in his proof, but don't believe him standing here without an expert to tell you that we ought not to have a gas well when in fact we have a gas well. He can't deny it, it's there, and no amount of verbiage is going to change that into an oil well.

What is your obligation, and that is to space on what is appropriate for the reservoir.

Don't make us drill additional wells when one well will do.

The fact that we can produce at a higher rate, the undisputed testimony is it does no damage and there's certainly no testimony at all before you that there's been any drainage. The first time I ever heard that idea is when Mr. Carr gave it to you. There's no evidence of drainage here; no proof of it at all. If he's concerned about drainage, where is his proof?

The only thing you can do with what you've given us is to treat this as a gas well. Your options are to extend the existing gas pool or to create a new one for us. We don't want to infringe upon Amoco. We don't think they're in the same reservoir for us, and that's our expert's opinion. If they believe otherwise, let them come demonstrate it to you.

We don't want to draw their well into our pool. We don't see any reason for it. They can produce at whatever rates they can next door; that's fine with us, but let us have what we think is appropriate in this case and please grant the application.

MR. STOGNER: Thank you. Is there anything further in this case?

MR. CARR: Mr. Stogner, there are several letters that I'm asking just be included in the record of the case from Mr. Byers, Mr. Nixon, and others.

MR. STOGNER: I have received several correspondence to be read into the record today. I will not read them; however, I will allude to them and they will be made part of the record.

One Alton C. White, Junior, in Austin, Texas objects.

James W. Nixon, M.D., and a James W. Nixon, Junior, M.D., both object, San Antonio, Texas.

A Mr. (unclear) Johnson of Austin, Texas, a letter of exception, and Adolph A. Karmel, that's K-A-R-M-E-L, Junior, of Austin, Texas, also sends an objection. Evidently they are interest owners within the acreage discussed today.

They will be made part of the record.

If there's nothing further in Case Number 9078, I do have one instruction for both attorneys today. Would you both submt me a rough draft order within the next ten days?

At that time I'll keep the record open for the receipt of just those particular items.

That will conclude this case and I'm going to take a thirty minute break.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of this portion of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

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

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

22 November 1988

EXAMINER HEARING

IN THE MATTER OF:

In the matter of Case No. 9078 being reopened pursuant to the provisions of Division Order No. R-8450, which created the Southwest Osudo-Wolfcamp pool in Lea County, New Mexico.	CASE 9078

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division:	Robert G. Stovall Attorney at Law Legal Counsel to the Division State Land Office Bldg. Santa Fe, New Mexico
For BTA Oil Producers:	W. Thomas Kellahin Attorney at Law KELLAHIN, KELLAHIN & AUBREY P. O. Box 2265 Santa Fe, New Mexico 87504

I N D E X

E X H I B I T S

MR. STOGNER: Call next Case Number 9058.

MR. STOVALL: In the matter of Case Number 9078 being reopened pursuant to the provisions of Division Order No. R-8450, which created the southwest Osudo Wolfcamp Pool in Lea County, New Mexico, upon the application of BTA Oil Producers.

MR. STOGNER: Call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin & Aubrey. I'm appearing today on behalf of BTA Oil Producers. They were the original applicant in the case that was heard by the Division back on March 4th, 1987, before you, Mr. Stogner.

My witness then is the same witness I have today, a petroleum engineer. His name is Steve Salmon.

MR. STOGNER: Are there any other appearances in this matter?

There being none, will the witness please stand?

(Witness sworn.)

STEVE SALMON,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Salmon, would you please state your name and occupation?

A Yes. My name is Steve Salmon. I'm currently employed by BTA Oil Producers in Midland, Texas, as Manager of Development and Reservoir Engineering.

Q Mr. Salmon, you testified as a reservoir engineer on behalf of your company before Examiner Stogner on March 4th, 1987, in the original case that established the West Osudo Wolfcamp Pool?

A Yes, I did.

Q And have you continued your studies of the production and information available from this pool?

A Yes, I have.

Q And pursuant to that study have you additional recommendations and conclusions and opinions for Mr. Stogner today?

A Yes, I do. At the previous hearing I testified that BTA 8605 JD-Byers No. 1 was completed in a retrograde gas condensate reservoir. Based on that testi-

mony, BTA was given a temporary new gas pool designation with 320-acre spacing.

Q Is it still your opinion today that that pool ought to continue on 320-acre spacing as a retrograde condensate gas reservoir?

A Yes. I think it should continue that. It may be possible the Commission would want to make this temporary, since the reservoir at this time is in a state of flux with water encroachment into the well.

MR. KELLAHIN: At this time, Mr. Examiner, we tender Mr. Salmon as an expert reservoir engineer.

MR. STOGNER: Mr. Salmon is so qualified.

Q Mr. Salmon, would you refer to what is marked as Exhibit Number One and let's refresh the Examiner's recollection about the original fact situation involved in this application.

A Yes. Exhibit One is the same Exhibit One that was presented in the previous hearing. It's an insert from the Midland Map Company producing zone map on a 1 inch equals 6 mile scale, strictly to locate the Southwest Osudo Wolfcamp Gas Pool in relation to the regional area.

The location of this field is colored in

and the small blue area just to the right of center of the map, located approximately 17 miles northwest of Eunice, New Mexico, and approximately 19 miles southwest of Hobbs.

This pool is in the transition area between the Northwest Shelf to the west and the Central Basin Platform to the east, with the approximate dividing line between these two provinces shown by the heavy dashed line just west of the pool.

Q Let's turn now, sir, to Exhibit Number Two and discuss specifically the area that's included within the current West Osudo Wolfcamp Pool.

A Okay. This is a Wolfcamp production --

Q I'm sorry, I said west. I meant the southwest.

A Yes.

Q The subject pool.

A Yes, okay. This is a Wolfcamp production and test data map. The area included in the pool at this time is the west half of Section 23, 20 South, 35 East, which is outlined in red.

Q The only current producer in the pool is your BTA Byers Well in the east half of the east half of that section?

A Right and it is designated by the red dot.

Q As we move farther east in the Section 24, in what pool is the Amoco Heller Well?

A It is designated by the blue to be in the Osudo Wolfcamp West Field, which is an oil field.

Q Part of the original discussion for a decision by the Examiner in March of '87 was whether or not the Byers Well was in fact in a separate reservoir from the Heller Well.

Does that continue to be your opinion based upon subsequent information generated since the last hearing?

A Yes.

Q Describe for Mr. Stogner what the current status of production is for the Byers Well.

A The Byers Well, the production shown on this map is for July of 1988. We will has some up-dates on different exhibits for this specific well later on, but in July it made 8.8-million cubic feet and 2,510 barrels of condensate.

Q When we look to the west of the Byers Well we find the Amoco Best Well and that well was watered out, plugged and abandoned at the time of the hearing back in March of '87.

A That's correct.

Q All right, sir. Let's turn now to the

structure map which is Exhibit Number Three. Would you again refresh our memory about what the structural situation is in the reservoir?

A Yes. This structure map covers the same area as the previous map. It is contoured on the Third Bone Spring sand. The contour interval is 100 feet and the structure is on an east to west dipping anticline. You do have a slight reversal on the south part of the map around the Lea Southeast Unit Well No. 1, and based on the list and the nature of the logs in the area, I feel that the trapping mechanism in this area is strictly stratigraphic.

Q There have been no subsequent wells drilled in this pool?

A No.

Q All right. Let's turn now to the cross section, Mr. Salmon, and this will be Exhibit Number Four.

A Yes. This is a cross section going from west to east from the Amoco Best Gas Com No. 1 on the left, through the BTA Byers No. 1 in the center, to the Amoco Heller to the right or on the east side of the cross section.

The well names and data for the wells is shown at the bottom of the log. The drill stem tests are -- we only have one on this cross section shown to the right of the log on the BTA Byers No. 1. The perforations

are shown by the rectangle in the center track of the log. The porosity greater than 5 percent on the neutron log is colored in green on the log. The correlation line shown on this cross section, the top line is the Third Bone Spring sand. We felt like this was a good correlation marker through the area to draw a structure map on and that is what we drew our structure map on.

The next line coming down is the top of the Wolfcamp Lime, which is the top of the lime bank that produces from the Wolfcamp. And then the bottom line is the base of the Wolfcamp lime.

The production in this Wolfcamp lime bank is between the top of the lime and the base of the lime.

Q I realize you have subsequent exhibits that detail specifically the production information from your Byers Well, but this might be a useful display to explain to Mr. Stogner why you believe the reservoir is in a state of flux and how you as the operator propose to modify the production by altering the perforations in the wellbore to continue to produce the reservoir.

A Yes. Subsequent exhibits will show that the water production on the BTA Byers No. 1 is increasing drastically; that the well is watering out. The well has recently been put on a beam pump to pump the water off. As

you can see on the log on the Byers, there is some porosity above the current perfs. When the existing perfs water out, we will be attempting a plug back to the upper pay.

Q That is similar to the manner in which the Amoco Best Well to the west of your location was operated, was it not, Mr. Salmon?

A Yes. The Amoco Well initially perforated with the perfs shown on the righthand side of the center track on the Amoco Best Well. These are labeled 4-1-83. Now they essentially perforated the whole porosity interval in their well at one time.

This well watered out from those perfs; in August of '84 it was recompleted with the perfs shown to the left of those and they attempted another recompletion in May of '85 when those perfs watered out, but it was pretty much unsuccessful.

Q Let me direct your attention to Exhibit Number Five and have you discuss for us the production information as plotted for the Amoco Best Well.

A Yes, sir. Exhibit Five is the production graph on the Amobo Best Well. The scale for oil, barrels of oil per month, barrels of water per month, and MCF per month is on the left side of the graph.

The scale for GOR is shown on the right

side of the graph, and the vertical scale is a 3-cycle log scale, the horizontal being a 5-year linear scale.

When the well initially came on production it had a very good producing rate; an oil rate of 4500 to 5000 barrels of oil per month. The gas rate was up over 20-million cubic feet per month. It had a very good rate initially.

The well then did start making water and the water production is shown by the circles with the dots in them. Once it started making water the production characteristics for the well became very erratic.

In August of '84 when they tried the recompletion, just looking at the graph it looks like it didn't do a whole lot of good, but the well did continue production through the middle of '85.

Q Let me direct your attention to Exhibit Number Six, now, Mr. Salmon, and have you show us the plot of production information from the Byers No. 1 Well.

A Okay. The scales on this graph are all shown on the left side of the graph. The oil production is shown by the dots connected with a solid line. The gas production is shown by the unconnected X's. The initial rate for this well was up around 40-million cubic feet per month. It had a very good condensate rate of over 6000 barrels per month.

The gas and condensate both had a drastic decline since that time. Since the water production started up in the first part of 1987, again the water production is shown by the circles with the dots in them.

The water production increased drastically, peaking at up close to 20,000 barrels of water per month. The GOR during this time, up until November of '87, the GOR being shown by the dots connected with a broken line, the GOR was pretty constant up until November of '87, between 6-to-7000 cubic foot per barrel of oil.

In November we installed a compressor. Gas was used in the compressor and this does not show up in the sales and production. Indeed, this gas being used in the compressor, the GOR did start down at that time.

I made an estimate to -- of the gas used in the compressor, assuming that December would have had 6,900 cubic foot per barrel of oil, which is in the range of what it had been running. This showed that we were using about 3100 cubic foot per month in the compressor.

The unconnected triangles are the GOR plugging this gas back into the calculation. They do still show some slight GOR decline but not near what we had seen before.

Q I direct your attention to Exhibit Number Seven, Mr. Salmon, and have you identify and de-

scribe that information.

A Okay. As I stated previously, the BTA Byers No. 1 started loading up with water. It got to the point where it would not produce consistently.

In September of '88, or excuse me, in November the 2nd of 1988 we did put it on a beam pump to lift the water off and since that time the well's been producing into a 20-pound Phillips line with a beam pump pumping the water off.

We have approximately two weeks worth of data. The production seems to have somewhat stabilized though it appears to still be dropping and our GORs since that time are still below what they were initially. I feel that this is probably due to the water production coming through the reservoir and possibly picking up some condensate and carrying it into the well. This may be some condensate that may have settled out of the gas.

It's also possible you could have a very thin layer of condensate laying on top of the water, but whatever, I feel that the lower GOR here is strictly due to the water bringing in some condensate.

Q Based upon your continued studies of this reservoir, Mr. Salmon, what are your conclusions and recommendations to Mr. Stogner?

A We still have a pretty good pressure in

the reservoir. The initial pressure was a little over 4500 pounds.

On September the 22nd the well had died and had been dead for several days, and we went out and took a pressure on it. The pressure was still 3,450 pounds, so we still feel that we have an appreciable reservoir pressure. I think the amount of production shows this.

Since the production right now is in a state of flux, it has not exhibited the GOR increase that would have, I think, been expected for a retrograde condensate mainly due to the water influx. The way it's declining, the life in the current zone would appear to be less than a year and at the time that it's uneconomical, we will plug back. We think we do have a chance to have a good gas well at that time and I would like -- I would recommend that the current rules be continued.

Q Based upon your additional studies of the reservoir, do you see any indication of communication between the Byers Well in your reservoir and the Amoco Heller Well in the reservoir to the east of you?

A No, I don't. The Amoco Heller Well continues to be a marginal well productionwise. It's currently making 55 barrels of oil and 3004 MCF per month. The last few months it's reported no water. The most water

it's reported in the past year has been just a few barrels of water per day. I see no communication between our well and the Heller Well.

Q Do you have a recommendation to the Examiner as to what the proper rate of withdrawal from the reservoir ought to be?

A At this point that question I don't think can be answered. The water production encroachment has essentially limited the production from our well. We have no evidence (unclear) water would make under a higher gas production. At the current time the production is pretty limited and we're not going to be producing high volumes of gas (not clearly understood.)

Q Your current production is shown on Exhibit Number Seven with the gas, the water and the condensate production?

A Yes.

Q Is this producing rate the result of reservoir limitation or limitations of your beam pump?

A The beam pump is pumping at capacity. We have -- we're pumping water up the tubing; some gas and condensate is coming up the tubing; it's also flowing gas and condensate out the annulus. So we are producing at the maximum rate that we can.

Q Do you have a recommendation to the Exa-

miner as to what additional period of time you would extend the temporary rules for this reservoir?

A Based on the graph on the BTA Byers, and current test data indicates the previous declines are still valid, it looks like the well would reach an economic limit from the current zone some time in the next year. At that time we would plug the well back and attempt a recompletion. So I would recommend that we extend the current rules for a period of a year.

MR. KELLAHIN: Mr. Examiner, that concludes our presentation of Mr. Salmon's testimony. We move the introduction of his Exhibits One through Seven.

MR. STOGNER: Exhibits One through Seven will be admitted into evidence at this time.

I have no further questions of this witness.

Are there any other questions? Are there any questions of Mr. Salmon?

He may be excused. Mr. Kellahin, would you provide me with a rough draft order?

MR. KELLAHIN: Be happy to.

MR. STOGNER: Is there anything further in Case Number 9078?

The case will be taken under advisement.

C E R T I F I C A T E

I, SALLY W. BOYD, C. S. R. DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) 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 CSR.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9078 (Reopened) heard by me on 22 Nov. 1988.

Michael E. Stogner, Examiner
Oil Conservation Division

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

EXAMINER HEARING

IN THE MATTER OF: Case 9078

In the matter of Case 9078 being Reopened pursuant to the provisions Of Division Order Nos. R-;8450 and R-8450-A, both concerning the Southwest Osudo-Wolfcamp Gas Pool in Lea County, New Mexico.

TRANSCRIPT OF PROCEEDINGS

BEFORE DAVID R. CATANACH, EXAMINER

STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO
January 10, 1990

ORIGINAL

CUMBRE COURT REPORTING
(505) 984-2244

A P P E A R A N C E S

FOR THE OIL CONSERVATION DIVISION:

ROBERT G. STOVALL, ESQ.
State Land Office Building
Santa Fe, New Mexico 87501

KELLAHIN, KELLAHIN & AUBREY
Attorneys at Law
Post Office Box 2265
Santa Fe, New Mexico 87504-2265
BY: W. THOMAS KELLAHIN, ESQ.

I N D E X

E X H I B I T S

MR. CATANACH: Call the hearing back to order and call Case 9078.

MR. STOVALL: In the matter of Case 9078 being reopened pursuant to the provisions of Division Order Nos. R-8450 and R-8450-A, both concerning the Southwest Osudo-Wolfcamp Gas Pool in Lea County, New Mexico.

MR. CATANACH: Appearances in this case?

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin & Aubrey appearing on behalf of the BTA Oil Producers. I have one witness to be sworn.

MR. CATANACH: Will the witness be sworn.

STEVE SALMON,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows.

MR. KELLAHIN: Mr. Examiner, we have five exhibits to discuss with you this morning. I've also given you a copy of the two prior orders that apply to this particular reservoir.

By way of introduction, Mr. Examiner, this witness I'm about to present, Mr. Salmon, is a reservoir engineer that testified at both of the two prior hearings, and he's here to testify again.

We're dealing with a retrograde gas

condensate gas reservoir. This is the west Osudo-Wolfcamp Pool. The pool is a one-well reservoir, and it was initially brought before Examiner Stogner back in March of 1987.

There was opposition to the creation of the pool at that time because there was concern by AMOCO, who had the offsetting Wolfcamp well to the east of us, as to whether or not our reservoir was in communication with theirs.

It was determined, based upon the evidence, back in 87 that they were in fact separate. Division created a separate pool and asked us to come back then in 1988 to discuss specifically what ought to be the producing rate for the reservoir.

There was a question in 87 and again in 88 as to what would be the appropriate producing rate in order to not waste the gas and, correspondingly, recover the maximum amount of oil in the reservoir.

At the second hearing of this case in 1988, there was no further opposition to what we had proposed to do. At that point it had become conclusive to all the technical people that this in fact was a one-well reservoir pool.

The purpose of our testimony today is to ask you to make the rules that we are using for this

reservoir permanent. The rules provide the opportunity to produce this as a gas reservoir with corresponding liquids.

This reservoir is unique in that it does not fit conveniently into the conventional thinking about whether this is a gas or an oil reservoir. It simply represents properties of each. And therein lies the unique character of the retrograde gas condensate reservoir.

Mr. Salmon has carefully reviewed the information available. And it will be his testimony that for the best interests of all the interest owners, including royalty and working interest owners, that it serves no useful purpose to set up a procedure whereby the pool well gets reclassified as an oil well and, subsequently, a gas well and flipping back and forth. The interests will be the same.

And for the economy of processing and administering the well, Mr. Salmon will conclude for you that the current producing rates of the well are such that we should continue with the gas well classification and allow him to operate as he has done for the last two years.

With that introduction, Mr. Catanach, I'd like to present Mr. Salmon.

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Salmon, for the record, sir, would you, please, state your name and occupation.

A. Yes. My name is Steve Salmon. I'm currently employed by BTA Oil Producers as their Chief Reservoir Engineer.

Q. Mr. Salmon, have you previously testified before the Oil Conservation Division, particularly in the two prior cases that involve the west Osudo-Wolfcamp Pool?

A. Yes, I have.

Q. Have you made yourself aware of and are you continually familiar with the facts surrounding this reservoir and the well that produces from this reservoir?

A. Yes.

MR. KELLAHIN: Mr. Examiner, we tender Mr. Salmon as an expert reservoir engineer.

MR. CATANACH: He is so qualified.

Q. (BY MR. KELLAHIN) So that Mr. Catanach will have the opportunity to understand some of the background of this case, Mr. Salmon, let me direct your attention, sir, to what is marked as Exhibit No. 1 and have you orient Mr. Catanach as to where the particular

Wolfcamp field is located.

A. Yes. Exhibit 1 is an insert from the Midland Map Company Producing Zone Map. This map is on a 1 inch equals 6 mile scale. The southwest Osudo-Wolfcamp gas field is located at as indicated by the small blue area just to the right of center of the map. The field is located about 17 miles northwest of Eunice and approximately 19 miles southwest of Hobbs.

Q. I misspoke a while ago. I referred to this as the west Osudo. This is, in fact, the southwest Osudo.

A. Yes.

Q. Where would we find the west Osudo-Wolfcamp field?

A. The west Osudo field will be shown on the next exhibit. But the producing well from the west Osudo-Wolfcamp field is just to the east of our well.

Q. And that's the AMOCO Heller well?

A. Right.

Q. Let's turn, sir, to Exhibit No. 2. Would you identify that display for us?

A. Yes. This is a Wolfcamp production and test data map. The legend on this map is shown down in the lower left-hand corner where we show the symbols for oil wells, gas wells, and so forth.

The scale on the map is 1 inch equals 2,000 feet. And we have omitted any wells that have not penetrated the Wolfcamp. The various Wolfcamp fields are color-coded by the code just to the bottom of the map.

The red is the Osudo-Wolfcamp southwest well. This is the BTA Byers Well No. 1. It's the well completed in the field that's the subject of this hearing.

Q. Currently what is the acreage assigned to the Byers well in Section 23?

A. The east half of Section 23 is currently assigned to the Byers well. This 320 acres is made up from two separate leases. One of the leases covers the east half of the east half of the section. The other lease covers the west half of the east half of the section.

Q. As a result of Division Order R-8450 entered in May of 1987, what acreage was dedicated to the Byers well in 23?

A. The east half of Section 23 was dedicated to the well.

Q. Summarize for the Examiner, Mr. Salmon, the basic facts, as you recall them, with regards to the justification of the creation of the southwest Osudo

Wolfcamp field in Section 23.

A. Okay. At the time of the last hearing, the AMOCO Best No. 1, which is located just to the west of our well, had been plugged. This was a well that had been completed, watered out quickly. It made about 27,000 barrels of oil and 181 million cubic feet.

At that hearing we felt like our well may -- in fact, probably had been in communication with that well. However, the AMOCO Heller well, which was the only producer in that field at the time, we felt like we were not in communication with that well.

That well at the time was at a very low rate. It was less than 60 barrels per month, makes very little water, the gas rate was low, indicating that the area was fairly well depleted pressure-wise.

When we completed the Byers No. 1, it came in close to original reservoir pressure. We felt like and, I think that we convinced the Examiner at that time, that the AMOCO Heller and our Byers No. 1 were in separate reservoirs.

Q. Let's take a look at Exhibit No. 3, which is the structure map. Is this the same exhibit that was used at the original hearing --

A. Yes.

Q. -- to establish the new pool?

A. It's the same exhibit. The only change made is we changed the date to today's date. Essentially, this map is contoured on the Third Bone Spring Sand. And contour interval is 100 feet. It shows that the area is an anticline, dipping to the west.

There is a slight amount of reversal just in the south part of Section 26, but this is very minor in a localized area.

The trapping mechanism for the Byers -- or for this field is strictly stratigraphic. I don't feel there's any structural component to it at all.

Q. Let's go to the cross-section, Mr. Salmon, which is marked as Exhibit No. 4. Okay. This is an east -- or west to east cross-section going from the west on the left side to the east on the right. A trace of it is shown by the map inset on the lower right corner.

It goes from the AMOCO Best No. 1 through the BTA Byers No. 1 to the AMOCO Heller No. 1.

Q. Let's focus specifically on the information available from the log to show you what are the likely producing intervals within the Wolfcamp.

A. The porosity greater than 5 percent is colored in green on the logs. Essentially, the more green, the better the porosity and, correspondingly,

the better the production.

Q. The vertical limits for this pool are identified by using this log and finding the top of the Wolfcamp line and then the base of the Wolfcamp line?

A. This is true. The two lower contour lines are the top of the Wolfcamp and the base of the Wolfcamp. And the production interval is between these two points.

The line that's labeled the Third Bone Springs Sand was the contour point that we used for our structure map. It's a consistent point in the area. It's easily -- you can easily correlate it between wells.

We tried to correlate on the top of the base of the Wolfcamp line. This is very inconsistent, and we would not have had a very good structure map.

Q. At the time of the original hearing, what was the producing status of the well?

A. Of which one?

Q. Of the Byers No. 1 Well.

A. The Byers No. 1 --

Q. -- had been completed in what portion of the Wolfcamp?

A. Oh, okay. We tested two zones prior to getting to the producing portion. Shown in the center

tract are the perforations on the well by the rectangles with circles in them.

The lower two zones that have the arrows through them, we tested water from those zones, indicating that we do have a water contact in the reservoir.

The actual perforated interval that is produced -- was producing then; it is producing now -- is from 11,428 to 11,440 feet.

Q. At the time of the original hearing, Mr. Salmon, had you obtained fluid samples from the well at some point and had those fluid samples analyzed by the PVT analysis?

A. Yes, we did.

Q. From what portion of the well or from that formation was that sample taken?

A. It was taken from these perforations, 11,428 to 440.

Q. What were the the results of the PVT analysis?

A. The results of the PVT analysis were that this reservoir conditions the fluids condensate and gas well and the gaseous phase.

MR. KELLAHIN: Mr. Examiner, that PVT analysis is in as one of the exhibits in the original

transcript of hearing. It's Exhibit No. 4. Here's a copy of the transcript and the exhibits in that prior case.

THE WITNESS: I think Exhibits 4 and 5 make up the analysis and the tests.

Q. (BY MR. KELLAHIN) At the hearing in 1988, you were asked to come back on behalf of your company and satisfy the Examiner as to what, in your opinion, would be the appropriate producing rates for the pool that the Division found to be a gas pool.

A. Yes. The tests on the reservoir fluids did indicate it to be a retrograde condensate reservoir, which means as you deplete the pressure, the condensate will come out of suspension in the gas.

And there was concern if you produced it too rapidly, you would leave a lot of your oil otherwise recoverable, that you would leave it in the reservoir.

Q. At that time what was your anticipated plan of operating the well in terms of completing the production out of the existing perforations and then recompletion into other Wolfcamp zones?

A. We felt like we would produce the current perfs until they deplete. In 1988 we, based on the performance at that time, we thought that would happen relatively quickly.

The production flattened out, and we are still producing from that zone. We have two intervals that we will plug back to in the future. They're shown on the log on the cross-section.

The best looking interval is the one from the 11,404 to 420 feet. We had good shows when we drilled this. It shows to have good porosity. We ran a drill stem test on it.

It flowed 3 million cubic feet per day at 2,150 pounds on the drill stem test. I think this will make a very good producing zone.

Another zone that will probably be tested is from 11,322 to 11,352 feet. The porosity colored in on that portion is the density porosity. It's probably greatly affected by the washout. That zone may not be too good.

Q. Have you tabulated for us what has been the production from the well, Mr. Salmon?

A. The next exhibit is a production graph on the well.

Q. The Exhibit No. 5, I believe. Let's a take a moment and have you identify for the Examiner the various color codes on the graph.

A. Okay. The black curve is the monthly oil production. The green broken curve is the gas-oil

ratio. The scales for both of these curves are on the left side of the graph.

The red broken curve is the monthly gas production. And the blue dashed curve is the monthly water production scales for -- these are shown on the right side.

This is a Similog scale with time on the horizontal scale and the other parameters on the vertical scales.

Q. Help us read the display, Mr. Salmon, by going back to approximately March of 87, which was the time of the initial hearing that has created this pool and give us the various rates using the gas-oil ratio, the oil production, and the water and the gas.

A. Okay. When the well first came on production, it had a very good deliverability. The gas rate is shown by the red curve -- was just over 50,000 MCF per month at the peak there.

The peak of the oil was just over 9,000 barrels of oil per month. The gas-oil ratio at that time varied somewhat, but it was between 6 and 7,000 cubic feet per barrel.

The water production at that time was very low, though the water production did increase rapidly. And by the middle of 1988, it was up to 18 to 19,000

barrels per month.

Q. Take us to the point in time that we had the second hearing, which was in November of 88, and give us the rates.

A. Okay. Through 1988 the production declined very rapidly for the gas and the oil. Apparently due to the high water production, the water was overrunning in the oil and gas.

We put the well on pump. Apparently we got the water pumped off. At the time of the last hearing, the production was decreasing rapidly. This is why we thought that the well would be depleted in this zone relatively quickly.

Just about the time of the hearing, the production flattened off, and since then the oil production has been between 1,000 to 1,150 barrels per month.

The gas bottomed down at about 3,000 MCF per month and has rebounded back up to about 4,000 barrels per month. With the production --

Q. You said barrels. You mean MCF?

A. MCF per month, yes.

Q. If you go back to November of 88, what was your gas rate on a monthly basis?

A. The gas rate in November was about 3,300 to

3,400 MCF per month.

Q. And your oil rate in November of 88 was what on a monthly basis?

A. The oil rate was, in October, it actually bottomed at about 800 barrels of oil per month and was about 1,000 barrels per month in November.

Q. In 87 at the first hearing, your gas-oil ratio was between 6 and 7,000 --

A. Right.

Q. -- cubic feet of gas per barrel of oil?

A. Right.

Q. What was your gas-oil ratio in November of 88 at the second hearing?

A. The gas-oil ratio in November had fallen down to about 3,300 MCF per barrel.

Q. As a result of that hearing, gas spacing and gas rules continued to apply to the reservoir?

A. Yes.

Q. And you continued to dedicate 320 to the well?

A. Yes.

Q. What are the current gas -- what is the current gas-oil ratio for the well?

A. The current gas-oil ratio is about approximately 3,600 cubic foot per barrel.

Q. What is your recommendation and opinion, Mr. Salmon, as to what rules should apply for the production from this reservoir?

A. I recommend that we continue the gas rules for this well.

Q. Why, sir?

A. If we -- at such time as we plug back to the next zone, I feel that we will have a gas well at that time. The drill stem test indicates the well in that interval capable of making it greater than 3 million cubic feet per day.

If we changed the rules at this point to oil rules, then we change them to gas rules, when we change it to oil rules, the spacing will drop between 40 acres and 80 acres, we'll lose the west half of our lease, the westernmost.

Q. West half of your spacing unit?

A. Right, the west half of the spacing unit. And that lease will no longer share in the production, and the royalty owners will no longer share in the production of that lease if it's changed to oil.

Q. And --

A. And when we change it back to gas, we won't have 320 acres to dedicate to the well.

Q. In terms of the method by which you are

operating the well, is it going to make a difference to the operation of the well as to whether this is a gas reservoir, an oil reservoir, a retrograde gas condensate reservoir, or an associated reservoir?

A. The current operations from existing zones will not be affected regardless of the classification of the reservoir. We're pumping as much oil as we can get out of it.

If it was changed to an oil reservoir, we would continue pumping it to recover all of the oil and gas that we can economically recover. The problem will come after we recomplete the well.

There will also be a problem with -- I think it would make inequities in how the production is shared if we were cut back to an oil well at this point.

Q. What is your opinion as to whether or not there is need for additional wells in order to fully develop the producible reserves in the reservoir?

A. I feel that the existing well will recover the reserves that can be recovered from this reservoir.

As I said, the trapping mechanism was stratigraphic. It's a limited reservoir. I feel that the existing well will recover the recoverable reserves

from the reservoir.

Q. If the Division should change the gas rules in the reservoir to oil rules after this hearing and space it on 40 acres, in your opinion, would that encourage the drilling of additional wells?

A. No. We would still -- we have no plans to drill because we feel that the existing well is recovering the reserves. We would continue to own the easternmost lease, the east 160 acres in the section.

We would lose the west half of our proration unit, but we wouldn't drill a well over there, and I don't think anybody else would come in and drill a well there.

Q. In your opinion, are there sufficient remaining recoverable reserves in the spacing units that would offset your well if it was spaced on 40 acres to justify the drilling of additional wells?

A. No. The acreage that we don't have is down-structure at a legal location. You have the AMOCO Best well that has already watered out.

It would take an unorthodox location to get any oil and gas at all. And I don't think you would make a good enough well even with an unorthodox location to justify a well.

Q. Let's look at the structure map, which is

Exhibit No. 3. Using that structure map, give us your opinion of the limits of the reservoir.

A. On the structure map you can't determine the limits. I think the limits are based strictly on stratigraphy.

Q. No. I meant to use this as a display by which you could describe your opinion of the limits.

A. You do have a well on the south part of the section that tested the Wolfcamp.

The AMOCO Best Com. No. 2 is located in the southeastern portion of the reservoir. This well perforated the Wolfcamp and tested noncommercial. Oil and gas showed.

The AMOCO Watkins, which is in the west half of Section 23, does not have the lime bank developed well. It would not make a producer.

We are not in communication with the AMOCO Heller No. 1, so the limits would be somewhere between our well and that well.

Going to the north, there's very little control, but from the completion to September of 1988, we lost over 1,000 pounds of reservoir pressure. I don't think it extends very far to the north either.

Q. Have you, as a reservoir engineer, made any calculations to satisfy yourself that the current well

is draining at least 40 acres?

A. I have made some poor volume calculations. With the performance of the reservoir at this point, I feel that they're not real accurate.

But I think that we -- based on those, I come up with that we have drained somewhere in the neighborhood of 45 to 50 acres at this point from the current zone. And we are continuing to produce, so that number will increase.

Q. Are you able to satisfy yourself that you can come up with a reliable drainage number that will show you the ultimate acreage to be drained by the well?

A. No. With the current performance of the well, I would say just about anything can happen. It appears to be stable at this point. The oil production is pretty much flat. You can't make an extrapolation of that.

The gas is actually increasing slightly. The water production appears to be fairly flat. It could continue stable like this for a long time, or it could change for the better or the worst in a few months.

Q. What is happening in the reservoir to influence the data by which you make the drainage calculations?

A. I think what we have is that the major

portion of the hydrocarbon reservoir is a gas condensate reservoir. That's the part of the reservoir we were originally completed in. That's the part of the reservoir we'll be in when we recomplete.

In producing from that interval, apparently we were depleting the pressure. This has caused a thin -- apparently we have a thin oil layer on top of the water.

This has caused the water and oil to encroach into the wellbore and actually come up. And we feel like right now we're probably producing from all three portions of the reservoir, the gas condensate, the oil, and the water zone.

Q. Notwithstanding the water influx that influences the data base by which you make your drainage calculation, you've satisfied yourself that even the oil zone itself is one that is draining more than 40 acres?

A. The calculations come out that we have drained more than 40 acres of oil, yes.

Q. So if this reverts to 40-acre oil spacing, we have acreage beyond that spacing unit that's contributing oil to the well?

A. Yes.

Q. Why couldn't you have simply -- if the

Examiner wants to choose the single criteria for establishing rules to be the gas-oil ratio in the reservoir, would you recommend that he do that?

A. No.

Q. Why not?

A. I think it would cause inequities between the royalty owners. If we go to 40-acre spacing or if we go to 80-acre spacing, the royalty owner on our easternmost lease is the only one that will share in the production.

I think that with us pooling the water up-structure, it's pushing oil and gas ahead of it. I think that we are recovering reserves from both the leases.

Q. Could you change the gas-oil ratio by simply going up and completing into the upper portion of the Wolfcamp, increasing your gas production and, therefore, changing the gas-oil ratio?

A. Yes, we could. To do that we would probably need to set a bridge plug on this zone and shut it off to complete in the other zone or it wouldn't flow like a normal gas well.

Q. Is there some risk to your remaining oil recovery if you do that, Mr. Salmon?

A. Yes. If we plug off the current zone, we

produce the upper zone. We would come back to this zone, I think there's a very good chance we wouldn't get the hydrocarbons that we're getting now.

Q. Would the continuation of gas rules for this reservoir cause the gas energy to be prematurely withdrawn from the reservoir thereby leaving greater quantities of oil or condensate left unrecoverable in the reservoir?

A. Repeat that.

Q. Yes, sir. Gas rules give you the opportunity to produce more gas out of the reservoir.

A. Yes, they do.

Q. Does the well have the physical capacity to produce --

A. No. Right now we are producing what we can with the maximum rate that we can get out of the well. The well is pumped off. This is the most that we can produce from it.

If we were to plug back, I think that we would be bypassing the oil that we're getting now.

Q. Mr. Stogner's concern at the last hearing was that the gas rules would give you an opportunity to prematurely withdraw too much gas from the reservoir and cause the condensate and liquids to remain unproduced in the reservoir.

A. Right. That was one of the concerns expressed. I think it was a valid concern. At this point, with current performance of the well, it's really not an applicable concern.

Q. So, in your opinion, you see no reason to change this to oil spacing or to create some kind of procedure where this is administered by associated gas pools?

A. No.

Q. Will the change in -- will the continuation of gas well spacing rules to the well change your method of operation?

A. No.

Q. In your opinion, will it be the method by which the interest owners, royalty override, and working interest owners receive the greatest benefit from the reservoir?

A. Yes.

Q. In your opinion, will the continuation of the current rules and making those rules permanent be in the best interests of conservation and the prevention of waste?

A. Yes.

MR. KELLAHIN: That concludes my examination.

We would move the introduction of his Exhibits 1 through 5.

(Thereupon, Exhibits 1 through 5 were offered into evidence.)

MR. CATANACH: Exhibits 1 through 5 will be admitted as evidence.

(Thereupon, Exhibits 1 through 5 were admitted into evidence.)

EXAMINATION

BY MR. CATANACH:

Q. Mr. Salmon, when you plug back eventually and recomplete in the upper zone, and assuming this is still a gas pool, won't you have the same problem? You won't have a limit on the rate of gas withdrawal and you may again be faced with leaving oil in the reservoir?

A. I think that is a valid concern at that point. We are going to operate in a method to try to get the maximum number of reserves out of it.

I think our method of operation is somewhat shown by this zone in that the well on initial completion had a rate of 3 million cubic feet per day with the flowing tube of pressure of over 2,000 pounds, which means we could have produced at a higher rate.

At no point did we produce at what I feel

like is an excessive rate at that time. When we plug back to try to get the maximum number of hydrocarbons out, we will not produce it at an excessive rate.

Q. From what you've calculated, your drainage area when you recomplete will not change; is that your opinion? It will still be draining at a little over 40 acres?

A. I think one of the reasons that our drainage area is so small at this point is due to the water influx. The well porosity-wise, permeability-wise is capable of draining a bigger area.

We're producing at this point over 300 barrels of water per day. It's got excellent porosity; it has excellent permeability. From that standpoint we have the capability to drain 320 acres.

I personally don't feel that the reservoir covers 320 acres based on the initial pressure drops that we have obtained.

So when we recomplete in the gas shown, if we squeeze this zone and are successful in shutting off the water production, I think it will drain a big area, yes.

Q. How much of the east half of Section 23 do you feel contains reservoir?

A. It goes at least to the AMOCO Best Com. No.

1. That well I feel like actually watered out prematurely, and it goes some distance past there. I have no control of saying how far past there.

But when they originally completed that well, they had a thick porosity interval. They perforated the whole interval rather than just perforating part of it.

The well came in flowing real well. It had a -- it flowed natural 3 million cubic feet per day and 545 barrels of condensate in 26 hours. Then it watered out.

They then attempted to squeeze those perfs and perforate just in the top. They made two attempts to squeeze off their water. And neither attempt was very successful.

Had that well been completed differently, I think that it could have probably produced the bulk of the reserves in the reservoir.

So it goes at least, I would say, halfway across that lease and maybe all the way across it.

Q. So you'd say approximately 75 percent of that east half may be productive?

A. I would say 75 percent of the north -- of the northern half of it. As I said, when you get down into the southern half of the section, you do lose your

reservoir before you get out of it.

At the original hearing, we suggested 160-acre spacing because that's what we felt like was productive -- was the northeast quarter of the section. That would have been unorthodox, and that's why we have the 320-acre spacing.

Q. I'm sorry. What would have been unorthodox?

A. If they had given us gas rules with 160-acre spacing. The south half of the section, I don't feel like it's contributing very much to the production.

I feel like it's mainly the northeast quarter and maybe the north part of the south half.

As I said, this reservoir, I think, is relatively limited in areal extent. From completion through September of 1988, we had 1,000 pound drawdown in the pressure.

But I do think that both halves -- both of our leases are contributing to the production of the well. And I think to be equitable, both of them should share in the production. The only way that they can share is if we continue the gas rules.

Q. Does BTA's interest in the well change from 40-acre well to a 320-acre well?

A. There may be a minor change, but there's no appreciable change.

Q. It's not significant?

A. No. We have 100 percent of the working interest in both of the leases.

Q. Mr. Salmon, when did you estimate that you'll be able to recomplete the well?

A. Looking at the graph, I don't feel that there is a way to predict that. The production is essentially flat at this point. As long as it remains flat, we feel like we're getting a higher percentage of the oil out than we would if we recompleted.

So we -- as long as it remains flat, we plan to produce it. The gas is actually creeping up slightly.

Q. And the pools that surround this particular pool, are those oil or gas?

A. The closest pool, which is the Osudo Wolfcamp west field, is an oil pool. The two wells to the south, the Lea Wolfcamp southeast wells, are gas wells. The field to the north, the Lea Wolfcamp field, is a gas pool.

I did talk to the operator about a year ago, and he was considering trying to get it changed to an oil pool to get higher priority on his gas. I don't know if he ever did that or not. I haven't checked that.

Q. Again, it's your opinion this will be the only well drilled in this particular field?

A. Yes, I think it is.

Q. And you believe this well can drain the entire --

A. Yes, I think that it can drain the entire reservoir.

MR. CATANACH: That's all the questions I have of the witness.

FURTHER EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Salmon, let me visit with you on two topics that Mr. Catanach discussed with you. One, he was concerned as to whether or not in the gas reservoir we needed some special rule to limit the gas-oil ratio notwithstanding the gas rule.

The question is once you recomplete into the Wolfcamp and get gas, that will give you the possibility of increasing your gas production up to a point where you might leave condensate and oil in the reservoir?

A. I have to say that would be a possibility. In the retrograde gas condensate reservoir, at best you're going to, you know, produce at some point. When you hit the dew point, the condensate will start

dropping out. So as you complete the reservoir, that's going to happen.

With a very high permeability reservoir, like we have here, and a limited reservoir, I don't think that's going to be a big problem. We haven't experienced big pressure drawdowns around the well.

And at any reasonable producing rate that I think we'll produce it at, I don't think that's going to be a problem.

Q. The question Mr. Catanach didn't ask you on that topic was whether or not, in your opinion, we need to adopt a special gas-oil ratio limitation in order to control that possibility?

A. No. I don't think that a special gas-oil ratio limitation is needed. I don't think gas-oil limitation would be practical.

Q. The only limitation that could be adopted that would be practical would be to put some maximum rate on the withdrawal rate.

And when we recomplete, we will see how the pressure draws down when we produce it and as long as possible, maintain the reservoir above the dew point.

Q. Using just good prudent operation techniques --

A. Yes.

Q. -- you don't see any way that you could now guess as to what those rules ought to be in order to preclude the least efficient operation?

A. Right. Until you recomplete the well, you see what the pressure drawdown is in that zone, there's no way to determine the rate.

Q. Your original calculations before Examiner Stogner back in 87 showed drainage in excess of 160 acres. And your original request then was for 160-acre reservoir?

A. Right. Our original request was for 160 acres. The reason we made that was we knew that coming into the hearing we would have a difficult time showing all 320 acres of our leases productive with -- at least that will contribute to this well because of the AMOCO Best Com. No. 2 in the southeast quarter of the section.

So to avoid that as a problem, we asked for 160 acres. As far as the operation, as far as how the lease will share in the production, it really makes no difference whether it's 160- or 320-acre spacing.

Q. That's my next question. The original Examiner order denied your request for 160-acre spacing and simply implied the state-wide Wolfcamp gas rules of 320 to the reservoir?

A. Right.

Q. But you would have no objection should this Examiner now determine that we now have sufficient evidence to say that it ought to be in the northeast quarter of the section?

A. No. I would have no problem with that. It will make no difference in our operations. It will make no difference in how the production is split out.

Q. Do you see if the gas spacing is changed from 320 to 160 that that will cause a well to be drilled in the southeast quarter of Section 23?

A. No. If that happens, I think that we will still hold all of our leases. And we don't plan on drilling a well.

Q. Would that create the opportunity for a well to be drilled in the southeast quarter that would simply utilize your information, drill to the very top, or at least perforate only in the very top of the Wolfcamp gas, and extract the gas then that you subsequently hoped to obtain with your recompletion?

A. It would allow wells to be drilled there, yes, if we wanted to drill one.

Q. Or does it create the opportunity under your lease arrangement for a third party to do it?

A. I don't think so, no.

Q. You wouldn't lose the leasehold interest in the southeast quarter if spacing is reduced to 160?

A. No.

Q. So changing the spacing is not going to encourage the drilling of additional wells?

A. No.

Q. In your opinion, that would be unnecessary anyway?

A. Right.

MR. KELLAHIN: Nothing further.

MR. STOVALL: One follow-up of where you're going, Mr. Kellahin.

EXAMINATION

BY MR. STOVALL:

Q. I don't know if you answered it or not or I didn't hear it. You've shown two rectangles, 260-acre rectangles on your Exhibit 2?

A. Right.

Q. Those are the two separate leases that are involved?

A. Right.

Q. And so not only your working interests, but the royalty interests would remain proportionally the same on 160 or 320?

A. No. The royalty interests under those two

leases are different.

Q. But the proportion of the interests participating in the well would be the same because it's still 50-50; is that correct?

A. I think it's approximately the same. It may not be exact, but it's approximately the same, yes. There are no big differences.

Q. But there wouldn't be a royalty owner excluded from the production if you went to a northeast quarter proration unit?

A. Right. If we went to a northeast quarter proration unit, right. They would share the same, which they are on the 320-acre spacing.

MR. CATANACH: Is that it? That's all the questions I have. There being nothing further in Case 9813, it will be taken under advisement. And this hearing is adjourned.

CERTIFICATE OF REPORTER

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

I, Debbie Vestal, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Examiner of the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL February 10, 1990.

Debbie Vestal
CSR No. 400

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9078, heard by me on January 10 1990.

David R. Catanach, Examiner
Oil Conservation Division

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

4 March, 1987

EXAMINER HEARING

IN THE MATTER OF:

Application of BTA Oil Producers to contract the horizontal limits of the West Osudo-Wolfcamp Pool and the concomitant creation of a new gas pool with special pool rules, Lea County, New Mexico. CASE 9078

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Commission: Jeff Taylor
Legal Counsel for the Division
Oil Conservation Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For BTA Oil Producers: W. Thomas Kellahin
Attorney at Law
KELLAHIN, KELLAHIN, & AUBREY
P. O. Box 2265
Santa Fe, New Mexico 87501

For Amoco Production: William F. Carr
Attorney at Law
CAMPBELL & BLACK P.A.
P. O. Box 2208
Santa Fe, New Mexico 87501

I N D E X

E X H I B I T S

MR. STOGNER: Call next Case Number 9078.

MR. TAYLOR: The application of BTA Oil Producers to contract the horizontal limits of the West Osudo-Wolfcamp Pool and the concomitant creation of a new gas pool with special pool rules, Lea County, New Mexico.

MR. STOGNER: Call for -- call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of the applicant.

I understand from Mr. Carr this morning that he has some concerns and potential objections in our case. I would estimate it will take us about an hour to present this case.

If you'd like us to wait and take a shorter case, we'd be happy to do so, but I believe some of the issues involved in this case may be disputed.

MR. STOGNER: Mr. Carr, who do you represent?

MR. CARR: I represent Amoco Production Company.

I also represent Ronald J. Byers, a mineral interest owner under the east half of the

east half of Section 23, which includes half the acreage which is the subject of Mr. Kellahin's application.

MR. STOGNER: Do you have any witnesses?

MR. CARR: No, I do not.

MR. STOGNER: Let's go off the record for a second, Sally.

(Thereupon a discussion was had off the record.)

MR. STOGNER: We'll take a little, short recess and call this case back later on the docket.

(Thereupon a recess was taken.)

parties that were interested in the application. I'll submit that to you as a separtate exhibit, Mr. Examiner.

The case was originally filed for hearing on February 18th, 1987, and at the time that application was filed, and the first page of Exhibit Thirteen is in fact the application, if you'll turn to the attachment to the application on the third page, you will find that when we file the application we sent notices to the operators in the pool and within a half mile of the pool that we though might be affected by what we were doing.

Thereafter, just prior to the February 18th hearing, on February 13th I received a phone call from Mr. Ron Byers who is a mineral owner underneath the east half of the northeast corner of 23, and Mr. Byers' interest is held by BTA as the operator.

Mr. Byers, as an interest owner, was concerned about the change in designation of this area as a gas pool.

Under the notice rules we normally do not notify the mineral owners under our own tracts of a spacing case, but because of Mr. Byers' call to me, we then went forward with a supplemental notice, continued our case, and sent notice to Mr. Byers and to all the other people that are indicated in the package of exhibits, as well as those operators that we had previously notified, advising

MR. STOGNER: This hearing will come to order.

We'll come back and continue with Case Number 9078. I believe we called for appearances and Mr. Kellahin had entered an appearance and Mr. Bill Carr had entered an appearance.

Have we sworn the witness yet?

MR. KELLAHIN: No, sir. I have one witness to present on behalf of my client.

MR. STOGNER: And, Mr. Carr, do you have any witnesses?

MR. CARR: I will not call a witness.

MR. STOGNER: Okay, will the witness please stand at this time to be sworn.

(Witness sworn.)

MR. STOGNER: Mr. Kellahin.

MR. KELLAHIN: Thank you, Mr. Examiner.

Mr. Examiner, I want to introduce at this time what we have marked as BTA's Exhibit Number Thirteen. This is a package of notices to the various

them that the case was now continued to the March 4th hearing, to give all those parties additional time and an opportunity to come forward.

I understand that some of those individuals wrote letters to the Commission.

Of those that we've notified, I believe Mr. Byers, through Mr. Carr, is the only party that's appeared at today's hearing.

With that explanation of the notices, then, I would propose to submit to you Mr. Steve Salmon, who is our reservoir engineer, petroleum engineer, to discuss with you the technical reasons that we believe support our application.

MR. CARR: I have only one comment in response. I'm also appearing on behalf of Amoco Production Company and Mr. Byers does own interest under the property as defined by Mr. Kellahin. He also has interest in the property underlying the Heller Well, which is the east offset to the subject well and a well operated by Amoco.

STEVE SALMON,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Salmon, let's begin, -- if that's acceptable, Mr. Stogner?

MR. STOGNER: Please.

Q Mr. Salmon, for the record would you please state your name and occupation?

A Yes. My name is Steve Salmon. I'm currently employed by BTA Oil Producers as the Manager of Exploitation and Reservoir Engineering.

Q Mr. Salmon, have you previously testified before the Oil Conservation Division as a petroleum engineer?

A Yes, I have.

Q And pursuant to your employment by BTA Oil Producers, have you made a study of the facts available to you surrounding this application?

A Yes.

Q And pursuant to that study have you prepared certain exhibits or caused those exhibits to be prepared under your supervision and direction?

A Yes, I have.

MR. KELLAHIN: We tender at this time Mr. Salmon as an expert petroleum engineer.

MR. STOGNER: Mr. Salmon is so qualified.

Q Let me direct your attention first of all, if you please, to Exhibit Number One and let you identify Exhibit One for us and help locate us as to where the property is that is the subject of this application.

A Yes. Exhibit One is an insert from the Midland Map Company Producing Zone Map. This map is on a scale of one inch equals six miles. It is prepared to locate the Byers in relation to the regional geology.

The approximate area of the Osudo West Wolfcamp and the Lea Southeast Wolfcamp Field is colored in blue, which is the small blue area just to the right of center of the map.

These fields are located approximately 17 miles northwest of Eunice and 19 miles southwest of Hobbs.

The fields are located in a transition area between the Northwest Shelf to the west and the Central Basin Platform to the east. The approximate dividing line is shown on this map between the geological areas is that dashed line just to the west of the blue area.

Q Let's turn to a plat that specifically shows the area that I have before me, Exhibit Number Two, Mr. Salmon, which, before you describe that exhibit, would

you simply identify it for us?

A Yes. This is an exhibit showing the Wolfcamp production data, the wells that have tested the Wolfcamp in the area, and a color code for the various leases, or the various fields in the area.

Q Before we describe the content of the exhibit, would you locate for the Examiner the well that is the subject of the case?

A Yes. This is the BTA Byers 8605 JV-P Byers Well No. 1. It's indicated by the double circle colored in red close to the center of the map. It's located in the northeast quarter of Section 23, Township 20 South, Range 35 East.

Q Based upon your studies as an engineer, Mr. Salmon, what are you recommending to the Examiner with regards to this application?

A Our application is to get a field discovery for our well, is -- what we are wanting to do is to get a gas well classification for the BTA well. We initially filed this well to be completed in the Lea Southeast Wolfcamp Gas Pool. This filing was rejected by the Conservation Division and -- however, we still think that this is a proper filing for the well. If this is not a proper filing, we still have a gas well. We will attempt to prove today that the -- it is separated from the Amoco Heller No. 1

and that these two wells should be in separate fields.

Q Let's identify for the Examiner the pools in the area, the Wolfcamp pools in the area that are spaced upon 160-acre spacing.

A Okay, at the top of the map there is a well colored orange. The orange color indicates this is in the Lea Wolfcamp Field.

This well is classified as a gas well. It actually has 320-acre spacing.

At the south end of the map, or at the bottom, there are two wells colored in green. These two wells are in the Lea Wolfcamp Southeast Field. This is a gas field on 160-acre spacing.

Q When we look at Section 24, which is the section adjoining your well, and look at the Amoco Heller Well, Mr. Salmon, that well has been designated and classified in what pool?

A It is in the Osudo-Wolfcamp West Field, which is an oil field on 40-acre spacing.

Q Because of the proximity of your well to the Amoco well, the District Office has recommended that your well be classified as an oil well?

A Yes.

Q And in the -- in the West Osudo Field.

A Yes.

Q When we look at the well to the west of the BTA well, there's an Amoco well, the Amoco Bass Com No. 1 Well?

A Yes. What is the status of that well?

A It is a P & A'd producer. It did produce in the Osudo Wolfcamp West Field.

Q If the Examiner approved 160-acre gas spacing for your well, what acreage would you dedicate to the well?

A It would be the northeast quarter section of Section 23.

Q Can you summarize for us, Mr. Salmon, your opinion as to whether or not the BTA well in 23 is separate from the Amoco Heller oil well in Section 24?

A Yes, I think it is separate from the Amoco Heller oil well.

Q If the Examiner decides not to designate a new gas pool and assign your well a discovery allowable, how would you recommend to the Examiner that he handle the BTA well in 23 in terms of its spacing?

A An alternate to giving us a discovery well would be to approve our original filing, which was to put the well in the Lea Wolfcamp Southeast Field.

Q Identify for us, and I don't think you have to go through the specific details of it, identify for

is the type of information that's available to the Examiner on Exhibit Number Two.

A The type of information on the Wolfcamp producing wells is general completion data information in an A, B, C, D, E nomenclature.

Opposite the A for each well is the perforated interval.

Opposite the B is the field that the well is completed in.

Opposite the C is the initial potential for the well.

Opposite D is the September of 1986 monthly rate.

And opposite E is the cumulative production through September of 1986.

Two wells that have not produced in the Wolfcamp but have tested the Wolfcamp have the test data shown. One of these wells is the Amoco Best Com No. 2, located in the southeast quarter section of Section 23.

This well was perforated in the Wolfcamp. The last fifteen hours it swabbed 7-1/2 barrels of oil, 12 barrels of water with a slight show of gas, and was plugged back to the Bone Spring. It's currently a plugged well.

The other well that tested the Wolfcamp that has not produced is the Lea Southeast -- or the Petro

Lewis Southeast Lea Unit Well No. 3 in the northeast quarter of Section 26.

This well drill stem tested gas too small to measure, reversed six barrels of oil.

There are quite a few gas wells shown on here that are not producing from the Wolfcamp. These wells are producing mainly from the Osudo Morrow.

Q When we look at the Southeast Lea Wolfcamp, the one where Petro Lewis has their wells in 26 and 25 --

A Yes.

Q -- summarize for us or characterize the kind of gas pool we have in that area in terms of its gas/oil ratio, the kinds of characteristics youre discovering in that type of qas pool.

A Okay, the Lea Southest -- Southeast Lea Unit Well No. 1 is an excellent well in terms of recovery. It has made 3005-million cubic feet of gas plus 357,000 barrels of condensate.

It had an excellent initial potential, 15-million cubic feet per day with a GOR of 4000 cubic feet per barrel of oil.

The adjacent well over in Section --

Q I'm sorry, I missed the number. The gas/oil ratio in that pool is about 4000-to-1?

A Yes. The American Trading Company -- or these were originally drilled by American Trading but the Southeast Lea Unit Well No. 2, just to the east of this well is a tight well looking at the logs. It's calculated absolute open flow was 1.1-million cubic feet per day with a 14,500 cubic foot per barrel of oil ratio.

It has been on production a long time but it has only recovered 285-million cubic feet and 25,000 barrels of condensate.

Q If we look at the gas pool in the north, the Lea Wolfcamp Pool, where TXO has their well, is that also a gas pool that has a low gas/oil ratio?

A Yes. This is a gas pool and on its potential it had a GOR of 8,571 cubic foot per barrel of oil.

Q Let's turn to Exhibit Number Three now, Mr. Salmon, and have you identify that exhibit for us.

A Exhibit Number Three is a structure map. The scale is one inch equals 2000 feet, which is the same as the previous map; covers the same area as the previous map. It is contoured on the Third Bone Springs Sand, which is a correlation marker above the Wolfcamp that we feel is a consistent correlation marker in the area.

The map shows that the structure in the area is an east to west dipping anticline. We do have a

small bump or a small ridge in the south end of the map around the Petro Lewis Southeast Lea Unit Well No. 1.

The trapping mechanism will be stratigraphic rather than structural.

Q Do you have an opinion as to what the drive mechanism is for the reservoir?

A It is essentially gas expansion. I think that the Amoco Bass does show that you have some water encroachment, but the main drive mechanism would be gas expansion.

Q Would you identify for us the kinds of factors that you would utilize as a petroleum engineer to satisfy yourself that you are dealing with either a gas or an oil reservoir?

A Well, you look at the GOR. If it's got a high GOR, obviously you have a gas well. If it has a low GOR, obviously you have an oil well. In between these two extremes you can run pvt tests on your wells and determine the state of the hydrocarbon in the formation.

Q Does the gravity of the liquids produced give you any indication or help in deciding whether or not you're dealing with a gas or an oil reservoir?

A Yes, a low gravity would generally go with oil wells, 40 gravity and below; 50 gravity and above, you're generally dealing with either a volatile oil or a gas

condensate reservoir.

Q What are the types of liquid gravity ranges that you're discovering in the gas pools immediately adjacent to your wells?

A The gravities are generally above 50 gravity.

Q When you have a well that produces in a gas/oil ratio such as you're seeing in this area, you've indicated to us that an engineer will cause pvt data to be developed and fluid studies to be made of the reservoir.

A Yes.

Q What is the purpose of doing that, Mr. Salmon?

A The purpose of that is to determine what type of reservoir you're dealing with, which helps determine your spacing; it helps determine how hard you're going to pull the well, and you run it for your knowledge to help you more efficiently deplete the field.

Q Have you caused such studies to be made of the BTA well?

A Yes, we have.

Q Before we look at that information, Mr. Salmon, can you give us what your opinion is with regards to whether or not this is a gas or an oil pool surrounding this well?

A Well, I don't think it takes an opinion. The data shows that at reservoir conditions the hydrocarbons are in the gaseous phase.

Q All right. Let's turn to that information and have you identify for us Exhibit Number Four.

A Yes. Exhibit Number Four is the report by Tefteller, who collected the samples for a recombined pvt study. It shows the shut-in bottom hole pressures. It shows their recommendations on GOR's for the pvt study. It shows a 4-point test and the stabilization prior to collecting samples.

The first sheet on this is strictly a cover sheet from Tefteller.

The second sheet starts showing the 4-point pressure data. On the extreme right part of the second sheet, the one labeled page 1 of 8 up at the top, shows that the bottom hole pressure at 11,434 feet is 4,526 pounds on the shut-in pressure. This is a 13-day shut-in.

The pages labeled 1, 2, and 3 of 8 in the upper righthand corner record te 4-point test and a 3-day stabilization period prior to collecting the sample for the reservoir fluid work.

I would like to point out that during the 4-point test the lowest pressure recorded is on page 2 of 8. It's while the well was producing at about 3-million cubic

feet per day. The lowest bottom hole presure that we encountered is 4,230 pounds.

This is approximately a 300-pound drawdown at 3-million cubic feet per day, which indicates an excellent deliverability for the well.

At the bottom of the page, labeled 4 of 8, Tefteller recommends that for the recombination work that 7,183 standard cubic feet per barrel be used for the recombined sample. This ratio represents the cumulative gas/oil ratio for the most stable part of the test, which is the last 24 hours.

The next sheet of this shows the gradient shut-in pressure survey prior to the test. Again the shut-in pressure is up in the upper lefthand corner. The shut-in pressure is 4,526 pounds.

Just to the right of the pressure are the pressure gradients. These range from .122 to .192, which would be consistent with a gas condensate type of fluid in the tubing.

The next page is a flowing pressure and flowing gradient test. These gradients, gradients which range from .161 to .180, are again consistent with a gas/condensate gradient.

The next two sheets show the log log plot for the 4-point test and the multipoint forms of gas wells

filled out by Tefteller. The calculated absolute open flow was 21-million cubic feet per day.

Q With the data collected did -- by Tefteller, what then does an engineer do to satisfy himself that at reservoir conditions he is dealing with a gas reservoir?

A Well, Tefteller delivered the samples to CORE Lab, who ran a pvt analysis on the hydrocarbons.

Q Is that pvt analysis shown as Exhibit Number Five?

A Yes, it is.

Q All right, let me direct your attention to Exhibit Number Five and have you discuss and describe its contents.

A Okay. The heart of this report is on page 3 of 5. That's really the fifth sheet. The previous sheets are the data and assumptions that we used in the collection or in the analysis.

This is a tabulation of pressure versus relative volume. It shows that on the top third of the pressure which they reported, they've shown that at 4,539 pounds the dew point of the hydrocarbon fluid is achieved. This means that above the 4,539 pounds the hydrocarbons would exist as 100 percent gas.

When you reach 4,539 pounds you begin to get some condensate turning to liquid and as the pressures

decrease, you get more condensate.

Q Based upon the studies by CORE Lab, then, the magic point for this particular reservoir, using the specific reservoir data, is that a dew point exists at 4539 pounds --

A Yes.

Q -- psig.

A Yes.

Q And above that point, then, if we find reservoir pressure above that point, the hydrocarbons in the reservoir are in a gas stage.

A Yes.

Q All right.

The current pressure in the BTA Byers, according to our shut-in pressure, is 4,526. This is just slightly below the dew point. We are at the point to where some condensate will begin to be turning to liquid. The original reservoir presssure, as we'll see when we get to the pressures, was higher than this and at the initial reservoir conditions you were 100 percent gas.

If you'll turn over two more pages to the graph that's labeled page 5 of 5, this is a graph of the retrograde liquid volume as a percent of hydrocarbon pore space on the vertical scale going from zero percent to 100 percent versus pressure on the horizontal scale.

Again, if you're above 4,539 pounds, you have no liquid. At the point at which 4,539 pounds is reached, you start getting some liquid. From there, as the graph going up shows, the condensate as a liquid does increase in the reservoir up to a maximum of 22 percent of the hydrocarbon pore space.

At that point, when you reach a pressure a little below 2000 pounds, some of the condensate will start going back into the gaseous phase. This is a typical graph on a retrograde gas/condensate reservoir.

Q Do you have an opinion as to whether a retrograde condensate reservoir such as this ought to have applied to it the state gas pool rules?

A Yes, I think it should.

Q Do you have a recommendation with regards to the spacing to be established for the pool?

A I think that our well can drain 160 acres and with the field to the south being 160-acre spacing, I recommend that we use this spacing.

There is a tight well in the southeast quarter of our Section 23. I might have trouble showing the Commission that we could drain the southeast quarter or that that area is commercially productive of hydrocarbons.

Q So rather than going to a 320-acre gas spacing it appears to you at this point that 160-acre spac-

ing is appropriate.

A Yes, I would think it would be.

Q All right. Let's turn to an analysis of the relationship between the BTA Byers Well and the offsetting Amoco Heller Well, which I understand your opinion is that that well ought to be left on 40-acre oil spacing.

A Yes.

Q All right, let's turn to that analysis and let me have you use for that discussion Exhibit Number Six, which is cross section A-A'.

A Exhibit Number Six is a west to east, as you go from left to right on the cross section, cross section.

The leftmost well is the Amoco Bass Com No. 1. The center well is the BTA Byers No. 1, and the rightmost well is the Amoco Heller No. 1.

On this cross section, as well as on the next cross section that we'll show, the well names and completion data are shown below the log. The drill stem tests are shown beside the log to the right. The perforations are shown by the rectangles with circles in them in the center tract and the subsea depths of the top and bottom perf on the initial completion is shown out to the right of the log.

The neutron porosity where we have the neutron curve, porosity greater than 5 percent is colored in

green. On the next cross section we will have some sonic logs and on that the sonic porosity greater than 5 percent is colored in green.

The top correlation line shown on the cross section is the Third Bone Spring Sand. This is the point that we mapped on because it is a nice, consistent, correlative interval from well to well.

The middle line is the top of the Wolfcamp lime or carbonate, and the bottom line is the base of the Wolfcamp lime or carbonate. The productive interval is between the top and base of the Wolfcamp lime, usually towards the top of the interval.

Q I know you're going to get to more details about the differences between the Heller Well and the BTA Byers Well in terms of your opinion that one is in a gas reservoir and the other is in an oil reservoir, but now might be a helpful time to explain to the Examiner, using this exhibit, what are some of the reasons that have caused you to conclude that the two are in different types of reservoirs?

A The GOR of the Amoco Heller initially was 2459 cubic feet per barrel of oil.

The GOR for the Amoco Byers was 6,284 -- no -- yeah, I've got that mislabeled. I notice that should be cubic feet per barrel of oil instead of MCF per day.

The GOR of the BTA well was 7,212 cubic foot per barrel of oil as noted on the potential test; on the stabilization it was 17,083.

The Amoco Heller well is up-structure from both of the other two wells and it has an initial GOR of less than half of what they are, and a -- this shouldn't happen if these wells are in communication.

We will look at a performance curve in a little bit and the Amoco Heller has a typical limited reservoir oil decline curve.

Q While we're using this exhibit, let's also discuss the well to the west of the Byers No. 1 Well, the Amoco Best Com 1 Well, to have you describe for us whether or not that Best Well has depleted the production in the Wolfcamp to such an extent that some portion or all of that 40-acre tract ought to be excluded from being assigned a portion of the allowable from the BTA Byers Well.

A No, I don't think it has. This well was perforated -- well, first of all, it has excellent porosity and permeability development; had a good deliverability; porosities up in the range of 20 percent. It has a nice, solid block of porosity. It looks like an excellent well. They perforated from the base of the porosity up almost to the top of the porosity initially as shown by the perforations on the left side of the middle tract. These are

labeled 4-1-83.

The well did start making water fairly soon after its completion and the performance became very erratic. They did try two plugback attempts as shown by the perforations on the left side of the inside tract and ones sown to the left of the log. These were not successful.

Q Mr. Salmon, please discuss Exhibit Seven.

A Exhibit Seven is a production graph on this well. As you can see, the -- this is a 3-cycle 5-year graph. The barrels of oil per month, barrels of water per month, and MCF per month are shown on the lefthand scale from 100 to 100,000 barrels or MCF per month.

The GOR is shown on the righthand side of the scale from 10 to 10,000 cubic feet per barrel of oil.

The well came in initially with an excellent rate. The oil rate was between 4-and-5000 barrels of oil per month for the first three months.

The gas was over 20-million cubic feet per month with one month being up around 90-million cubic feet.

The GOR kind of jumped around there. One month it dropped down, but it was generally 3500 cubic foot per barrel of oil in place.

It started out real high; it did drop down to 4500.

In January the well started making a lot of water. In January it reported over 12,000, January of 1984, it reported 12,000 barrels of water per month. As you can see, from then on the performance became very erratic and the oil and gas production both dropped off drastically.

I think that this well watered out and had some channeling problems and they just couldn't get the water shut off.

Q In your opinion did the Best Well deplete the Wolfcamp reservoir?

A No, and I think we'll have to look at the BTA Well before we can get to the reasons as to why I think that.

The center well on our cross section, going back to it, is the BTA 8605 JV-P Byers No. 1. This well also had excellent porosity development as shown by the amount of green colored in. It wasn't quite as high as on the Amoco well, but it's excellent porosity.

However, there are major differences between the porosity on the two wells.

The porosity on the Amoco well, and this is the Best Com when I'm saying the Amoco well, occurred 25 feet below the top of the Wolfcamp Lime, while the porosity in the Byers occurred 90 feet down into the Wolfcamp Lime, so there's a big difference in where the porosity occurred

in the interval.

Also, in the Byers you have a 90 feet -- no, you have about, roughly, 60 feet of porosity development. You don't see any real tight intervals. It looks like it's all one zone.

The porosity in the BTA well occurs over 122-foot gross interval. It does have tight streaks separating it into various porosity zones, so you can see that there, even though they both are good, they do have, do show that between the wells it's a very heterogeneous reservoir.

The two lower perforated intervals in the BTA well that are shown in the center tract, the perforations with the arrows marked through them, were perforated, both zones swabbed water, and the well was plugged back to the top perforations shown from 11,430 to 11, 440 feet.

In looking at where the water is in the Byers Well, the BTA well, it has to be somewhere between the top set of perfs and the middle set. Looking at how this ties in with the Amoco Best Com, the top perf in the middle set is the minus subsea of 7785. The subsea of the base of the porosity on the Amoco well is -7785.

So on that basis, on our way you could say that the potential's there for the rest of that to have hydrocarbons in it.

If you take the more pessimistic outlook

and say that the water is right at the base of the top set of perfs, that would be a subsea of -7749.

If you take that subsea over to the Amoco well you would still have 33 feet of porosity above that interval, and I think on this basis you can say that the Amoco well's problems were probably largely due to a channeling of water from the bottom and that they have not adequately depleted the reservoir in that area.

I might point out the Amoco well made its initial potential natural; the BTA well producing first, then acidized with 200 gallons.

Okay, that's all I have on those two wells right now.

Q Let's see, we're looking at exhibit -- the information on the --

A Exhibit Six.

Q -- Exhibit Six?

A Right. The third well on this cross section is the Amoco Heller No. 1. This well was perforated over a gross interval from 11,326 to 11,436; however, the only porosity over 5 percent on the neutron curve is over the interval from 11,414 to 11,422 feet. The porosity is less than 10 percent and it's only an 8-foot interval.

The extreme deterioration in porosity from the other two wells is obvious just from the appearance

of the cross section.

The Amoco Heller Well was fraced with 12,500 gallons, which I think confirms that initially it was probably tight. It did potential for 379 barrels of oil, 5 barrels of load water, and a GOR to 2,459 cubic feet per barrel of oil, and in looking at the cross section it's obvious most of the perforations are above any perforations in the Amoco Best Com or in the BTA Byers No. 1.

Q In your opinion is the Amoco Heller Well producing in the same reservoir as the other two wells on the cross section?

A No.

Q Let's turn to Exhibit Number Eight, which I think is the production information on the Heller Well.

A Yes. This is a production graph on the Amoco Heller No. 1. The oil and gas scales and the symbols used are the same as on the previous graph. It's again on 3-cycle 5-year paper. The GOR scale again is on the right-hand side of the graph. The scale is different in that it goes from 1000 cubic feet per barrel of oil at the bottom to 1-million cubic feet per barrel of oil at the top.

The oil, which is shown by the solid curve on this cross section, is on a very steep decline.

The gas, which is shown by the x's is declining but not as steeply.

The initial GOR, which is shown by the broken line, started at less than 3000 cubic foot per barrel of oil, at about 2600 to 2800 cubic feet per barrel of oil. It has climbed rapidly and it is currently over 8000 cubic feet per barrel of oil.

Now this well during this period was flowing. It has been put on pump recently. I talked with Steve White, an engineer in Amoco's Hobbs Office. He said it was currently making 30 to 40 barrels of oil per day and approximately 250 MCF per day on pump.

Q How would you characterize the performance --

A That's in the first part of February.

Q How woudl you characterize the peformance of this well?

A Well, it's a typical limited reservoir oil well, probably volatile oil since its oil gravity is up over 50 gravity.

The pressure on the BTA Byers, and we'll look at the pressures later, showed very little depletion or difference between it and the Amoco Best Com No. 1. It would be hard to rationalize the BTA Byers with a high deliverability and high pressure being in communication with a limited reservoir oil well.

Q Let's turn now, Mr. Salmon, to a consid-

eration of the relationship of the BTA Byers Well to the Petro Lewis wells in the Southeast Lea Wolfcamp Gas Pool, and as an aid to that presentation, let me direct your attention to Exhibit Nine, which is the B-B' cross section.

A Yes. Cross Section B-B' is a north to south trending cross section. On the lefthand side it starts on the north, about two miles north of the BTA well, on the TXO Jordan No. 2-B. A trace of the cross section is shown on the map on the inset.

It then proceeds to the south through the BTA Byers Well; then to the south offset of this well, the Amoco Best Com No. 2; then to the south offset of that well to the Southeast Lea Unit No. 3; then to the south well from that, the Southeast Lea Unit Well No. 1. All these wells appear to -- the producers appear to be completed in the same carbonate bank.

The leftmost well on this cross section, as I said, is the TXO Production Corporation Jordan B Well No. 2. This well is completed as a gas well. It potentialed for 2.4-million cubic feet per day; GOR of 6875 cubic feet per barrel of condensate.

As shown by the lack of green color, it again is a tight well; does have a few feet colored black there in the perforations from 11,440-to-50 feet.

Just to the right of that well is the BTA

Byers No. 1, which we looked at on the previous cross section and again the extreme heterogeneity of the reservoir is shown by the differences in the porosity development.

The third well, or the middle well going to the right, is the Amoco Best Well No. 2. This is the south offset to the BTA Byers.

Again there's a total lack of neutron porosity over 5 percent. Right around 11,400 feet the density does get up over that and cross plotting those wells, those two curves would probably result in a porosity of about 7 percent over 4 to 5 feet.

It was perforated, as shown on the center track. It was acidized with 6,500 gallons and it swabbed noncommercial oil and water.

Again the extreme heterogeneity of the reservoir is shown by the differences in the porosity development between the two wells.

The next well going to the right is the Petro Lewis Southeast Lea Unit Well No. 3.

This well has a remnant of the porosity development. It has about six feet of porosity over 5 percent and the well was drill stem tested, flowed gas to surface too small to measure and it did reverse out 6 barrels of oil.

The pressures on this test, the initial

shut-in, 3,992; the final shut-in, 5,289, does indicate that the pressures in this tight test aren't adequately built up.

The last well on the right is the Petro Lewis Southeast Lea Unit Well No. 1. This is the best producer in the area from the Wolfcamp. As I said, it made 2 BCF, 357 barrels of condensate, and as shown by the amount of green shown on the sonic log, we would expect it to be a good well.

It was perforated initially from 11,400 to 500 and the perfs below there from 11,4 -- no, the initial perfs were 11, 400 to 470. The perforations from 11,470 to 11,500 feet were added in 1974.

Q Do you have a production graph of the performance of the Petro Lewis well --

A Yes.

Q -- that you've been discussing? Is that Exhibit Number Ten?

A Yes, that's Exhibit Number Ten. Now this graph is on 3-cycle 20-year semilog paper. The GOR is indicated byl the blue curve and the scale is shown on the left side of the graph, going from 1 to 1000 MCF per barrel.

The monthly gas production is indicated by the red curve and this scale is on the righthand side.

As you can see, the well for the first six months had an excellent deliverability, up in the range

of 70-million cubic feet and higher.

It then declined rapidly to a little bit over 10-million cubic feet per month where the decline flattened out; been on production since 1968 and it's been an excellent well.

The GOR for this well has bounced around quite a bit. It's ranged from 4000 cubic foot per barrel to generally less than 10,000 cubic feet per barrel.

In 1980 through 1983 the GOR appeared to be gradually creeping up and since that time the production has been very erratic.

This well also was initially completed natural.

The one producing well that we don't have on our cross sections is the well immediately to the right of this well, the Petro Lewis Southeast Lea Unit Well No. 2. This well appears to be tight on the logs. It was fraced with 21,000 gallons, and it did flow on test 384 MCF per day. I think the potential, if I remember, was .1 -- calculated open flow with 1.1-million cubic feet per day.

It also has produced since 1968 but its cumulative is only 285-million cubic feet plus 25,000 barrels of condensate.

Q Have you made a study of the pressure data available for the Wolfcamp wells in this area?

A Yes.

Q And have you presented that study in forms of a tabulation and a -- of the data, and a graph of that data?

A Yes. Exhibit Eleven is the graph of the data with the pressure on the lefthand side of the graph in thousands of psi and the date being on the horizontal scale.

Exhibit Twelve is this same data presented in a table format.

Q What's the reason that you have made a study of the pressure data, Mr. Salmon?

A This is to try to determine the pressure relationship between the BTA well and the other gas producers in the area and the Amoco Heller.

Q And what have you concluded about the pressure relationship among those wells?

A Well, it appears that the Amoco Byers, or the Amoco Best Com No. 1, very possibly had some pressure depletion from the Southeast Lea Unit well. Pressure on the BTA well is close to the pressure that the Best Com No. 1 had. I did get a pressure from Mr. Zinsmeister with Amoco on the Heller. When he gave it to me he told me it was a single dip-in point, that it wasn't built up, and I think that the data shows that it is not a built-up pressure and is inadequate for making any conclusion as to -- just on the

pressure data -- whether it's in the same field as we are.

Q That's only insofar as the Heller Well goes.

A As the Heller, yes.

Q All right. Using the pressure information available to you, what have you concluded about the relationship of the Best Com Well and the BTA well versus the Wolfcamp wells to the south? In the Southeast Lea?

A I think that both of the Amoco Best Com and the BTA Byers do show pressure depletion from that, from the production to the south.

The TXO Well two miles ot the north also could be showing some pressure depletion from that production.

Going over the --

Q Does it change your opinion with regards to the pressure depletion in the northeast quarter of 23 that Amoco drilled the Best Com No. 2 Well in the southeast of the southeast of 23?

A No, as I said, this is a very heterogeneous reservoir. It could very easily be trending in a north/south direction over a fairly thin streak and could bend around between those two wells, or between the Best Com No. 2 and the Southeast Lea Unit Well No. 3.

You can't prove this geologically but I

think the pressure data indicates it's a definite possibility.

Q What have you concluded with regards to the pressure depletion in the area insofar as that information is useful to reach a conclusion about spacing patterns?

A I think that the pressure is transmitted very well over an area where the porosity carries.

Going over the pressure data in detail, the first pressures we have available are 1968 on the Southeast Lea Unit Well No. 1. This well was DST'd twice. The pressures on one DST at 11,430 feet were 6,502 pounds.

On the second DST the pressures were 6,616 pounds.

Now, closely behind that, in June of 1968, the Southeast Lea Unit Well No. 2 was drill stem tested. The initial shut-in on that was 6,791 pounds.

The final shut-in was 5,336, indicating an insufficient build-up on the test or depletion during the test.

But these tests established an initial reservoir pressure for the Wolfcamp carbonate to be between 6,500 and 6,800 pounds, in that range.

The Southeast Lea Unit Well No. 3 is the next pressures available. It was DST'd in 1982. Again I think the pressures are not adequately built-up in a tight

well, and are very little help in determining anything, but the pressures on the initial shut-in were 3,992 and on the final shut-in were 5,389.

Following this the Amoco Best Com No. 1 was drilled in 1983. In April of 1983 they had a 12-day shut-in where the pressure was 4,717 pounds. The following month they had a 3-day shut-in of 4,654 pounds.

Looking at the excellent porosity on the well, the good permeability, I think in 12 days that well would probably build-up and that would be a good pressure for the area at that time.

The Amoco Heller was drilled in 1985. Its pressure was 4,140 pounds. As I mentioned before, it's a one point dip in pressure. The Amoco personnel that I talked to, Mr. Zinsmeister, didn't think it was built-up, since the well took such a big frac to turn it into a producer, and I think just from that data alone you can think that it may not be built-up.

The later pressure on the TXO Jordan B No. 2 and the BTA Byers No. 1, that are higher than this pressure, confirms that the pressure in that well probably wasn't built-up.

The TXO Well, which is two miles north of the BTA Byers, had a 63-hour shut-in pressure of 4,683 pounds. I got this data out of the Commission files. The

pressure was flat for the last 48 hours of the shut-in and I think that that indicates it's a good pressure.

On the BTA Byers the DST pressure was 4,531 pounds. The test chart was flat. They had a 13-day shut-in of 4,526 pounds. I think those are good pressures.

Now there are two possible interpretations from this data.

One interpretation would be, and I think that it's the most probably correct, is that the the Southeast Lea Unit Well No. 1 and 2 have depleted the area for -- around the Amoco Best No. 1, the Byers No. 1, prior to their completion and maybe even as far north as the TXO Jordan No. 2-B.

The other interpretation would be that the original pressure around the Amoco Best Com No. 1 is 1,785 pounds -- at least 1,785 pounds lower than the initial pressure in the Lea Southeast Unit well, and if that is the interpretation, then the Amoco Best No. 1, the TXO Jordan B No. 2, and the BTA Byers are seeing close to virgin reservoir pressure.

Since good pressure data is not available on the Heller, the pressure is of no help in determining the status of that well.

Q Let me have you summarize, Mr. Salmon, your opinions on the various issues and then have you iden-

tify some of the factors that you've utilized to support those opinions.

Starting off, first of all, with your study to determine whether or not you have an opinion that the Byers No. 1 Well is a gas well producing from a gas reservoir.

A The Byers No. 1 in my opinion it's definitely a gas well producing from a retrograde gas condensate reservoir.

Q Do you base that opinion in part upon your analysis of the information received from CORE Lab, the pvt study --

A Yes.

Q -- and the fluid information?

A Yes.

Q Is that a typical study that is done by individuals in your profession and relied upon by you as engineers --

A Yes, it is.

Q -- and is it typically used to determine that the hydrocarbons in reservoir conditions are either gas or oil?

A Yes, it is.

Q With regards to the opinion that you've expressed that the Amoco Heller Well to the east of your lo-

cation is an oil well and is separated from the BTA gas well in Section 23, summarize for us the factors that make up or include that opinion?

A The factors there are the, of course, the initial GOR on the potential, the initial producing GOR, which I think placed this well as an oil well up structure two wells that appear to be gas wells.

The second factor is the decline curve on the well which is typical for a limited reservoir oil well. You generally don't have oil wells in the same reservoir up structure of gas wells.

Q Let me ask you your opinion with regards to the spacing pattern and the efficiency of dedicating the northeast quarter of Section 23 to the BTA well.

A Well, a gas well with excellent permeability as evidenced by the deliverability of the BTA Byers Well, as evidenced by a drill stem test that we have where the pressure just broke flat, which indicates an excellent permeability, the well can drain 160 acres. If the reservoir extends 320 acres I think it could drain that and I think that the New Mexico Conservation Commission pretty well accepts that a well can drain -- a gas well can drain 320 acres.

Q Would a 160-acre gas spacing be cnsistent with the other Wolfcamp gas spacing in the area?

A It would be consistent with the Lea Southeast Wolfcamp. To the north you do have a field with 320-acre spacing.

Q Do you have an opinion as to whether or not the spacing was less than 160 you as an operator would be forced to drill an unnecessary well?

A We would eventually be forced to drill additional wells to protect and hold our acreage and keep other operators from picking up the leases after the primary terms and drilling the leases, yes.

Q In your opinion is that expense of additional wells necessary in this reservoir?

A No, I think the well that we have will drain the reservoir.

Q Additional wells in the northeast quarter, in your opinion at this time based upon available information, would not produce reserves that would otherwise be produced by the -- not otherwise be produced by the Byers Well No. 1?

A No.

Q You concluded for us earlier that the Best Com No. 1 Well did not have an impact, or a significant impact, on the ability of the west half of the northeast quarter to contribute productive acreage to the Byers Well.

A Right.

Q And htat opinion was based on the fact that that well watered out before it was pressure depleted?

A Right.

Q And the fact it watered out was attributable to the low perforations that Amoco placed in that well?

A Yes.

Q And those low perforations led, then, to the water channeling and the drowning out of the production.

A Yes.

Q As opposed to having the west half of that quarter section being depleted of reserves.

A Right.

Q Do you have an opinion, Mr. Salmon, as to whether the -- Mr. Salmon, for this particular reservoir do you have an opinion as to whether it is rate sensitive? In other words, must the producing rates of the wells in this gas reservoir be controlled in some fashion in order to maximize the ultimate recovery?

A No, I don't think so. The small drawdown in pressure in the BTA Well, I think indicates it's not rate sensitive. You wouldn't expect it to be rate sensitive, no.

Q In your opinion, Mr. Salmon, will approval of this application, the establishment of 160-acre gas pool under statewide rules for 160-acre gas well be the

optimum method to handle the production and spacing for this reservoir?

A Yes, I think it will.

MR. KELLAHIN: That concludes my examination of Mr. Salmon, Mr. Stogner, and we would move the introduction of his Exhibits One through Twelve.

MR. CARR: No objection.

MR. STOGNER: No objection? Exhibits One through -- what did you say?

MR. KELLAHIN: Twelve.

MR. STOGNER: Exhibits One through Twelve will be admitted into evidence.

Mr. Carr, your witness.

CROSS EXAMINATION

BY MR. CARR:

Q Mr. Salmon, if I understand BTA's application, what you're seeking is either the contraction of the West Osudo Wolfcamp Pool, deleting the northeast quarter of 23 and making that a separte new gas pool, or extending the Southeast Lea Wolfcamp Pool up to and including the northeast quarter of Section 23.

A Yes.

Q And in either event you would have a 160-acre unit dedicated to a gas well.

A Yes.

Q If either of those are approved by the Division, BTA will be able to produce substantially greater quantities of oil and gas from that well than under present rules, is that not true?

A Yes.

Q And you'll be able to also hold the acreage without drilling additional wells.

A We will hold the full northeast quarter. We would, I think, lose the southeast quarter after the primary term of the leases --

Q But you would hold the entire northeast quarter without additional drilling there.

A Right.

Q If the rules stay as they are, there would be -- you would need to drill additional wells on 40 to hold that acreage.

A Yes, past the primary term.

Q Now if I understand your testimony, we don't have a dispute here today that the gas/oil ratio for the BTA well in the northeast of Section 23 is such that it would be classified an oil well if we adjusted the gas/oil ratio.

A I don't think we -- there is a set cutoff in the New Mexico rules, but --

Q Is that --

A -- I think it is low enough to where, in a lot of cases, it would be classified as an oil pool, yes.

Q It has a gas/oil ratio below or less than 100,000 cubic feet of gas per barrel of oil, does it not?

A Yes.

Q So then if that is the cutoff, it would be classified as an oil well.

A Yes, if that's the cutoff.

Q Okay. So looking at the gas/oil ratio you don't feel you have an accurate reading on this particular well, is that correct?

A If that's the only piece of data you looked at, correct.

Q And you've concluded that one of the things that signalled that you might look at the situation in the reservoir was the gravity of the oil.

A Yes.

Q And the gravity of the oil was somewhere in the neighborhood of, what, 50 degrees?

A Yes, it was up -- the gravity -- it's above 50. It's in the 53 to 55 gravity range.

Q And that would indicate to you that you might have a volatile reservoir situation?

A Yes, it could indicate a possible vola-

tile oil type reservoir or it could indicate a retrograde gas condensate reservoir, either one.

Q And when you get over 40 that -- degrees, that's what that sort of tells you?

A Oh, you have oilfields, you know, that 40 to 45 degrees are generally oil fields. When you get up over 50, then you start getting into the volatile oil and the retrograde gas condensate.

Q And the gravity of the oil in the Heller Well, the Amoco well, is also over 50, is it not?

A Yes.

Q Now, if we declare this a gas well, would this be a proration gas well? Or do you know? I don't.

A I don't know right offhand. I don't think it would be.

Q All right, do you have any idea what -- at what rates this well would be permitted to produce the hydrocarbons under it?

A As far as the Conservation Division rules, I don't think that there is a limit.

As far as practical rules on deliverability -- delivering gas into the pipeline, these days I think it would probably be in the 3-to-6-million cubic feet a day range.

Q And that is in excess of what it could

now as an oil well.

A Maximum. Yes, as an oil well it would have 2000 times 365 barrels of oil and 730 MCF a day.

Q Okay, and if you -- if this is classified as a gas well, how much of the oil will you be able to produce?

A We'd be able -- you mean over the life of the well or --

Q No, I mean daily. Will you be able to produce more than a 365 barrel depth bracket allowable?

A It's conceivable that if you produce -- yes, it's conceivable that you could.

Q So that is the real benefit that BTA would derive, is it not?

A Yes. BTA would derive a benefit from a higher producing rate.

Q Now, to establish that you had a retrograde condensate reservoir, you ran a pvt test.

A Yes.

Q And from that you were able to conclude that at a reservoir pressure, that the hydrocarbons were in a gaseous state, is that correct?

A Yes.

Q Were you able to make a similar computation for the reservoir under the Amoco well?

A No.

Q You don't have pressure data that --

A You mean under the Amoco Byers or the Heller --

Q I'm sorry, the Heller Well.

A Under the Heller Well, no.

Q You don't have really sufficient pressure data to do a lot with the Heller Well, isn't that fair to say?

A Well, we don't have sufficient pressure data and you can't at this time go back to the initial producing conditions for the well. You -- at this point you can't get that.

Q So that's something we don't know about that well.

A Right.

Q Now if we take a look at -- I'll work backward through these, your Exhibit Number Nine, which is the cross section, the north/south cross section, one of your proposals, I understand, is to extend the Southeast Lea Wolfcamp Pool to the north, is that correct? Is that not right?

A That is one of the options that would be acceptable to us, yes.

Q And to that you would have take in the

Petro Lewis well that was incapable of commercial production, is that not right? It lies between the existing Southeast Lea and the BTA Byers No. 1?

A The No. 3 Well did DST gas. It's currently a Morrow producer. It's possible that with large stimulation it could be turned into a producer.

Q In the Wolfcamp?

A The No. 2 Well, yes.

Q And that's the well that's the second well from the right on your cross section that has just a very small portion of the log shaded in green.

A Right.

Q And that's what you called, I think, a remnant of porosity.

A Yes.

Q If you look at this whole cross section, I believe it was your testimony that they're all in the same carbonate reservoir.

A Carbonate bank, yes.

Q Do you think they're all in the same pool?

A I think with the probable exception of the Heller, yes.

I think that the area right immediately around the Southeast Lea Unit No. 3 is probably so tight

that you probably won't see any depletion of that area.

Q So what you're seeking is a possible extension of this pool to the north and you have a well that was wet in it and well that had only a remnant of porosity in it.

A Well was wet, which well is that?

Q Isn't that the Amoco well immediately north, the Best Com No. 2?

A The Best Com No. 2 was tight. It did swab oil and water at low rates.

Q It was never able to -- made into a commercial producer, was it?

A This is correct.

Q And as to the Petro Lewis Well immediately south of that, was it ever a commercial producer?

A The No. 3 Well?

Q Yes, sir.

A It's a commercial producer in the Morrow.

Q But not in the Wolfcamp.

A Not in the Wolfcamp.

Q And never in the Wolfcamp.

A Never in the Wolfcamp.

Q And you're proposing --

A It (not clearly understood.)

Q And you're proposing to extend the South-

east Lea to include the acreage on which both of those wells are located.

A Yes.

Q Now, if we look at the Petro Lewis No. 3, you believe this is in the same reservoir as the BTA Byers No. 1.

A The No. 3?

Q Yes, sir.

A The porosity -- well, you're in the same carbonate bank. At that location, no, I don't -- that well is a tight well. It could respond to stimulation and end up making a well.

Q And if it did, it's your opinion that that would be in the same pool?

A If it did, yes, I think it would probably be in the same pool.

Q If we look at your cross section that's Exhibit Number Six and we look at the Heller No. 1 it also has a very small section shaded in green. Isn't it possible that what we have there is also just a remnant of porosity?

A I think it is a remnant of porosity, yes.

Q Okay, so if we go from your Byers Well south to the Petro Lewis No. 3, the remnant of porosity in your opinion would be in the same pool but if we go to the Amoco Heller to the east it is not.

A Yes.

Q Now if we look at these zones on the cross section, Six, there is a small shaded area on the Amoco Heller Well. That shaded area is the producing interval, is it not, in that well?

A The entire perforated interval is the producing interval.

Q All right, and --

A It was fraced with 12 -- hold it, are you talking about which well?

Q I'm sorry, I'm talking about the Heller Well, the one on the right.

A Okay, yes, it's perforated over approximately a 100-foot interval.

Q Okay, now the green shaded area on this log section shows what?

A The green section shows porosity.

Q Porosity, so is it fair to assume that that is where the production is coming from in the Heller Well?

A It could be, yes. It most -- the well was fraced with 12,500 gallons. When you frac a well you can break into zones that don't show up on the log --

Q So there may be vertical communication.

A -- so there may be vertical communica-

tion. The porosity zone that you see there is probably the most likely zone.

Q And that zone would correlate with part of the producing interval in the BTA Byers Well, would it not?

A Yes, it would.

MR. CARR: I have nothing further.

MR. STOGNER: Mr. Kellahin, any redirect?

MR. KELLAHIN: No, sir.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Salmon, as far as the Heller Well goes, do you know what the gravity of oil coming out of that well is?

A It's between 53 and 55; gravity of that well is about the same as it is in our well. They're both in the 53 to 55 range; depending on where you catch your sample you'll get a range in there somewhere.

MR. STOGNER: I have no further questions of this witness.

Are there any other questions of Mr. Salmon?

MR. KELLAHIN: No, sir.

MR. STOGNER: He may be excused.

Do you all have any closing statements?

MR. CARR: Very brief.

MR. STOGNER: Mr. Carr.

MR. CARR: May it please the Examiner, BTA is before you today having drilled a well in the West Osudo Wolfcamp Pool classified as an oil well. It's a very good well and they're interested in producing it at higher rates than permitted under existing rules, so they seek to do one of two things, either create a new pool for this well becaue it's a good well, or extend the Southeast Lea Wolfcamp Pool to include it.

I submit to you that, first of all, in regard to extension of the Southeast Lea Wolfcamp, this was not included within the call of the case. It would require readvertisement.

That aside, it is asking you to extend a pool over an area in which there are two noncommercial wells and I don't believe anything in the record would justify doing that from an engineering point of view.

If either of the alternatives sought by BTA are granted, we will have a gas well. The gas

well will be nonprorated and their purpose will be -- their purposes will have been achieved in that they'll be able to produce at a higher rate and they won't have to do the drilling that would be required to develop the oil pool.

Amoco is here today, as is Mr. Byers, in opposition to this application. We believe that the evidence shows that these are the same reservoir. We may have a smaller portion of it but the data BTA has presented I think is woefully inadequate in certain respects.

First of all, they talk about the well that Petro Lewis operates to the south that has a small porosity shelf and they'll stand here before you and claim that this would be in the same reservoir and that the reservoir does extend to the south.

They admit that the zones correlate between their Byers Well and the Amoco Heller Well to the east.

They talk about having and have presented pvt information that they have prepared which would tend to show, perhaps, a retrograde condensate condition in the reservoir. They were directed or pointed this way because of the gravity of the oil in their Byers Well, and yet if we look at it, the gravity of the oil in the Amoco Well would certainly indicate that the oil is the same and there's no pvt information on that. Simply showing what

they have in their well, it seems to me, and breaking it and calling it a separate pool, is an inadequate presentation and if you accept their argument, we submit that you'll be authorizing drainage which will have two sets of rules in the same reservoir, and we therefore request that the application be denied.

MR. STOGNER: Thank you, Mr. Carr.

Mr. Kellahin?

MR. KELLAHIN: Mr. Examiner, it's undisputed that Mr. Salmon has used the best available information, using standard engineering practices, to tell you under reservoir conditions what type of well he has.

It is undisputed that that testimony shows that this is a gas reservoir and that the DTA well produces from a gas reservoir.

What Amoco wants to do with their acreage is certainly up to them. If they want to be in our pool, that's fine; if they don't, why, that's fine with us. If they want to stay on forties, that's all right, too. If they want to stay on 160's, the gas -- that's fine with us, too.

They have not provided you any information to demonstrate what ought to be done with the Heller Well. It is undisputed that Mr. Salmon has told you

that in his opinion, and it's the only opinion you have before you, that that is in a separate reservoir. You're stuck with a gas well and you've got to be able to do with it, one of the logical things to do is simply extend the closest gas pool that you have.

I mean you can do that. The District Office can simply extend it and it's done. It does not matter that there are wells in the area that don't produce commercial Wolfcamp; the testimony is that it was pressure depleted from Wolfcamp gas wells. It shows in the evidence that this is a gas well.

You cannot ignore the information Mr. Salmon has given you but it does not preclude you from a number of options.

The option is that you can space this on 160 acres and let Amoco come in with their own presentation to demonstrate with their own pvt study what they well is or is not. If Mr. Carr wants to argue it's an oil well, let him bring in his proof, but don't believe him standing here without an expert to tell you that we ought not to have a gas well when in fact we have a gas well. He can't deny it, it's there, and no amount of verbiage is going to change that into an oil well.

What is your obligation, and that is to space on what is appropriate for the reservoir.

Don't make us drill additional wells when one well will do.

The fact that we can produce at a higher rate, the undisputed testimony is it does no damage and there's certainly no testimony at all before you that there's been any drainage. The first time I ever heard that idea is when Mr. Carr gave it to you. There's no evidence of drainage here; no proof of it at all. If he's concerned about drainage, where is his proof?

The only thing you can do with what you've given us is to treat this as a gas well. Your options are to extend the existing gas pool or to create a new one for us. We don't want to infringe upon Amoco. We don't think they're in the same reservoir for us, and that's our expert's opinion. If they believe otherwise, let them come demonstrate it to you.

We don't want to draw their well into our pool. We don't see any reason for it. They can produce at whatever rates they can next door; that's fine with us, but let us have what we think is appropriate in this case and please grant the application.

MR. STOGNER: Thank you. Is there anything further in this case?

MR. CARR: Mr. Stogner, there are several letters that I'm asking just be included in the record of the case from Mr. Byers, Mr. Nixon, and others.

MR. STOGNER: I have received several correspondence to be read into the record today. I will not read them; however, I will allude to them and they will be made part of the record.

One Alton C. White, Junior, in Austin, Texas objects.

James W. Nixon, M.D., and a James W. Nixon, Junior, M.D., both object, San Antonio, Texas.

A Mr. (unclear) Johnson of Austin, Texas, a letter of exception, and Adolph A. Karmel, that's K-A-R-M-E-L, Junior, of Austin, Texas, also sends an objection. Evidently they are interest owners within the acreage discussed today.

They will be made part of the record.

If there's nothing further in Case Number 9078, I do have one instruction for both attorneys today. Would you both submt me a rough draft order within the next ten days?

At that time I'll keep the record open for the receipt of just those particular items.

That will conclude this case and I'm going to take a thirty minute break.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of this portion of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

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