STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 9996

EXAMINER HEARING

IN THE MATTER OF:

Application of TXO Production for an Unorthodox Oil Well Location, Eddy County, New Mexico

TRANSCRIPT OF PROCEEDINGS

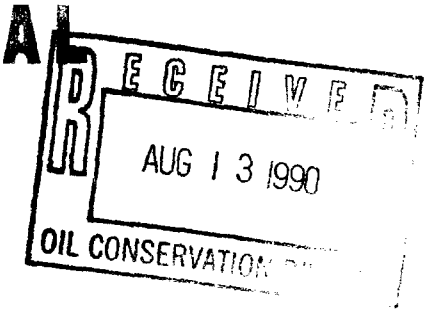
BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

July 11, 1990

ORIGINAL



A P P E A R A N C E S

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ALSO PRESENT:

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I N D E X

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E X H I B I T S

APPLICANT'S EXHIBITS:

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WHEREUPON, the following proceedings were had at 8:28 a.m.:

EXAMINER STOGNER: Call next case, Number 9996.

MR. STOVALL: Application of TXO Production for an unorthodox oil well location, Eddy County, New Mexico.

EXAMINER STOGNER: Call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin and Aubrey, appearing on behalf of the Applicant, and I have three witnesses to be sworn.

EXAMINER STOGNER: Are there any other?

If not, will the witnesses please stand to be sworn?

(Thereupon, the witnesses were sworn.)

EXAMINER STOGNER: Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner.

GLEN BROWN,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

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

A. Glen Brown, petroleum geologist.

Q. Mr. Brown, on prior occasions have you testified before the Division as a petroleum geologist?

A. Yes, I have.

Q. Pursuant to your employment as a geologist by TXO, have you made a study of this particular Delaware pool and the geologic data available to you?

A. I have.

Q. Based upon that study, have you reached certain conclusions with regards to the optimum location in which to drill a well for the spacing unit involved in Section 18, Township 20 South, Range 29 East of Eddy County, New Mexico?

A. Yes, I have.

MR. KELLAHIN: Mr. Examiner, we tender Mr. Brown as an expert petroleum geologist.

EXAMINER STOGNER: Mr. Brown is so qualified.

Q. (By Mr. Kellahin) To orient the Examiner as to the objectives of your company with regards to this particular Application, Mr. Brown, would you take what is marked as TXO Exhibit Number 1 --

A. Yes.

Q. -- and identify that for us?

A. This is a production study of a 12-section area immediately surrounding the proposed location.

Q. Identify for us the color code by which we identify the various pools or formations from which these wells produce or were drilled.

A. I point your attention, in the bottom left-hand corner of the map, to the color code. The important formation for this hearing that we're involving would be the Delaware, which is colored in red.

Q. Give us the chronology, Mr. Brown, of your company's efforts to find Delaware production and then subsequently drill and develop further producing Delaware oil wells.

A. If I can point you out to TXO Production Yates Federal Number 3, it's in the southwest of the northwest of Section 17, right in the very middle of the map.

That well was recompleted to the Delaware sands. It was formerly a Morrow producer. It was recompleted in, I believe, September of last year. We recompleted that well. It's currently made 9700 barrels of oil. It makes 37 barrels of oil per day, and 90 barrels of water.

Q. Prior to the recompletion of that well in September of 1989 to Delaware production, was there any other well capable of Delaware production within the

immediate vicinity of Section 17 or 18?

A. There was not. That was the first effort to develop Delaware potential in this area.

Our second effort was in drilling the TXO Production Yates Federal Number 6 well, which is located in the northeast of the southeast quarter of Section 18. And you'll note the dry-hole symbol there. It was an unsuccessful development attempt of a reservoir that turned out to be quite a bit more variable than we thought.

After we drilled this dry hole, we felt that we needed to reduce the risks of further development of Delaware potential in the field. We recognized that that potential was behind pipe in our Number 4 well, which is in the southeast of the northeast of Section 18. You'll note that it is a blue and green color on this map. It produces currently from the Strawn formation.

We noted at that time that the Strawn had reserves that would be producing for a period of 10 years or more. The decision on present-day value was made to drill the Yates Federal Number 10, which is a 300-foot direct north offset to that well. You'll note the red Delaware color.

That well was drilled in the spring of this

year, in February. That well has now cum'd 10,700 barrels of oil. It currently makes 95 barrels of oil a day and no water.

What I'd like to present to you today is the maps that will show you that, first of all, the Delaware production is coming from a somewhat erratic stratigraphic interval -- it obviously changed on us in our Number 6 location to the south where it was dry -- and that an optimum location that we propose to you, the Yates Federal Number 16, is in a location that should in fact encounter two different Delaware sands that are producing in the Number 3 and the Number 10, and also find that -- those sands at a structural position that is similar to the production in Section -- in those two wells, 3 and 10.

If I can call you to --

Q. Let me ask you a few questions on the production map before we complete this exhibit, Mr. Brown.

What is the exact footage location of the proposed well that you're seeking approval for?

A. It would be 2540 feet from the south line and 100 feet from the east line of Section 18. It's identified on your map and on all maps as "proposed location," and it has a small red dot.

Q. That would put it 100 feet off the section line between 17 and 18?

A. That's correct.

Q. And it would be a hundred feet off, then, the quarter quarter line that separates the northeast southeast quarter from the southeast northeast quarter?

A. That's correct.

Q. When we look at the well in the southwest quarter of 17, the Number 5 well --

A. Yes.

Q. -- shown as a Morrow producer --

A. Right.

Q. -- have you examined a log in that well in order to determine what information is available to you on potential Delaware locations in the southwest quarter of 17?

A. Yes. As a matter of fact, that's the final step in the chronology to date that I had forgotten to mention before. The Delaware section in that well was never logged when the well was drilled in -- I believe it was 1982.

TXO went back in that well, plugging out the Morrow, and logged the Delaware section about a month ago. And we found the same sands that are productive in the wells to the northwest, but we found them all to

be water-bearing. We took sidewall cores and ran electric logs and found no oil saturation at all in that wellbore.

The lack of any saturation at all created quite -- somewhat of a concern to us that that well is structurally downdip, approximately 60, 70 feet, and thus the structural element of the play became quite a bit more important with the lack of oil saturation in that wellbore.

So therefore our current location also has to satisfy maximum structural position.

Q. What is the pool from which these wells produce and to which their production is dedicated? This is an undesignated Burton Delaware pool, is it?

A. I'm not sure.

MR. COATS: That's correct.

THE WITNESS: Okay.

Q. (By Mr. Kellahin) It's 40-acre spacing?

A. Right, state well.

Q. You have a producing Delaware well in Section 17 on 40-acre spacing?

A. That's correct.

Q. In the southwest of the northwest?

A. Yes.

Q. And then you have, I guess, 40-acre offset to

the west in the Number 10 well, correct?

A. That's correct, which is -- It's 300 feet north of the standard 40 location.

Q. The Number 6 well in the northeast of the southeast of 18 is on the same 40-acre tract as the proposed location?

A. That's correct.

Q. Within this immediate vicinity, then, the only remaining 40-acre spacing unit that might be drilled would be the northwest of the southwest of 17?

A. That's correct.

Q. Summarize for us your conclusions geologically as to why you don't move to a standard location in that 40-acre tract in order to drill the next Delaware pool well.

A. Well, in short, we have a structural risk that would -- based on the fact that you're between those Delaware producers and this Number 5 well that had no oil saturation, you would interpret that it would be anywhere from 20 to 40 feet low to the known producers.

And at this time, we can extrapolate the known oil contact from the northwest, and the known water contact from the southeast, but we don't know where the actual contact is, and so it introduces an

element of risk at this time in development that we feel is -- with that, on top of the stratigraphic risk, tells us that we really economically have trouble drilling a well there at this time.

Q. Based upon your study, then, can you recommend to your management that your company drill a Delaware well in the northwest of the southwest of 17 at a standard location?

A. I cannot recommend that at this time.

Q. Let's go through some of your other displays, Mr. Brown, and see the specific details of your study and your conclusions as to various aspects of that study.

Let me direct your attention to the structure map which is marked as Exhibit Number 2.

A. Yes.

Q. Identify and describe for us the important information to you as a geologist that causes you to conclude that the proposed location is the next best location in which to drill.

A. Well, if you note that the structural position of -- Well, first of all, this is a structure map on the base of the producing sand interval.

We are losing the sand as we proceed up in the northwest direction, so a marker below that point

where the sands are lost is necessary to make a more complete map.

It reflects very well the positions of the producing sands themselves.

What you'll find is that the two producers -- the Yates Federal Number 3 is at a minus 89 datum below sea level, the Number 10 is at a minus 83.

What I'll show you later on the cross-section, the Number 4, which we twinned, is at a minus 99, and it has both of the pay sands that are producing in the 3 and 10 and by log calculation shows to be entirely productive. Therefore the minus 100 line that you see darkened is a critical line for knowing that the sands, if encountered, would be totally filled with hydrocarbons.

Q. When we look at the Number 6 well --

A. Yes.

Q. -- just to the southwest of the proposed location, that was at a structural point of a minus 78?

A. That's correct. It was in a favorable structural position to produce, however the sands were not present. And we'll see that on our isopach as we go along.

Q. Compare for us the relative merits of the structural position between the proposed location and

the closest standard location in the 40-acre offset to the east in 17.

A. We're on 20-foot contour intervals here. You can see that a standard location in the northwest of the southwest of 17 would fall at approximately minus 130. It would be between the minus 120 and 140 contour lines.

Q. And that will give you a vertical difference in structure between the proposed location and that location of what?

A. In excess of 30 feet.

Q. Why is 30 feet critical to you?

A. The pay thicknesses that we're dealing with are in the 20- to 30-foot thickness range. Well, one of the sands actually gets to 38 feet in thickness. But the -- It is possible to go that far downdip and encounter no hydrocarbons whatsoever, or a partially filled sand. And since the reservoirs need to be sand-frac'd, any amount of water in the sand interval would make the production quite a bit less economic because of the associated water.

Q. Are we dealing with the same Delaware sand in each of these wells?

A. There are two different sands. I've referred to them as a "B" and a "C" sand and have separate

isopachs for presentation of those.

Q. All right. Let's turn to your isopach. Let me have you identify and describe, Mr. Brown, TXO Exhibit Number 3.

A. Exhibit Number 3 is an isopach map of the Delaware "B" sand. It is the sand, the specific sand that produces in the Number 3 well, the first well that we recompleted in the field.

Q. Delaware "B" sand means what in terms of all sands in the Delaware? Where is it in relation to the others?

A. It's one of the uppermost sands, as they commingle and interfinger with the reef complex.

Q. Where would the "A" sand be in relation to the "B" sand?

A. The "A" sand is below the "B", "C" sand is above the "B".

Q. In this particular area, you're dealing with Delaware "B" sand and "C" sand?

A. That's correct.

Q. Use Exhibit Number 3 and show us those wells that are productive from the "B" sand.

A. The only well that is productive is again our Yates Federal Number 3 well in the southwest of the northwest of 17.

Q. When we look at the "C" sand map in a minute, what well are we going to be looking at that produces from that sand?

A. The Number 10 is the only well that produces from that interval.

Q. What do you conclude from isopaching the "B" sand on Exhibit Number 3?

A. The producing interval in the Number 3 well is 20 feet in thickness. The proposed location, as mapped, should be slightly thicker than 20 feet, so an improvement of thickness is anticipated from the Number 3 well.

Q. Compare your proposed location to the closest standard location in the northwest of the southwest of 17 in terms of pay thickness for the "B" sand.

A. I think they would be very similar in pay thickness.

Q. Okay, so comparison of the "B" sand thickness is not the deciding criterion by which to determine this proposed location over the next closest standard location?

A. That's correct, that's correct. I expect them both to encounter sand. It's whether they contain hydrocarbons or not.

Q. Okay. Let's turn to your analysis of the "C"

sand. Describe for us what you have done.

A. The "C" sand map, as mentioned before, produces from the Yates Federal Number 10 in the northeast of 18, noted by the red color. It produces from 37 feet of Delaware sand.

The isopach map that you see here is porosity greater than or equal to 12 percent. I forgot to mention that on the previous map; that's the same cutoff.

And what this shows is that the Number 3 well does not have any of this sand present, and we would anticipate in our proposed location to encounter 40 feet of this sand interval.

Q. Identify for us the basis for locating what is identified as the lowest known oil; it's the green line on the display.

A. Yes.

Q. What are you doing and what do you show?

A. The lowest known oil line is taken, and what we have is, we have a -- by combining the structural map that we've looked at as Exhibit Number 2 and the pay thickness that we have in the Yates Federal Number 10 well, what that reflects is an oil column 37 feet in thickness, and that is a combined line taken from the structural contour that we see on the structure map at

a position 37 feet downdip from that well.

So at that point we know that there is oil column down to that point.

In a similar fashion, the Yates Federal Number 5 has 12 feet of pay, and it's completely filled with water. We know that the water probably would exist at least 12 feet updip from that position, so that reflects the structural contour position of known water, where the actual contact in between is unknown.

Note that the proposed location is in a favorable structural position. We noted previously that it should be flat to the producers and should be above the known oil line at this time.

Q. What's the purpose of the circles around the two wells on Exhibit Number 4 as well as the two wells on Exhibit Number 3?

A. In both cases, in both isopachs, the circles reflect the calculated drainage area for the producing sand interval, to be discussed further by our reservoir engineer at a later point in the testimony. They reflect a 25-acre radius, and they also -- and we have put for convenience a 25-acre radius of drainage, proposed drainage area, around our proposed location to show that they show little interference.

Q. Let's turn now to Exhibit Number 5, Mr.

Brown. Would you identify and describe that display for us?

A. Exhibit 5 is a stratigraphic cross-section.

Q. We need to save one of the other displays out to see the line for the cross-section.

A. That's correct. Either one of the isopachs, Exhibit 3 or Exhibit 4, would have -- in fact all the maps have the cross-section outlined. It's a northeast-southwest trending cross-section, B/B-prime. You'll find on this cross-section both of the producing Delaware wells in the area.

The second well from the right on the cross-section is the Yates Number 3. It is the first well that we recompleted in the area. And you'll note the red perf indication on the cross-section. That zone is producing from the "B" interval, as previously mentioned when discussing the isopach.

The third well from the right is the Yates Federal Number 10, and we can see that that well produces from a higher stratigraphic interval than the Number 3 does, termed "C" sand interval.

Q. Do you interpret any "A" or "B" potential in the Number 10 well?

A. The "A" and "B" sands are not developed in the Number 10 well. They're -- We're in a dolomite

facies of the reef.

Q. When we go back to the Number 3 logs, do you interpret from analyzing the logs any of the "C" sand in that well?

A. The "C" sand is absent in the Number 3 wellbore.

Q. Okay. Let's go now to the Number 4 well on the cross section.

A. If you move to the west, you can see the Yates Federal Number 4, which is the well that we previously mentioned. We recognized it had Delaware pay behind pipe but was a Strawn producer, and we elected to twin that well with the Number 10. So the distance between the Number 10 log that you see and the Number 4 is only 300 feet.

Q. That's surface -- a horizontal surface distance of 300 feet --

A. Yes.

Q. -- between those two wells?

A. That's correct.

Q. What occurs in the distance of 300 feet in these wells in the "A", "B" and "C" sand?

A. Well, what we can see is that in the "C" sand there's a thickening from 27 to 37 feet in the 300 feet. And in the "B" sand -- The "B" sand and "A"

sands totally disappear. So over a period -- over a distance of 300 feet, the reservoirs for the "B" interval is totally gone.

Q. How is that useful to you as a geologist in picking the location you've proposed in the southeast of Section 18?

A. Well, what we've -- you know -- Well, what you do know is that since the "B" sands are disappearing in that direction to the north, they probably would be developing better as they come to the south, and I guess the importance of the relationship of these two wells is how quickly these sands can, in fact, change over a 300-foot distance. That's really what our location exception is all about, is that we want to move about 300 feet from standard location.

Q. When we then continue to the left on the B/B-prime cross-section, you have your proposed location --

A. Yes.

Q. -- interpreted through the cross-section?

A. That's correct.

Q. And what does that show you?

A. It shows that we anticipate finding both "B" and "C" sands, developed in thicknesses comparable to the producing interval in the two wells.

Q. All right. Let's turn now to Exhibit Number 6, Mr. Brown. Identify and describe this display for us.

A. Exhibit Number 6 is cross-section A/A-prime, which is a structural cross-section. It's also indicated on all the accompanying maps as to its orientation. It's a northwest/southeast cross-section going down the regional dip. It goes through a Delaware show well to the northwest in Section 7, through the Yates Federal Number 3 producer, down to the Yates Federal Number 5 well, which I mentioned earlier that we had recently logged and sidewall cored with no oil shows.

The importance of this cross section is to show you the structural difference between the wells, to better illustrate the known water relationship to the southeast and the known oil column. One can clearly see on the structural section that the "B" sand is approximately 60 feet downdip from the known producers.

Q. Summarize for us your geologic conclusions that have caused you to believe that the proposed location is the optimum location in which to drill the well.

A. The -- In short, we're in an area that the --

for the depth, 3700 feet, the wells are rather expensive. They have the Carlsbad casing programs that we have to deal with, which adds another $50,000 to our dry-hole costs.

So any location that we pick needs to be an optimum location. And we're at the point in the development of the play that we need to maximize stratigraphic potential for both of the sands to develop and be in a location that has little or no structural risk.

Q. Were Exhibits 1 through 6 prepared by you or compiled under your direction and supervision?

A. They were.

MR. KELLAHIN: That concludes my examination of Mr. Brown. We would move the introduction of his Exhibits 1 through 6.

EXAMINER STOGNER: Exhibits 1 through 6 will be admitted into evidence.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Brown, looking at your isopach maps --

A. Yes, sir.

Q. -- the water-contact line and the oil-contact line seem to overlap each other. Is there some sort of a relationship between that and these two stringers?

Or at least that's what they appear to me.

A. They happen to be in the approximate same position because of the -- In the Number 3 you have a thinner pay interval, and so you're 20 feet downdip from that well. The Number 10 well is located further to the northwest but has a thicker pay interval. So therefore they happen to occur at approximately the same position.

Q. This is a fairly relatively new production in the Delaware and in the -- What did we call that? The Burton Delaware pool?

A. Yes, it is.

Q. And the discovery well is the Number 3?

A. That's correct. It came on line, I believe, in September of last year.

Q. And your Number 10 well was your next one; is that correct?

A. Yes, next successful development well. In between those, we did drill the dry-hole Number 6 well, but it was drilled in February of this year.

Q. And that's when the "C" sand --

A. That is --

Q. -- was tested and produced. It wasn't discovered because your Number 4 well did penetrate it, but prior to your Number 10; is that correct?

A. Yes, it was behind pipe on those logs. It was already identified; it was just a twin to accelerate recovery of those reserves.

The present-day value of those reserves was close to nothing, since there was a 10-year life in the Strawn remaining. So we drilled and developed those reserves.

Q. Were you out there when both of these logs were run, or when the Number 10 log was run?

A. Yes, I was. Well, actually, the Number 10, I was out of town. I had my geologist that works for me on location on that particular well, but it was done under my supervision. I was not there when the logs were run on the Number 3, let me correct myself, because that was an old log. It was drilled in 19- --

Q. It looks like 1974?

A. Right. I was not employed by TXO at that time. The workover was done at my recommendation from evaluation of those logs, clarify that.

Q. What was your reaction when you didn't see that the "B" sand was there?

A. Well, it kind of bothered me. As you can see, it introduces a certain element of risk. Of course we -- What we lost in the "B" we gained in the "C", so we weren't overly disappointed. We made a very

good well.

Q. Now, you show -- In the Number 10, you show a perforated interval of -- What is that? About --

A. Well, it has 37 feet of pay. The perforated interval is much smaller. It's about 10 feet in thickness.

Q. But you did test a wider area or a larger spectrum than your perforated interval?

A. Right. We restricted the perfs to the upper part of that. It's kind of a long story, but it has to do with the frac height.

We give this a small frac treatment. And because the dolomites that surround the sands are weaker in frac strength than the sands themselves, if you restrict your perfs to inside of the sand then you get a more effective frac and you don't frac out of zone and get water. So that's why we restricted the perforations in that interval.

We do know that the entire interval is full of hydrocarbons, because we took a full core of this interval, and we have high oil saturations right to the base of the sand. So we're positive that it is entirely full.

Q. Now, did you take a core sample just of the "C" sand or the whole Delaware sand?

A. Actually, the core was taken from -- The core barrel was put in late. It picked up from about 3240 and drilled 30 feet, so we got the basal -- approximately basal 10 feet of the sand. But there isn't any doubt about the oil saturation and it being totally full.

Q. Was the "B" sand cored, or was there any other cores in any of the other Delaware wells?

A. The only other one -- We did not core the "B" sand in the Number 3. We just did a workover. The Number 5 we did cores in. I mentioned before to the southeast the well that's downdip, and those cores show no oil saturation.

EXAMINER STOGNER: Are there any other questions of Mr. Brown?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: If not, he may be excused.

Mr. Kellahin?

MR. KELLAHIN: Call Mr. Vickers at this time.

CLARK VICKERS,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Vickers, would you state your name and

occupation?

A. My name is Clark Vickers; I'm a reservoir engineer.

Q. Mr. Vickers, on prior occasions have you testified before the Division as a petroleum engineer?

A. Yes, I have.

Q. Pursuant to your employment by your company, have you made a study of the drainage areas involved in each of the two producing Delaware wells that are shown on Mr. Brown's exhibits?

A. Yes, I have.

MR. KELLAHIN: We tender Mr. Vickers as an expert petroleum engineer.

EXAMINER STOGNER: Mr. Vickers is so qualified.

Q. (By Mr. Kellahin) Let's use one of Mr. Brown's displays just to understand what you did in your participation, Mr. Vickers. I have before me Exhibit Number 4. It's one of the displays that shows two of the wells with circles around them.

A. Uh-huh.

Q. Do you have that?

A. Yes, I do.

Q. What were you asked to do as an engineer?

A. Well, to again reiterate a little bit of the

chronology involved in the development of this area, subsequent to the results of the Number 5, the sidewall cores and the fact that we saw absolutely no oil encountered, our next proposed location, as was mentioned, was in the northwest of the southwest of Section 17.

We were very concerned about encountering water at that location, so it was decided to undertake a study of just how large an area the two producing wells, being the Number 3 and the Number 10, would drain.

In the course of that evaluation, we believed that the drainage areas would be quite smaller than one would normally expect, being on the order of about 25 acres for each well.

Q. And that's work you have performed and conclusions that you have reached yourself?

A. That's right.

Q. In summary, when we look at the proposed location --

A. Uh-huh.

Q. -- as Mr. Brown proposes to locate that well in 18, will that well be located at a point in the reservoir where you are simply accelerating the recovery of oil reserves from the pool that might

otherwise be recovered by other wells, or are you at a point in the reservoir where you're going to recover additional oil that the other two wells can't recover?

A. I don't believe we're going to be accelerating any reserves at all from either that would otherwise be recovered by the Number 3 and Number 10.

Again, based on this study, the drainage areas appear to be quite small, and the only way to increase the recoveries would be to produce these wells long beyond the economic limits, which is impractical.

Q. Have you satisfied yourself as an engineer that the drilling of this well at this location will recover oil that might not otherwise be recovered by the existing wells?

A. Yes, I have.

Q. Describe for us how you went about that process in order to reach that conclusion.

A. Okay, I'll refer you to Exhibit Number 7, which shows some calculations that I've done to calculate the drainage areas.

Again, to reiterate some of the data that Mr. Brown stated, the Yates Federal Number 3 located in Section 17 is currently producing about 37 barrels a day and has a cumulative production of 9700; based on a decline analysis established for remaining reserves of

about 38,000, which gives an ultimate recovery of approximately 47,900 barrels.

And again, utilizing data supplied by Mr. Brown, I show a calculation here to calculate that drainage area. The calculations were normally used to determine that.

The parameters used in this equation, again, were partially supplied by Mr. Brown, the ϕh and the water-saturation data in particular.

The recovery factor was determined based on studies I did of adjacent fields that have been producing for a little bit longer period of time than this particular field, particularly the Fenton and the Avalon Delaware fields. In that study, I determined recovery factors of anywhere on the order of 9 percent to 13 percent.

Q. I'm sorry, 9 to what?

A. Nine to 13 percent.

Q. Okay.

A. I used an average in this case of about 10 percent. Based on those parameters for the Number 3, I calculated a drainage area of 24 acres, and that's represented by the circle drawn in Exhibit Number 3.

Again, the same type of calculations were done for the Number 10 well in Section 18: Cumulative

production of 10,700 barrels, a current rate of 95 barrels; the same decline analysis study generated remaining reserves of about 78,600 barrels to give us an ultimate of 89,300 barrels.

Again, this well has thicker pay, as was noted. The drainage area calculates to be about 25 acres.

Based on these two drainage areas and what we would expect most likely reserves to be at the location, the circle depicted at the proposed location is a 25-acre drainage circle.

Q. Can you assess for us as an engineer whether or not -- after producing the two existing wells for a longer period of time, what is the probability that that information might change your -- the decline curves, and therefore materially change the area of drainage, pursuant to your calculations?

A. At this point, I don't believe we're going to see a significant change. The way the wells are acting right now are, they're following very closely the character of the wells that I studied in the two adjacent fields, the Avalon and the Fenton Delaware fields, and I don't believe we're going to see a significant change in the producing character of these wells.

I might mention, the Number 10 well is currently producing at about a 70-percent decline rate. The nature of these Delaware sands is to exhibit a hyperbolic decline rate. At the lower rates it will tend to flatten out somewhat, ultimately reaching about a 15-percent decline rate.

The Number 3 well is declining at about a 28-percent decline rate at this point. It has been on a little bit longer, it has flattened out somewhat since it originally came on line.

We actually saw a peak production in the Number 3 of 95 barrels a day. It dropped off very quickly and is currently following a fairly steady 28-percent decline.

Q. In order to materially change the ultimate recovery of your decline curves, the parameter in the calculation that would have to change the greatest would be the recovery factor?

A. The recovery factor would have to go up to increase ultimate recovery. Or if the decline itself changes and you do see additional reserves recovered, I feel very comfortable about the 10-percent decline.

So the only other thing that would change if reserves went up would be the drainage area itself.

Now, I took a look at what would happen if we

were to recover additional reserves. And assume, say, a 40-acre drainage, which normally you would consider to be a standard drainage area for these types of oil wells.

The declines that would have to take place to give you a 40-acre drainage are quite a bit more optimistic than we've seen in any of the offset fields, on the order of 10 to 15 percent from this point forward.

As I mentioned, the Number 10's existing a 70-percent decline rate. It would have to arrest itself immediately to a 15-percent decline rate to be able to drain at least 40 acres. That, in my opinion, is very unreasonable to expect. I don't think it's going to happen.

MR. KELLAHIN: That concludes my examination of Mr. Vickers, Mr. Stogner. We would move the introduction of his Exhibit Number 7.

EXAMINER STOGNER: Exhibit Number 7 will be admitted into evidence.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Vickers, in looking at your calculations, for the record, what does ϕh represent?

A. ϕh is the porosity height parameter, based on

log analysis. It's porosity times height.

Q. And you used the porosity -- What was your porosity figure you used?

A. Well, it's -- It varies throughout the zone. If you recall the cross-sections that Mr. Brown put on, you had greater porosity in the middle of the zone; you had less porosity at the top and the bottom.

You take short sections -- of that section, multiply it by the porosity, and then add all those parameters together to get the total ϕh, and that is the main volumetric parameter used in this calculation.

Q. But a different porosity was used for your Number 3 well as opposed to your Number 10 well; is that correct?

A. Yes, sir. Again, it was done on a foot-by-foot basis.

Q. Now, all the other figures here -- Sw, your water saturation, your RF and your other factor of 1.1 -- those were standard throughout both wells, however they were in the "B" and "C" zone. Could you elaborate a little bit more?

A. Yes, I could. The water-saturation calculation, again, was based on Mr. Brown's analysis.

Both of the wells exhibited water-free production initially, and currently the Number 10 is

still water-free. The Number 3 does make some water. We believe very strongly we've frac'd out of zone.

But based on the initial rash of those wells being water free, the water-saturation number used in here would be an irreducible water-saturation calculation, and that was based on Mr. Brown's study of these logs.

And of course you can see on here, it was approximately 35 percent.

The recovery factor, once again, that was based on a study I did of the two older Delaware fields to the southwest, the Fenton and the Avalon.

Expected ultimate recoveries on these wells, given a reasonable drainage area for a group of wells, was on the order of 10 percent. I mentioned a range of 9 to 13 percent and used a 10-percent recovery factor.

Certainly, without that study you could expect recovery factors on the order of 5 percent, you could expect them on 20 percent. The purpose of that study was to better quantify and determine what a most likely recovery factor would be.

Of course, in the calculation, to use a higher recovery factor for these reserves would give you a smaller drainage area. So I used what I consider to be a slightly more conservative recovery factor,

just to incorporate our own margin of error in there.

The B_o, your formation volume factor of 1.1, these wells have a solution gas/oil ratio on the order of 500 cubic feet per barrel, which is quite low. At the depths and pressures we're dealing with, the 1.1 is a conservative estimate of formation volume factor.

I did not conduct any calculations or any type of bubble-point analysis to better determine that number. That's just a standard number we use in these low GOR reservoirs like this.

Q. The 7,748 figure is just a --

A. That is a conversion factor, that is barrels per acre foot.

Q. And it's just a typo that it didn't get added in your number 3 calculation; is that correct? Just for the record.

A. You're right.

Q. Okay.

A. That's absolutely right.

EXAMINER STOGNER: Are there any other questions of Mr. Vickers?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: If not, he may be excused.

Mr. Kellahin?

MR. KELLAHIN: Like to call Mr. Coats.

RICHARD COATS,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

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

A. My name is Richard Coats, and I'm a landman with TXO Production Corp.

Q. Mr. Coats, on prior occasions have you testified as a petroleum landman on behalf of your company before the Division?

A. Yes, I have.

Q. Pursuant to that employment, are you familiar with and knowledgeable about the land ownership involved in the west half of Section 17, as well as all of Section 18 and parts of the south half of 8 to the northeast?

A. Yes, I am.

MR. KELLAHIN: We tender Mr. Coats as an expert petroleum landman.

EXAMINER STOGNER: Mr. Coats is so qualified.

Q. (By Mr. Kellahin) Mr. Coats, let me direct your attention, sir, to what is marked as Exhibit Number 8. Identify that for us.

A. This is a standard oil and gas plat of the area. Our lease, which we own 100 percent of, is outlined in yellow, and the ownership within this area is common in terms of working interest and overriding royalty interest.

Q. When we look at the area outlined in yellow, what type of lease is that?

A. It's a federal oil and gas lease. It covers additional acreage besides the part that we have there.

Q. Let's turn now, sir, to Exhibit Number 9. Would you identify and describe that display?

A. Yes, this is a drafted version of the same plat we just looked at. It focuses on the specific area that we have under lease.

Q. All right. Based upon your study, then, the royalty owner for all the spacing units that adjoin the 40-acre tract to which the proposed well would be dedicated, that royalty owner is the federal government?

A. That's correct.

Q. And this is all the same base federal lease?

A. Yes, that's correct.

Q. When we look at the 40-acre spacing units towards which this well is encroaching, do all the working-interest owners remain the same, and are they

common with the spacing unit in which the unorthodox well is located?

A. That's correct, it's 100 percent TXO.

Q. And with regards to the overriding royalty interests, if there are any, are those the same among all the spacing units towards which this well encroaches?

A. There is an overriding royalty, and they are all the same.

Q. What do you conclude as a landman with regards to the protection of correlative rights if this Application is approved?

A. Well, the correlative rights would be protected in all instances.

Q. Because why, sir? The owners --

A. The ownership is exactly the same.

MR. KELLAHIN: That concludes my examination of Mr. Coats.

We move the introduction of his Exhibits 8 and 9.

EXAMINER STOGNER: Thank you, Mr. Kellahin.

EXAMINATION

BY MR. STOGNER:

Q. Mr. Coats, have you discussed this proposal with the BLM, either the Roswell district office or the

Carlsbad area office?

A. We have an individual who handles our federal applications for -- application for permit to drill. The well has been staked. I notice that staking has been sent in. I do not know of -- right at this point, at what stage the application to drill has been approved.

Q. How long ago was that? Do you know?

A. Fairly recently. I don't have an exact date.

EXAMINER STOGNER: Okay. I have no other questions of Mr. Coats.

Are there any other questions of this witness?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: If not, he may be excused.

Mr. Kellahin, do you have anything further?

MR. KELLAHIN: That concludes our presentation.

EXAMINER STOGNER: Does anybody else have anything further in Case Number 9996?

If not, this case will be taken under advisement.

(Thereupon, these proceedings were concluded at 9:16 a.m.)

* * *

CERTIFICATE OF REPORTER

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

I, Steven T. Brenner, 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 transcribed my notes; 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 August 4, 1990.

STEVEN T. BRENNER
CSR No. 106

My commission expires: October 14, 1990

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9996, heard by me on 11 July 1990.

, Examiner
Oil Conservation Division

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date JULY 11, 1990 Time: 8:15 A.M.

NAME	REPRESENTING	LOCATION
Maurice Timmer	Byram Co	SF
CLARK VICKERS	TXO PRODUCTION CORP	MIDLAND TX
RICHARD COATS	TXO PRODUCTION CORP	MIDLAND TX
Glen Brown	TXO PRODUCTION CORP	MIDLAND TX
Scott Hall	Miller, Stratvert lawfirm	Santa Fe
James Bruce	Hinkle Law Firm	Albuquerque
[illegible]	Kellahin Kellahin & Aubrey	Santa Fe
[illegible]	[illegible] Artesia	Santa Fe
W Perry Pearce	OCD	Santa Fe
Victor Lyon	El Paso Natural Gas	El Paso, TX
E.P. Manning	OCD	Santa Fe
Jim Morrow	EPNG	El Paso, TX
Paul M Burchell	Santa Fe Energy Resources	Midland, TX
Bruce Insalaco	Santa Fe Energy Resources	Midland, TX
Vernon D. Dye	Campbell and Black, P.A.	Santa Fe
William F. Carr		

NEW MEXICO OIL CONSERVATION COMMISSION

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