STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING)
CALLED BY THE OIL CONSERVATION)
DIVISION FOR THE PURPOSE OF)
CONSIDERING:) CASE NO. 10873

APPLICATION OF MEWBOURNE OIL COMPANY

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: David R. Catanach, Hearing Examiner
Jim Morrow, Hearing Examiner

December 2, 1993

Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Division on December 2, 1993, at Morgan Hall, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before Deborah O'Bine, RPR, Certified Court Reporter No. 63, for the State of New Mexico.

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I N D E X

December 2, 1993
Examiner Hearing
CASE NO. 10873

E X H I B I T S

A P P E A R A N C E S

FOR THE APPLICANT: HINKLE, COX, EATON, COFFIELD & HENSLEY
P.O. Box 2068
Santa Fe, New Mexico 87504
BY: JAMES G. BRUCE, ESQ.

EXAMINER CATANACH: At this time we'll call Case 10873, which is the application of Mewbourne Oil Company for Special Pool Rules for the Walters Lake-Bone Spring Pool, Eddy County, New Mexico.

Are there appearances in this case?

MR. BRUCE: Mr. Examiner, Jim Bruce from the Hinkle law firm in Santa Fe representing the applicant. I have three witnesses to be sworn.

EXAMINER CATANACH: Additional appearances?

(Witnesses sworn.)

MIKE BOGART,

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

EXAMINATION

BY BRUCE:

Q. Will you please state your name for the record.

A. My name is Mike Bogart.

Q. Where do you reside?

A. Midland, Texas.

Q. Who do you work for and in what capacity?

A. I work for Mewbourne Oil Company in the capacity as a professional landman.

Q. Have you previously testified before the Division as a landman?

A. I have not.

Q. For the examiner, would you outline your educational employment background?

A. I have a bachelor's of business administration in petroleum land management from the University of Oklahoma. I've worked in the petroleum industry for four years before I took my job with my present employer. I've been with Mewbourne for almost six years.

Q. Does your area of responsibility at Mewbourne include southeast New Mexico?

A. It does.

Q. Are you familiar with the land matters involved in this application?

A. I am.

MR. BRUCE: Mr. Examiner, I tender Mr. Bogart as an expert petroleum landman.

EXAMINER CATANACH: Mr. Bogart is so

qualified.

Q. (BY MR. BRUCE) Mr. Bogart, would you please refer to Exhibit 1 and identify it for the prosecutor.

A. Exhibit 1 is a plat that outlines the Walters Lake-Bone Spring Pool and the corresponding surrounding contiguous sections that we've given notice to offset operators in.

Q. And this is the pool that you seek to increase the GOR to 5,000?

A. That's correct.

Q. What is Exhibit 2?

A. Exhibit 2 corresponds with Exhibit 1. The numbers starting at the top and on down correspond on this plat, and it just lists the offset operators, leasehold operating rights.

Q. Operating rights' owners?

A. Right.

Q. How did you come up with this list?

A. This list was compiled from the records of the county, the BLM and the state and the OCD, the land records of those various agencies.

Q. There's quite a few people named here. Who are the primary operators in this pool?

A. The primary operators -- you mean those who

operate wells?

Q. Yes.

A. Mewbourne Oil Company, Yates Petroleum Corporation, Enron Oil & Gas Company.

Q. What is Exhibit 3?

A. Exhibit 3 is a listing of all of the waivers, letters that we have gotten, we sent out asking for consent for our application and waivered any objection. And I'd like to point out, the first two pages are the two Yates and Enron, the two other operators in the pool who actually operate Bone Spring wells.

Q. And notice of this application was sent to all the people listed on Exhibit 2?

A. That's correct.

Q. And is Exhibit 4 your affidavit regarding notice containing the certified return receipts?

A. Yes, it is.

Q. Were Exhibits 1 through 4 prepared by you or under your direction or compiled from company records?

A. Yes.

Q. In your opinion, is the granting of this application in the interest of conservation and the prevention of waste?

A. Yes.

MR. BRUCE: Mr. Examiner, I tender Exhibits 1 through 4.

EXAMINER CATANACH: Exhibits 1 through 4 will be admitted as evidence.

MR. BRUCE: That's all I have of this witness.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Bogart, the companies you have listed, do they have operating rights within the Bone Spring formation?

A. That's right.

Q. Do some of these companies just have the leasehold interest, they don't necessarily have a well drilled on the acreage?

A. That's right. The only wells that are producing from the Bone Spring formation are within the Walters Lake-Bone Spring Pool, and these surrounding are just those that have leasehold interest in the rights to the Bone Spring formation.

Q. Have you had any objection from any of the companies that you notified as far as you know?

A. Not that I know of.

EXAMINER CATANACH: I don't have anything

further. The witness may be excused.

MR. BRUCE: Call Mr. Shatzer to the stand.

DAVID SHATZER,

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

EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name and city of residence for the record.

A. My name is David Shatzer, and I live in Midland, Texas.

Q. And who do you work for?

A. I work for Mewbourne Oil Company.

Q. And what is your job there?

A. I'm a petroleum geologist.

Q. Have you previously testified before the division as a geologist?

A. Yes, I have.

Q. And were your credentials as an expert accepted as a matter of record?

A. Yes, they were.

Q. Are you familiar with the geology involved in the Walters Lake-Bone Spring Pool?

A. Yes, I am.

MR. BRUCE: Mr. Examiner, I tender Mr.

Shatzer as an expert petroleum geologist.

EXAMINER CATANACH: Mr. Shatzer is so qualified.

Q. (BY MR. BRUCE) Mr. Shatzer, could you refer to your Exhibits 5, 6, and 7, and go through those for the examiner, and identify them?

A. Exhibit No. 5 is a structure map on the top of the first Bone Spring sand. The structure is contoured on a 50-foot contour interval.

The Bone Spring wells that are presently producing from the first Bone Spring sand are those that are enclosed in the aqua blue color on both Exhibit No. 5 and Exhibit No. 6 that I haven't gotten to yet. So the producers are all colored in aqua blue, and there's a few other wells that probably will produce at some time later that have apparent pay behind pipe.

Exhibit No. 6 is a first Bone Spring sand interval net porosity isopach; that is, the porosity greater than or equal to 10 percent that is greater than that cutoff for the entire first Bone Spring sand interval, and then this cumulative figure is then isopached.

Do you want me to go on to --

Q. Yes, why don't you go on to the

cross-section?

A. The cross-section P-P' runs west to east across Section 3 and Section 2. It's marked on both maps in a dashed line. It starts with the Enron Nelson 3 Federal No. 10 and goes to the east to the Mewbourne Oil Loco Hills No. 2, then goes to the Mewbourne Oil Loco Hills No. 4, and then the last well at the position P-P' is Mewbourne Oil Cedar Breaks 2 No. 4.

The three Mewbourne wells all are perforated in the upper two sand members. Later on, testimony may refer to these as the aqua sand and pink sand. Those are merely internal in-house determinations for the sand. The aqua sand would be the uppermost portion that's got the two lines across, and then the second little, slightly thicker member where there's perforations is the pink sand.

But basically it shows the continuity of the gross sand packages across the field, and the isopach was merely a data derived from the porosity greater than the 10 percent cutoff.

Q. The wells in the pool, I notice at the bottom of your map have the top of the carbonate. What do the wells in this pool produce from?

A. The wells in this pool produce from the

first Bone Spring sand. There's --

Q. Go ahead.

A. There's one perforation in the second Bone Spring sand, but that's no longer an economic well, and that's in the northern half of Section 3.

Q. And is the Bone Spring formation continuous across this pool?

A. Yes, it is.

Q. Were Exhibits 5 through 7 prepared by you or under your direction?

A. Yes, they were.

Q. And, in your opinion, is the granting of this application in the interest of conservation and the prevention of waste?

A. Yes, it is.

MR. BRUCE: Mr. Examiner, I move the admission of Exhibits 5 through 7.

EXAMINER CATANACH: Exhibits 5 through 7 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Shatzer, the sand intervals that are being produced, are those separated by something that's impermeable?

A. Not really. There are individual sands,

and obviously they have the porosity and permeability that we derive our oil and gas from, but these wells are all stimulated by large frac stimulation programs. And, therefore, I don't know that there would be any consistent boundary that would separate one sand package from another once these are brought on production.

Q. And this sand interval is the only productive interval in the pool, as far as you can tell? The carbonate is not productive?

A. The carbonate is not productive.

Q. It has been tested?

A. Not really. I don't think in this particular pool, no one's perforated the carbonate. As I said, the second sand, which is a couple hundred feet below this, anything on the cross-section was perforated in a well that's not colored in the north half of 3. It's in the C unit of 3, and it's operated by Enron Oil & Gas. It's no longer a very economic well. And the second sand doesn't have the porosity permeability that the first sand does, and it's not part of the active reservoir that we've been working with.

EXAMINER MORROW: Is the second sand one of these markers you have through here, or is it down

below everything generally?

THE WITNESS: No, it's hundreds of feet down below the top of the second Bone Spring carbonate. It's a whole another sand package.

EXAMINER MORROW: So this whole thing from the top of the sand to the top of the carbonate is the first?

THE WITNESS: Is the first sand, yes.

Q. (BY EXAMINER CATANACH) Is that Enron well still producing from that second sand?

A. Yes, it is. I don't think it's producing that much. I don't have the daily figures on it. It's only produced a few thousand barrels of oil cumulative.

Q. Have you been able to geologically define any boundaries within the sand reservoir, the gas-oil boundary, or oil-water boundary or anything?

A. No. There really isn't an oil-water contact. The sands in the lower half of the first Bone Spring sand haven't, I don't feel, added too much to the production. We have had one well that we perforated them in, and I don't know how much they've added to the production. Certainly, they contribute whatever -- they're open through the fracture stimulation that would probably frac from the top of

the sand all the way to the base, but they don't look productive.

The characteristics are a little bit tighter, higher-bound water, and they don't look like they would be contributory.

EXAMINER CATANACH: I think that's all we have of the witness at this time.

DAN WILKIRSON,

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

EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name for the record.

A. My name is Dan Wilkirson.

Q. Where do you reside, and by who are you employed?

A. I currently reside in White House, Texas. I'm employed by Mewbourne Oil Company.

Q. And in what capacity are you employed by Mewbourne?

A. I work for Mewbourne in Tyler, Texas, as the chief reservoir engineer.

Q. Have you previously testified before the OCD as an engineer?

A. No, I have not.

Q. Would you outline your educational and work background?

A. I have a bachelor's of science in petroleum engineering from the University of Texas that I received in 1977. Since then I worked for 15 years for Core Laboratories, engineering consulting department, as a reservoir engineer, ranging from an entry-level engineer to, my final position was manager of domestic engineering services. During that time, I did studies of fields throughout the United States, as well as internationally.

Q. Have you testified before any other commissions?

A. Yes, I have. I've testified before the Texas Railroad Commission and the Oklahoma Corporation Commission.

Q. Are you a Registered Professional Engineer?

A. Yes, I'm a Registered Professional Engineer in Texas.

Q. When did you join Mewbourne?

A. I joined Mewbourne about a year and a half ago. I had worked for Mewbourne previously. They were one of my clients as a consultant, and I joined them full time about a year and a half ago.

Q. What type of work do you perform?

A. My specialties are reservoir simulation and secondary recovery, but I act as a general reservoir engineer for all of Mewbourne's properties that they operate, looking at properties that require additional study or additional work to determine the best way to produce and develop them.

Q. Are you familiar with the engineering matters and reservoir matters pertaining to this pool?

A. Yes, I am.

Q. In particular, what have you reviewed regarding this pool?

A. I have reviewed all the production from the wells in this field. I have reviewed all the geologic information that Mr. Shatzer has prepared, as well as studied some of it on my own, and I have looked at what might be the best way to maximize recovery from this pool.

MR. BRUCE: Mr. Examiner, I tender Mr. Wilkirson as an expert reservoir engineer.

EXAMINER CATANACH: Mr. Wilkirson is so qualified.

Q. (BY MR. BRUCE) Mr. Wilkirson, would you refer to your first exhibit, No. 8, and identify it for the examiner and describe its contents.

A. Yes. Exhibit 8 is a tabulation of the wells currently completed in the Walters Lake-Bone Spring Pool. They include, the first three wells are in Section 3, and they are operated by Enron.

The very first well on the list is the Nelson 3 Federal #8. That is the well that is completed in the second Bone Spring sand. It was completed in 1988 and is considered the discovery well of the pool. That well is still producing, and the final columns show the latest production that we have on each of these wells. That well produced 33 barrels of oil in the month of June 1993. And that is why Mr. Shatzer refers to it as probably uneconomic.

Mewbourne currently operates four wells in the field. They're all located in the south half of Section 2. The Loco Hills State #2, #3, and #4. They are each in the southwest quadrant of Section 2.

The Cedar Breaks 2 State #4 is in the southeast quadrant -- it would be in the southwest of the southeast quarter.

And there are two wells that are operated by Yates Petroleum, the Federal AML #1, which is in the south half -- sorry -- it's in the northeast of the southeast quarter -- I'm sorry -- the northwest of the southeast quarter of Section 2, due north of our

Cedar Breaks #2.

And they've completed one well in Section 11 just across the southern boundary of Section 2, and that's the Federal MZ #2. The Federal MZ #2 was tested in September of this year, produced for just a couple of days to test it, and has been shut in awaiting connection. So we don't have any full production information on that well yet. What's tabulated there is the 24-hour initial potential test.

Q. What does the data that you have here show as far as the solution gas-oil ratio and the current GOR's?

A. It shows that for most of the wells, the gas-oil ratio is elevated for all the active producers between 7 and 10,000 standard cubic feet per barrel currently. The Nelson Federal #8 is in that range but probably uneconomic, and I don't know what Enron's plans are for that well.

The Nelson Federal #10 is currently shut in, awaiting recompletion. It was only produced for a few months, and we have an ownership interest in that well, and I know Enron is considering recompleting out of the Bone Spring.

Q. Did you determine the original bubble point pressure and matters related to that?

A. Yes. I've looked -- Exhibit 9 is a tabulation of the first month of production on each of our wells on a daily basis. Most of our wells initially produced in the range of 1,000 to 1,250 standard cubic feet per barrel as a producing GOR. That only lasted for a few days, and the GOR's tended to climb rapidly by the end of the first month. Most of them were over 2,000 cubic feet per barrel.

I also took standard industry correlations, the standing correlation, and used it to estimate a solution gas-oil ratio of about 1,200 standard cubic feet per barrel. And that's based on a -- this is a 44 to 45 degree API oil, a fairly light oil. It's about a .82 gravity gas, and we estimate the reservoir temperature at 113 degrees.

I also used standard industry correlation to estimate a bubble point pressure in the range of 2,700 pounds, and our initial reservoir pressure we estimate at about 2,650 pounds. I also crosschecked this with some other industry correlations. They gave similar results. So it appears that it is a very nearly saturated oil at original conditions with an initial GOR somewhere around 1,200 cubic feet per barrel.

Q. Have you seen any evidence of a gas cap

based on this data?

A. No, we have not seen any wells that produced at an elevated initial GOR except for our Cedar Breaks #4, and it is actually structurally lower than some of the other wells, and I feel that it is elevated in GOR due to production by our three wells, other three wells in the south half of Section 2.

There's been no increased gas-oil ratio as a function of structural position, nor did I see any indication on the logs of crossover in our neutron density log that would indicate free gas present.

Q. Referring to your Exhibit 10, would you discuss that for the examiner and discuss whether you've seen any evidence of a water-drive in this reservoir?

A. Exhibit 10 is the monthly production history for each of the wells that are currently completed in the Walters Lake-Bone Spring Pool. They all produce some water, most of them in the 15 to 20 percent range of water cut, and none of them indicate any increasing water cut with time, nor have we seen any indication there might be some pressure maintenance due to an active aquifer.

So I've interpreted it as no active water-drive. The water we see produced is merely

original water that is above the irreducible water saturation being drained from some of the sand intervals.

Q. Moving on to Exhibit 11, would you discuss estimated recovery from the wells?

A. Yes. Based on the monthly production history, I did decline curve analysis to estimate the ultimate recovery. That table shows, as Mr. Shatzer mentioned, a subdivision of the first Bone Spring sand into two intervals, referred to as aqua and pink. It shows our estimation of what the net pay might be and the average porosity in each of those intervals, and I calculated an oil in place based on the estimated fluid properties and on estimated gas in place.

I used decline curves to come up with what is labeled the estimated ultimate towards the far right side of the table from each of the wells, and that is assuming a 40-acre area for each of the wells -- I'm sorry, the oil in place is for a 40-acre area. And then I calculated the ultimates, and then I have a tabulation of what percentage recovery of that initial oil in place that ultimate might represent.

You can see that it varies quite a bit from one well to the next. There are two wells. If you look at the net isopach map that Mr. Shatzer showed,

there are two wells that show a very thin section of the Bone Spring in Section 2, and those are the ones that show that very low recovery, less than 1,000 barrels.

I also back-calculated what area each of the wells might be draining if I assume that these ultimate recoveries represented a 15 percent recovery factor for the oil, and that's the final column, estimated acres drained. And it shows that on average, it looks like each of the wells is draining about 40 acres.

The well with the largest estimated drainage area is our Loco Hills State No. 2, but it also has two offset wells that have quite a bit of sand thickness in them. So it's hard to tell how big an area that well is truly draining. It might be stealing some from our other wells next door.

Q. Referring to Exhibits 12 and 13, would you discuss your opinion as to the drive mechanism of this pool?

A. Yes. I interpret on the basis that there's no gas cap that I can identify and no active aquifer involved, that this would be a solution gas-drive reservoir, and that is the primary and only recovery mechanism currently available to us.

And Exhibits 12 and 13 are quotes from a couple of petroleum engineering textbooks that in the discussion of maximum efficient rate, that in a solution gas-drive reservoir, the ultimate recovery is not dependent on the producing rate; that you'll recover approximately the same amount of oil, whether the wells are produced or a field is produced at its maximum capable rate, or if it is restricted and produces for a longer time, but you'll end up with essentially the same ultimate recovery.

Q. Okay. Have you measured permeability in this reservoir?

A. Yes. We did core the Cedar Breaks 2 #4, our most recent completion, and Exhibit 14 is a cross-plot of permeability and porosity from the core analysis on that well. The core was a little disappointing to us because it indicates that almost all the permeability and sand in this field is less than one millidarcy, and we only had one sample that had a permeability that was greater than 3-1/2 millidarcies.

The core also indicated that the reservoir is a severely laminated sequence of sand and silt over a fairly small interval.

This low permeability tends to agree with

the production characteristics where the gas-oil ratio increases very rapidly, because to get any production out of this low permeability rock with oil, we have to have a large pressure drawdown on the interval.

That creates a rapid increase in gas saturation because the reservoir is very near the original saturation pressure. And because of viscosity and relative permeability characteristics, you then have a rapidly increasing gas-oil ratio around the wells.

If I could, we also put a photograph on the cross-section that is from this core that illustrates this highly laminated sequence. That's Exhibit 7, I believe.

Q. Exhibit 7 or -- yes.

A. That's a photograph of a single foot of interval from this well. The core requires about a 12-foot adjustment in depth compared to the logs. And so we have drawn an arrow to indicate that the interval that this is selected from appears from the logs to be a very good porosity zone with porosities on the order of 12 to 14 percent, but you can see that this rock is very highly laminated. The dark streaks are silt. They aren't truly shale but consist of very fine-grained particles.

The grayer streaks are the cleaner sand. And that's what leads to the extremely low permeabilities that we measured in the core. This also creates drainage problems for us because it does impede vertical communication within the net pay interval in a single well in that these silts are very low permeability and will act somewhat as barriers to flow, not total, but the only real production mechanism that we have is horizontally through these sands into the fracture system, and that's into the wellbore.

Q. So, in your opinion, do you need large drawdowns to prevent the waste of hydrocarbons in this reservoir?

A. Yes. In my opinion, because of these low permeabilities and this laminated nature, if you do not have large drawdowns, you won't produce oil from these low permeability streaks. And, therefore, maybe late in the life when the pressures are way down they may contribute, but it's going to be at a time when the well may not be economic.

Q. What does Exhibit 15 represent?

A. Exhibit 15 is our newest well. It was the Cedar Breaks 2 State #4. It's located in the southwest of the southeast of Section 2. This well

came on with an initial gas-oil ratio of 6,000 standard cubic feet per barrel and is capable of producing quite a bit of oil, but in conjunction with it, it is also producing gas in excess of the allowable rate.

This is a production graph over the month of November. In the early part of the month, the well was restricted. The little plus lines are the gas, and it was restricted to the 375 Mcf a day, which is the current gas allowable in the pool.

I'd like to note that the little shaded squares on the water cut -- and when we had this well restricted, it was not producing any water. When we first tested the well, it produced at about 25 percent water cut. When we cut back the rate to the allowable, it ceased producing the water. And I requested our production department to increase the rate to test the well to see if the gas-oil ratio is sensitive to production rate and drawdown.

So we increased the gas rate for a couple of weeks and found that when we increased the rate, the water cut -- or the well began producing water again.

The gas rate increased, but the GOR, which is the black diamonds, really didn't change as we

increased the gas rate. But the water production, I believe one of two things were happening, either some of these lower permeability sands that probably have a fairly high water saturation were not contributing when the well was cut back, and that's why we weren't producing any water, or the well was producing at such a low velocity of fluid that the water was not being efficiently lifted from the well. I can't swear which one is true, but both would tend to reduce the eventual recovery from the well because this water would have been collecting in the bottom of the well if it was due to the velocity of the fluid and would eventually cause loading problems within the well.

Q. If you produce at the current allowable, does Mewbourne face operational problems in these wells?

A. Yes. Because of -- obviously, the water production factor indicates to me, I feel probably we aren't draining some of those low permeability sands when a well like this is restricted so heavily.

We also are facing having to install artificial lift in the wells, which will reduce the economics of the well and lead to an earlier abandonment of the well or reach an economic limit sooner.

We have currently finished installing artificial lift in the Loco Hills 2, 3, and 4. The Loco Hills 4 is probably capable of producing at higher than current gas allowable; so it would have to be artificially restricted, probably by having to be shut in part of the month to meet the current gas allowable.

That will, once again, cause reduction in recovery from these low perm sands. If that thing is not continuously on production, every time you shut it in, you're going to cut the amount of drainage you're eventually going to get from these low permeability intervals.

Q. Finally, would you just briefly refer to Exhibit 16 and describe its contents for the examiner?

A. Yes. We searched the record to see if our problems here in Walters Lake were similar to problems in other Bone Spring pools. We did find that there were several Bone Spring pools that have increased gas-oil ratio limits, and this is a plat that shows the other pools nearby in Eddy County.

At the far north end is our Walters Lake Bone Spring where we're requesting a 5,000 gas-oil ratio limit.

Then there's the Palmilio Bone Spring,

which has an 8,000:1 granted in 1980, the Parkway Bone Springs, which has a 10,000:1 which was granted in 1990. East Avalon Bone Springs has a 5,000:1 that was granted in 1989. And the Fenton Bone Spring, which was granted in 1980, which has a 10,000:1.

There are also several pools in Lea County Bone Spring Pools that have been granted increased GOR's. I think the production mechanism and the type of rock we're seeing in our field is not very different from so many of the other Bone Spring pools. It's a light oil that goes to relatively high gas-oil ratio very quickly. And these pools are all along a common trend along the shelf of the basin.

Q. In your opinion, is the granting of this application in the interest of conservation, the prevention of waste, and the protection of correlative rights?

A. Yes. I feel that the granting of this application will give each operator the chance to recover the maximum hydrocarbons from their pool and to protect their correlative rights and allow them to produce their appropriate share of those.

Q. Were Exhibits 8 through 16 prepared by you or under your direction?

A. Yes, they were.

MR. BRUCE: Mr. Examiner, I move the admission of Mewbourne's Exhibits 8 through 16.

EXAMINER CATANACH: Exhibits 8 through 16 will be admitted as evidence.

MR. BRUCE: I pass the witness.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Wilkirson, I believe you said you examined the wells to determine if there was any structural component to the GOR's?

A. Yes, sir.

Q. And you found that there was not?

A. That's correct. The only well that has shown a truly elevated initial gas-oil ratio is the Cedar Breaks 2 #4. When it first came on production, if you refer to the structure map, it is the well that's labeled P', and you can see that it is one of the structurally lowest wells currently completed in the pool.

All the other wells, to the best of our knowledge, had initial gas-oil ratios between 1,000 and 2,000. We don't have daily data on the other operators' wells, but with their monthly production, most of them came on in the first month at not more than 2,000 standard cubic feet per barrel.

Q. Which wells are you talking about again?

A. The well that's just north of the P' --

Q. Right.

A. -- or P in Section 3, that is the Enron Nelson #9, and that is the well with the longest production history from the Bone Spring.

If you can glance at Exhibit 10, that well at the first month or two of production -- Exhibit 10 is the monthly production history. I don't have any daily data on it.

You can see that that well, the first couple of months -- it's the second page of that exhibit -- was around 1,000 standard cubic feet per barrel. It climbed very rapidly to 2,000, within a year was at 3,000. It leveled off for two or three years at about 3,000, and then began to climb again, and is currently up about 8,000 or 9,000. That is also about the structurally highest well that's producing from this field.

There is a Mewbourne well that on the plat is a diamond that was originally a Strawn producer that we recompleted in the Bone Spring, and it essentially was unproductive. We produced 500 barrels, I believe, out of it, and it has been abandoned in the Bone Spring, but its gas-oil ratio

was also in the 1,200, 1400 range.

So I have not seen any relationship between initial gas-oil ratio and structural position.

EXAMINER MORROW: How about between the position of the perforations within the sand, have you done any testing to see if there is any relationship there, the top part of it a higher ratio than the lower part.

THE WITNESS: No, sir, we haven't. A couple of the wells, the upper portion is a much better developed sand than the lower portion, and I would believe that the bulk of the production is coming from there in those wells.

The Nelson #3, the one I asked you to look at just a moment ago that has the longest production history, that one has more good sand in the upper portion, that upper interval that we internally refer to as the aqua. Our wells over in Section 2 have better development in the lower portion that we call the pink or the second stratigraphic member within the first Bone Spring sand. And they all had approximately the same initial gas-oil ratio.

But all these wells were hydraulically fractured. They produce almost nothing until they are hydraulically fractured; so it would be very hard to

say truly where the production came from.

EXAMINER MORROW: Were there some natural fractures in the sand?

THE WITNESS: I don't believe so. The core that we cut did not indicate any natural fractures. And when we try to produce these wells before we fracture stimulate them, they're essentially unproductive; so I don't believe there's any natural fracture system available.

Q. (BY EXAMINER CATANACH) You mentioned that you need a lot of drawdown to produce some of these laminated sands. Doesn't the hydraulic fracturing take care of that problem?

A. Well, the hydraulic fracturing will create an equal pressure in the bottom of the well among each of those sands, which gives them the potential to produce, but the actual amount of drawdown is dependent on what the flowing bottomhole pressure is in that well.

In other words, if the bottomhole pressure is, say, 300 or 400 pounds below the reservoir pressure, a sand within the interval that's open is going to produce proportionate to its permeability and its saturations. So the better permeability sands will tend to have the majority of the production.

These lower permeability sands may require 800 pounds of pressure differential to really get any flow out of them. And that's the phenomenon I'm referring to.

But the fracture there opens with the potential, but unless we can create a pressure gradient large enough to get production from these low permeability sands, they really won't contribute. The good sand will contribute almost everything. What I would be concerned with is we would deplete the good sand, and those small sands are going to contribute so little, that the well will become uneconomic before we really get good drainage out of those low permeability intervals.

Q. Have you done an examination to determine if maybe some of these sands are predominantly gas-bearing?

A. The only way that we might have to indicate it would be from the logs, and although there is separation between the neutron and the density log, we never see the reversal of the neutron log that would imply that it is gas-bearing in any of the sands.

And the core that we cut, almost all the interval has residual oil saturation in it of the magnitude that would imply that it's an oil-bearing

sand. We see residual oil saturations in the 10 to 12 percent through most of the cored interval. A gas-bearing oftentimes in the core would have residual oil saturations in the 3 to 5 percent range.

Sometimes in the core you can see a sharp break in residual oil saturation where it increases going from a gas zone to an oil zone, but we haven't seen any indication of that in this field.

Q. You haven't done any PVT analysis on any of these sands, have you?

A. Well, we did collect a fluid sample and had a laboratory study done of it several years ago from, I believe, our Loco Hills #3, which was completed in 1990. And the well had been on production for two months at the time the sample was taken, and I believe that the sample is nonrepresentative because the producing gas-oil ratio in the well was about 2,500 at the time, and the sample recombined to a saturation pressure of about 3,700 pounds, which is probably 1,000 pounds above what the original pressure was.

They then asked that it be recombined at a saturation pressure of 2,650, which the laboratory did. And that gave a solution GOR of about 900, which, based on the production data, says that's too low.

So I think that the sample that was taken was really not representative of the original reservoir fluid. And that's not uncommon. In my 15 years with Core Lab, I looked at an awful lot of fluid studies, and in a reservoir like this, if you don't catch one in the first few days of production before you have created a gas saturation around the wellbore, your sample won't be representative.

So I personally feel that the correlations give results, the standard industry correlations give results very similar to what we see in the way of production history in the field. So I really have more confidence in them than in the fluid study.

Q. The 1,200 cubic feet of gas per barrel, that was calculated?

A. Yes. That's estimated from correlations.

Q. And the bubble point pressure was calculated?

A. Yes, sir.

Q. Was the Enron well you talked about that was perforated in the second Bone Spring sand, was that ever produced in the first Bone Spring?

A. No, it hasn't, and I don't know what Enron's plans are. I would suspect they would want to try the first Bone Spring sand in that well, although

the first Bone Spring sand in that well does not look as good as it does in the south half of Section 3 where they have other producers from the first Bone Spring sand.

But I don't have any information on what Enron's actual plans are for that well. That well -- it's the first one on the monthly production graph, and you can see that the production has been declining for quite a while, and it's been producing less than a hundred barrels a month for several years. So I would have thought if they had some additional potential, they probably would have tested it by now, but I'm not sure what their plans are.

Q. Will the GOR increase have any effect on that second Bone Spring sand interval in that well, any adverse effect?

A. That well has already a gas-oil ratio of 8,000 to 10,000, but the production rate is so low that it is well under the allowables of both oil and gas; so it's really not going to affect that well particularly.

EXAMINER MORROW: Is the current GOR 2,000?

THE WITNESS: It's under statewide rules, yes, sir, of 2,000. And the oil allowable is 187

barrels a day.

Q. (BY EXAMINER CATANACH) Mr. Wilkirson, are you requesting a permanent change in the GOR, or are you requesting a temporary change?

A. We're requesting a permanent change in the field rules so that all operators in all future wells that are developed would operate under these same rules.

Q. Do you feel like there's enough evidence right now to establish permanent pools, or do you think it's justified to establish temporary pools and then gather more additional evidence?

A. I don't know if I'm qualified to answer that. Obviously, if the commissioner would prefer, they can set up temporary rules and set this for review again.

I personally am convinced that -- I know what the drive mechanism is here, and I can't see much potential for any change in the drive mechanism or change in something that would want to reduce that GOR limit again. It may be that somebody wants to come back and increase it at some point in time because these gas oil ratios are climbing very rapidly.

Q. Do you feel like there's going to be considerable further development in this pool?

A. The Yates well that's in Section 11, of course, all we have is the initial potential test, but it tested very well. Mewbourne owns an interest in that section, and I don't know what the development plans are because I don't work in the exploration department, but I would suspect that they will consider drilling another well. And I would suspect that there's some additional development in the east half of Section 11, which I believe is owned by Enron.

In Section 2, Mewbourne has plans to drill a well in the northwest of -- I'm sorry -- the southeast of the northwest, just north of our Loco Hills #2. We have a location there and plan to drill an additional Bone Spring target there.

So, yes, there is some additional development, I'm sure, in this field.

Q. How many wells in the pool does this increase in GOR actually have an effect on?

A. If you'll refer to Exhibit 8, those are the currently producing wells in the pool. So those are the wells that it would affect. They're all formally designated as the Walters Lake-Bone Spring Pool.

Q. They're all producing at above 2,000?

A. All except -- well, the Nelson #10 well that has the low GOR, that well is shut in. They only

produced it for a few days, and I believe they intend to recomplete out of the Bone Spring.

And the only well that is below -- other well that's below 2,000 is the last well on the list, the Yates well, and it was right at 2,000 on its first daily test.

EXAMINER MORROW: Most of them, though, are producing below the 375 a day, aren't they?

THE WITNESS: Yes, sir. We have two wells that are currently restricted by that 375. The Loco Hill State #4 is capable of producing more than that. It's capable of producing approximately 500, I believe. And then our Cedar Breaks 2 #4 is currently probably capable of producing in the 1.7 to 1.8 million a day range. When we first brought it on production, it was up in that range.

The new -- the 5,000 GOR limit would give us an allowable of about 950. So that well would still be restricted under what we're proposing for the rules.

EXAMINER MORROW: How many wells did you say you're lifting now?

THE WITNESS: In the last month, we have put three wells on artificial lift, the Loco Hills 2, 3, and 4. I believe that Yates has a pumping unit on

that Federal AML #1 which has been producing about six months. I'm not sure if they're actually using that to produce the well or if it's still flowing naturally.

EXAMINER MORROW: You think it will eventually lift everything?

THE WITNESS: Yes, I'm pretty sure we'll have to.

EXAMINER MORROW: So the increase will just delay that expenditure rather than eliminating it completely that you talked about?

THE WITNESS: Yes.

EXAMINER CATANACH: I think that's all we have. The witness may be excused.

THE WITNESS: Thank you.

MR. BRUCE: I have nothing further in this case, Mr. Examiner.

EXAMINER CATANACH: There being nothing further in this case, Case 10873 will be taken under advisement.

CERTIFICATE OF REPORTER

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

I, Deborah O'Bine, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that I caused my notes to be transcribed under my personal supervision, and that the foregoing transcript is a true and accurate record of the proceedings of said hearing.

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 9, 1993.

Deborah O'Bine

DEBORAH O'BINE
CCR No. 63

OFFICIAL SEAL
Deborah O'Bine
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: Oct. 19, 1994

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10873 heard by me on December 9 1993.

David R. Catanach, Examiner
Oil Conservation Division