NEW MEXICO OIL CONSERVATION DIVISION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10863

IN THE MATTER OF:

The Application of Yates Petroleum Corporation for a Horizontal Directional Drilling Pilot Project and Special Operating Rules Therefor, Chaves County, New Mexico.

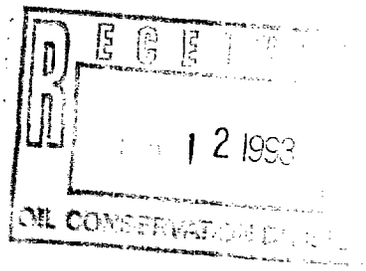
BEFORE:

DAVID R. CATANACH

Hearing Examiner

State Land Office Building

November 4, 1993



REPORTED BY:

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Certified Shorthand Reporter
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ORIGINAL

A P P E A R A N C E S

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I N D E X

E X H I B I T S

EXAMINER CATANACH: At this time we'll call Case 10863.

MR. STOVALL: Application of Yates Petroleum Corporation for horizontal, direction drilling pilot project and special operating rules therefor, Chaves County, New Mexico.

EXAMINER CATANACH: Are there appearances in this case?

MR. CARR: May it please the Examiner my name is William F. Carr. I represent Yates Petroleum Corporation, and I have two witnesses.

EXAMINER CATANACH: Any additional appearances? Will the witnesses please stand to be sworn in.

[And the witnesses were duly sworn.]

MR. CARR: At this time we call D'Nese Fly.

D'NESE FLY

Having been first duly sworn upon her oath, was examined and testified as follows:

EXAMINATION

BY MR. CARR:

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

A. D'Nese Fly.

Q. Where do you reside?
A. Artesia, New Mexico.
Q. By whom are you employed?
A. Yates Petroleum Corporation.
Q. What is your current position with Yates Petroleum Corporation?
A. Geologist.
Q. Have you previously testified before this Division?
A. Yes.
Q. At the time of that testimony, were your credentials as a petroleum geologist accepted and made a matter of record?
A. Yes.
Q. Are you familiar with the application filed in this case on behalf of Yates Petroleum Corporation?
A. Yes.
Q. Are you familiar with the proposed wells and the status of the land surrounding the well?
A. Yes.
MR. CARR: Are the witness' qualifications acceptable?
EXAMINER CATANACH: They are.

Q. Please briefly summarize what Yates seeks with this application.

A. Yates is seeking the authorization of a horizontal drilling pilot project in the Tomahawk-San Andres pool, on our Loveless LQ state lease, in the southwest quarter of Section 36, Township 7 South, Range 31 East, of Chaves County, New Mexico.

Q. Is Yates seeking an exemption to the existing well location requirements for this project?

A. The surface location of the Loveless LQ State Well No. 9, the only well in the project, is standard on a 40-acre tract, and its location is 990 from the south line and 2310 from the west line.

We'll stay back a hundred feet from the outer boundary of the tract. If we're closer than 330 feet to the boundary, we will need an exception to the Division spacing requirements.

Q. Is Yates seeking an exception to the acreage dedication requirements for this well?

A. Yes. We hope to dedicate the entire 160-acre project area to the well.

Q. Is Yates also seeking a special

allowable for the well?

A. Yes. Our engineering witness will testify in a little more detail about that, but we believe the well will drain about 160 acres and, therefore, we're seeking a 160-acre allowable of 320 barrels per day.

Q. Ms. Fly, what is the reason behind this particular application?

A. These vertical wells in this southwest quarter of 36 have reached their maturity. We believe that there are substantial reserves left in the formation that can now be recovered with horizontal drilling technology.

Q. If you drill this well and it is a success, what are you hoping to achieve?

A. We're hoping to encounter quite a few more fractures, drilling laterally through the pay zone of the P2, and, therefore, hoping for a very commercial well that will reach top allowable.

Q. Let's go to Yates' Exhibit No. 1. Could you identify and review this for Mr. Catanach?

A. Yes. Exhibit 1 is a land plat within the area. The proposed location is shown by a

red dot in Unit N of Section 36.

The project area that I'm speaking of is the southwest quarter of this section, and the acreage that is colored solid in yellow is operated by Yates, and the acreage that is outlined in yellow, Yates Petroleum has a working interest in but does not operate.

Q. What is the status of Yates' ownership in the southwest quarter of Section 36?

A. Yates' entities have about 45 percent working interest in this southwest quarter, but there are also numerous other working interest partners that are shown on Exhibit 2.

Q. Exhibit No. 2 is just an attachment to the AFE, is that correct?

A. That is correct.

Q. This shows each of the other interest owners in this 160-acre tract and their percentage ownership?

A. Correct.

Q. You're not intending with this to indicate which parties have or have not at this time voluntarily committed their interest to this well?

A. That's right.

Q. Let's go to Exhibit No. 3. Could you identify this and review it for the Examiner?

A. Exhibit No. 3 is a blown-up portion of the Township 7/31, Section 36. I have put this in to show the names of the surrounding wells and to also show where our surface location will be located, how far we expect to have our building section, and run casing, that is shown here by the pink location, and our hundred-foot-off-the-section-line final location of our lateral hole.

Q. The project area is the southwest quarter of this section. There are four wells shown on that tract in the San Andres. Generally speaking, what are they able to produce at this time?

A. They've pretty much reached maturity and they are producing about a barrel a day.

Q. Apiece?

A. Right.

Q. Could you generally describe, for Mr. Catanach, the characteristics of the San Andres formation in this area?

A. Yes. It's a fine to very fine crystalline, oolitic dolomite, that has vuggy and fractured porosity. Its average thickness that

we hope to encounter in the P2 zone holds constant at about 50 feet. The average porosity in this P2 is around eight percent, with a permeability of one to two millidarcies.

Q. I would like you now to go to Yates' Exhibit No. 4, identify this exhibit, and review it for Mr. Catanach.

A. Exhibit No. 4 is a structure map on top of the P2 zone, which is our target zone for our lateral. Our proposed location of the Loveless No. 9 is shown by the double circle in Section 36, Unit N.

The reason I have Section 36 highlighted in pink is just a reference from my previous exhibit, cross-section A - A', which will be Exhibit No. 5 as shown here, and the contours on the top of the P2 structure are in 25-foot increments.

And why I would like to show this is that we have a very gradual dip to the southeast in our P2 and in the zone that we will be drilling laterally, and there is not a lot of structural relief. This is more of a stratigraphic pinchout for this reservoir. It has been proven up, by previous drilling, that we

will have reservoir porosity throughout our zone.

Q. All right. Let's go now to the cross-section, Exhibit No. 5, and review this exhibit for Mr. Catanach.

A. Okay. This is just a cross-section from A - A' which is located to the south of our proposed location. I drew this just to show the pay zones that have been perforated in this San Andres dolomite, the P1, P2 and P3 zones.

The P2 is the more prolific reservoir, and we expect to stay within the top 25 feet of this reservoir. I was just submitting this cross-section to show that there is very consistent porosity throughout the upper portion of this P2 zone along the lateral, which we will be drilling.

Q. Does the San Andres in this area look like a good candidate for a horizontal well?

A. Yes.

Q. Will Yates be calling another witness to review the engineering aspects of this case?

A. Yes.

Q. Were Exhibits 1 through 5 either prepared by you or compiled under your direction?

A. Yes.

MR. CARR: At this time, Mr. Catanach, we move the admission of Yates Petroleum Corporation Exhibits 1 through 5.

EXAMINER CATANACH: Exhibits 1 through 5 will be admitted into evidence.

MR. CARR: That concludes my direct examination of Ms. Fly.

EXAMINATION

BY EXAMINER CATANACH:

Q. Ms. Fly, the direction that the well will take, how was that determined?

A. Well, our engineering witness will expand on that question a little bit, but there have been other horizontal wells drilled in this area, and the best direction seems to be in a westward direction. The fracture orientation within the dolomite tends to run in a north/south direction. Therefore, we would be crossing that perpendicular.

Q. The producing interval is just the P2 interval?

A. Different wells in this field, this Tomahawk Tom-Tom field area, have produced from the P1 and the P3, but the P2 is the most prolific zone, and that is the zone we have

chosen as our target.

Q. Are you attempting just to keep the horizontal wellbore just within the P2 section?

A. Yes.

EXAMINATION

BY MR. STOVALL:

Q. Ms. Fly, if I understood your testimony correctly, Exhibit 2 was just intended to show who owns an interest in this project area, is that correct?

A. That's correct.

Q. You're still in the process of negotiating with the parties?

A. Just about all have signed up, less than three percent. And I have been told that they, more than likely, are going to sign up. They're just slow at their responses.

Q. So participation is not at issue in this?

A. No.

Q. It's obviously not a force pooling, anyway?

A. No.

Q. You're simply seeking the horizontal well on a technical conservation basis--

A. Right.

Q. --and not with respect to other property issues?

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

MR. CARR: At this time, Mr. Catanach, we call Pinson McWhorter.

[Discussion off the record.]

MR. CARR: Mr. Catanach, as a follow-up on the questions you had of D'Nese Fly, this acreage has been put together and it's under an operating agreement. The AFE is just addressing the question of who is going to voluntarily agree to pay their share of the costs of this particular horizontal well, so there is no reason to come in and ask the OCD to consolidate the acreage. It has been voluntarily put together by the owners in the tract.

EXAMINER CATANACH: There is an operating agreement?

MR. CARR: I believe there is, and we could provide that, and also a copy of this attachment to the AFE showing the parties are in. I appreciate your concern that this order might look like the OCD is coming behind and

pushing this last three percent to actually ratify, but we would be happy to submit to you an operating agreement and a signed copy of this AFE.

MR. STOVALL: Mr. Carr, I think the discussion we were having behind closed mikes--

MR. CARR: Hopefully will be behind closed mikes.

MR. STOVALL: --was just that issue of this order simply approves, on a technical conservation basis, if it approves the project. That would be the basis, and exactly that. It doesn't say that you can proceed without compliance, and I think the language of the order might say you're authorized to do it, but a clear indication that it also requires all the other compliance with the statute, regarding consolidation and pooling of interests.

MR. CARR: Correct, and the AFE--

MR. STOVALL: And I'm not sure that we need the operating agreement, but the operators would be put on notice that they have to comply with all the other--which I think they're aware of, but we ought to make sure.

MR. CARR: And that's no problem for

us. I didn't want to confuse you by including this exhibit to the AFE. We decided to do that yesterday instead of asking D'Nese Fly to review all the other interest owners, because, as you can see, there are a number of them.

MR. STOVALL: And the notice issue only goes to whether they approve a working interest conservation, and not a--

MR. CARR: Yes.

MR. STOVALL: I think we are in concert on that.

EXAMINER CATANACH: You're satisfied that we don't need a copy of the operating agreement?

MR. STOVALL: Not at this time, because I think Yates has to comply with the statutory requirements, as far as bringing all of the interests into any project area or production unit.

MR. CARR: Correct.

MR. STOVALL: And they're not asking us to bring those interests in.

EXAMINER CATANACH: But are there statutes that relate to forming a special project area? because this is not a standard proration

unit.

MR. STOVALL: I think you could, by interpretation, apply--what is it, Section 35? I can't remember it. Mr. Carr probably knows which one I'm referring to.

MR. CARR: Mr. Carr does not. We would be happy to provide the documentation to you, and if it's helpful, fine. If not--

MR. STOVALL: My reason for saying "I don't think we need it," I think the operators, the operator must interpret the operating agreement to ensure itself that it permits this operation.

MR. CARR: And our exposure would be back, not only to you, but to those interest owners who were not properly brought in, and that portion of it would probably be outside the Commission.

MR. STOVALL: I can't remember the statute section, but I'm referring to the one that requires the consolidation of interests, either by voluntary or force pooling, and I think it would be applicable to this.

MR. CARR: I'm sure it would be.

EXAMINER CATANACH: Are you satisfied?

MR. STOVALL: I'm satisfied. Are you satisfied?

EXAMINER CATANACH: I am if you are.

MR. STOVALL: That's pretty scary.

EXAMINER CATANACH: Okay. You may proceed, Mr. Carr.

PINSON McWHORTER

Having been first duly sworn upon his oath, was examined and testified as follows:

EXAMINATION

BY MR. CARR:

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

A. My name is Pinson McWhorter.

Q. Where do you reside?

A. Artesia, New Mexico.

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

A. Employed by Yates Petroleum Corporation as a petroleum engineer.

Q. Have you previously testified before this Division and had your credentials as a petroleum engineer accepted and made a matter of record?

A. Yes, I have.

Q. Are you familiar with the application filed in this case on behalf of Yates Petroleum Corporation?

A. Yes, I am.

Q. Are you familiar with the status of the lands involved in this matter and the proposed well?

A. Yes.

MR. CARR: Are the witness' qualification acceptable?

EXAMINER CATANACH: They are.

Q. Mr. McWhorter, let's go to Yates' Exhibit No. 6. Would you refer to this exhibit and then review, for Mr. Catanach, how Yates proposes to drill this horizontal well.

A. Yes. Exhibit No. 6 is a schematic of a vertical cross-section of the wellbore. We propose to drill a 7-7/8" hole to approximately 4300 feet TD. That would be a pilot hole.

We'll log the hole with normal openhole logging suite, and we'll also log with a formation microimaging tool.

The purpose of this will be to determine both the top and bottom of the P2 zone, which is our target interval, our target zone.

Secondly, the formation microimaging tool will be used to determine fracture orientation, if possible. If we do intersect some fractures in the wellbore, we'll be able to determine the orientation of those fractures with the formation microimager. Well use that fracture orientation information in fine-tuning the orientation of the direction of the lateral hole.

Additionally, from that information from the logging suite, we'll be able to calculate our kickoff point, the depth of our kickoff point.

At that point, we'll set cement plugs and kick off from our kickoff point to drill a medium radius turn to a horizontal. We'll build section with 500 foot turn, and intersect the top of the P2.

Right now we're estimating the top of the P2 to be 4045 feet. We'll adjust that after openhole logging evaluation. We're estimating the kickoff point to be 3545 feet at this time.

We'll drill the lateral section in the upper half of the P2 zone to a terminus within 100 feet of the western lease boundary, which is

100 feet of the western side of Section 36.

We'll run 5-1/2 casing to the top of the P2. We'll cement back to the surface, circulate back to the surface on that casing string.

The lateral section, which will be approximately 1710 feet of actual lateral, will be left openhole. The reason for that is the integrity of this San Andres dolomite is such that we should have no problems with wellbore integrity. We do not plan to log any of the openhole section.

We'll produce this well. Completion will be to set a pumping unit on 2-7/8" tubing. With regard to the actual stimulation procedures, we're still studying those at this time. The stimulation procedures to be used, in the lateral section this long, are still actually matters of investigation and research.

And we're in consultation with service companies to help us design a stimulation if we decide that we need some acid-type stimulation work in the openhole section. We will run directional surveys throughout the well, throughout the lateral section, throughout the

build section, and we'll submit those to the OCD.

Q. Mr. McWhorter, D'Nese Fly indicated that Yates felt the well could, in fact, drain the 160-acre project area. Could you expand on that for Mr. Catanach and explain upon what Yates bases this opinion?

A. Yes. The concept of a lateral hole application in this particular reservoir is to create the maximum amount of reservoir surface area open flow in the wellbore. This will be enhanced through the intersection of the wellbore, of natural fractures and vugs that are present in this formation.

The state of the reservoir is such that permeability is skewed in a north/south direction because of the orientation of fractures in the, generally, north to south direction. This anisotropy of permeability will cause a greater influence of the pressure drainage boundary to the north and to the south, although the spatial location of the wellbore itself will be in units M and N of Section 36.

This well, when it starts producing, will actually begin to establish pseudostudy state conditions at boundaries that drain almost

the entire 160 acres in this project area, which would be Units K, L, M and N.

Now, from some calculations that I've done, I calculate that a northern drainage boundary from this well will be approximately 2118 feet from the south line of Section 36. So that would result in pressure draw-down, pressure drainage, fluid drainage, almost 798 feet into Units K and L, which are north of the wellbore.

Additionally, the wellbore itself, the lateral extent of the wellbore, from east to west, is 1710 feet of horizontal section. The actual drainage area will be slightly bigger than that in the east/west area, and it will drain a significant portion of the east/west section of that 2640 feet, which will be attributable to the east/west direction of the southwest quarter.

The method that I used to establish that northern drainage boundary and the southern drainage boundary, which would be close to the southern lease line, are presented in a paper authored by Joshi and Mutalik, in the Oil & Gas Journal. Specifically, that paper was designed to predict transient flow in horizontal wells, but they also addressed the concept of drainage

boundaries being skewed by a permeability anisotropy, which we have in this case.

Additionally Dr. Joshi's text, "Horizontal Well Technology," addressed the same condition. I believe that's in Chapter 2 of his text.

Q. Identify what has been marked as Yates Exhibit No. 7?

A. Yes, Yates Exhibit No. 7 is a copy of this paper published by Mutalik and Joshi, and it was published in the Oil & Gas Journal in September of 1992.

Q. What do you estimate to be the remaining recoverable reserves for this well?

A. I estimate the remaining 227,000 barrels of oil.

Q. What do you base this on?

A. I base this on a study that was done, a simulation study done by the National Institute for Petroleum and Energy Research in Bartlesville, Oklahoma. They did some numerical simulations with their bow simulator, which is a full 3-D numerical simulatopr, black oil model. They did a study which showed what the recoverable reserves for horizontal versus

vertical wells were, for various spacing units.

Using the results of those published studies, I calculated based upon what a new lateral well with this dimensions, in a 160-acre unit should recover. Then I subtracted off the cumulative production from the current wells in this 160 acres, these four 40-acre tracts, and came up with the remaining recoverable reserves that could be drained by this lateral.

Q. What would you anticipate the producing life to be of the well?

A. I anticipate this well could produce eight to nine years.

Q. Is Exhibit No. 8 an affidavit confirming that notice of this application has been provided to offsetting owners, as required by OCD rules?

A. Yes, it is.

Q. Now, this wellbore is going to the west. Who is the offsetting operator to the west?

A. The offsetting operator to the west is Petroleum Development Corporation.

Q. Do you anticipate unreasonable drainage from that tract?

A. No, I do not.

Q. Could you identify what has been marked Yates Exhibit No. 9?

A. Yes, Yates Exhibit No. 9 is a letter of support from Petroleum Development Corporation stating that they fully support the application of Yates Petroleum in Case No. 10863, and that they state that they are the operator of the offset leases to the east, northeast, west and northwest of this 160-acre project area.

Additionally, Petroleum Development Corporation will also support a four times 80 barrel per day allowable for the 160-acre project area, which calculates to be 320 barrels of oil a day.

Q. Mr. McWhorter, in your opinion, if this application is approved and the well is drilled, will this development be in the best interest of conservation, the prevention of waste, and the protection of correlative rights?

A. Yes, that's my opinion.

Q. Will it result in the recovery of hydrocarbons that otherwise will not be recovered?

A. That's my opinion, also.

Q. Were Exhibits 6 through 9 either prepared by you or compiled under your direction?

A. They were.

MR. CARR: At this time, Mr. Catanach, we move the admission of Yates Petroleum Corporation Exhibits 6 through 9.

EXAMINER CATANACH: Exhibits 6 through 9 will be admitted as evidence.

MR. CARR: That concludes my direct examination of Mr. McWhorter.

MR. STOVALL: I have a couple of questions before the real engineer starts.

EXAMINATION

BY MR. STOVALL:

Q. Have you talked to Mr. Johnson at all with PetCo?

A. Yes, I've had numerous conversations with Mr. Johnson.

Q. You're aware they have done similar types of projects? I'm not sure if it's the same formation, but--

A. Yes, it is. He has drilled through reentries into older wells with short radius turns. He has drilled into the P2 zone, which most of the operators in this field feel is the

primary target. I'm very familiar with everything that he's done.

In the four wells that he has drilled and what he's now beginning to do in the seven wells, he has now ordered to do the same type of operation.

Q. Have you been able to get information from him that helps you make new mistakes rather than repeat his own, and improve on, based upon his experience, or is there room for improvement?

A. Well, I think Mr. Johnson would say that there's always room for improvement. I would agree, in oil field operations, that that is generally true. There's always room for improvement.

Q. Let me make sure I get back to the point I'm interested in. You're out there doing this, and while horizontal is not really experimental anymore, with what the production analysis is, is there an informal cooperative effort where you can share information, without getting into proprietary stuff and losing competitive advantage, so that you can keep on improving, or is each company going on their own and learning their own lessons?

A. Well, no. Each company, at this point, is not going on their own. There is a cooperative exchange of information about the operations, and we have already learned a lot about the information from the information shared with us by Mr. Johnson and Petroleum Development Corporation about some of the problems that are encountered in the lateral section and even in the build section, in drilling these holes.

The difference being that Mr. Johnson, he is reentering wells, drilling out casing section, then kicking off with a short radius turn. We will be drilling this well with a vertical pilot hole, setting a plug, and then kicking off for a medium radius turn. So, there will be a little bit of difference there.

The point of saying all that is, we may have a little bit different learning curve, in some aspects, than Mr. Johnson would.

Q. One other question. This article you provided, just skimming over it, indicates that there is a potential interference effect of horizontal wells being too close to each other?

A. That is correct.

Q. Is there any indication, as far as

having these vertical wells? Any interference between vertical wells and horizontal wells?

A. I would say this to that. Any time that we drill a horizontal well in a formation and create a pressure sync along that wellbore, any wells that are within the pseudostated state or the drainage boundaries of that pressure sync, of course, will be affected by that well.

And these wells, these vertical wells, the four vertical wells that are there currently, are also pressure syncs and I would say that they will be within the drainage boundary of this well.

MR. STOVALL: That's about as technical as I want to get.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. McWhorter, without having read this article, your Exhibit No. 7, "Decline Curve Analysis Predicts Oil Recovery From Horizontal Wells"--

A. Correct.

Q. --without any established production on the wellbore, how can you estimate drainage areas? Isn't it based upon a decline curve from

the horizontal wellbore?

A. Well, the purpose of this article is to be able to predict a decline curve without--now, this is predicting the decline curve, without having any established production in the well, using the reservoir properties and then using a dimensionless solution for time and rate, cubed, with respect to pressure draw-down calculations that have been well-established in the petroleum industry for decades.

Mr. Mutalik and Dr. Joshi go through the solution in the paper, for how they do this, and what they wind up with is similar to transient well test analysis. They wind up with type curves, based upon the length of the wellbore and the height of pay, and the size of the well, as far as the lateral length, and the permeability anisotropy conditions.

From that type curve, since it's a curve of rate versus dimensionless time, dimensionless rate versus dimensionless time, you can use that type of curve to predict the decline rate versus time decline of the well.

Of course, as you produce the well, then, you learn more about being able to

history-match this particular decline curve and where you need to make adjustments and more accurately predict the actual behavior of the well. But this is our best guess of the accuracy of the well at this point.

Q. Have you used this type of calculation to determine the northern drainage boundary that you testified to?

A. Yes. And specifically I used the type of calculation that's spoken of at page 46, called areal anisotropy, where the authors refer to a method of expected drainage in the Y direction, which, in my case, I designate as north/south, approximately, and the drainage in this Y direction is related to the square root of the Y direction permeability divided by the X direction permeability, times the lateral length itself.

I did make an adjustment there because we believe that the Y direction permeability is controlled by the fractures, which we believe are probably a little bit northeast to southwest orientation, so I made an estimate of what that might be. It would be 30 degrees off north, and just took the cosine of that angle times the Y

direction permeability to correct it for those effects.

Q. Mr. McWhorter, are you aware of any wells that have been horizontally drilled in the San Andres, in this area, that have encountered substantial producing rates?

A. Yes. As referred to earlier, Mr. Johnson, Mr. Jim Johnson with Petroleum Development Corporation, has drilled four lateral drain holes from existing wells. Two of those drain holes, the Strange Federal No. 5 and the Waddum No. 7, one is currently top allowable well still, after several months of production, and the other one is just below top allowable.

I do have those exact rates for each of those wells, if you would like for me to discuss that, but the effects are that the lateral sections significantly improve the productivity of these wells, even in reentries of old wells that have produced before.

FURTHER EXAMINATION

BY MR. STOVALL:

Q. You say they're top allowable. Are those in any of the project areas, where he has done more than one proration unit and he's got a

vertical well already there? Where he's done the same type of project area that you're asking for here?

A. These project areas that he has done, has completed, are all within the boundaries of the 40-acre tract.

Q. I don't remember on those. Were there existing wells on those?

A. There were existing wells, right. That is correct.

Q. The horizontal well is a top allowable well, without even counting the vertical well?

A. Right.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. So you're talking about an 80-barrel a day well?

A. Yes, on a 40-acre tract.

Q. What you're requesting is 320 barrels a day?

A. That is correct.

Q. Do you have any reason to anticipate that you'll actually encounter a well at that significant producing rate?

A. Well, yes, I do. Based upon some

calculations of productivity indices of horizontal versus vertical wells, a well of 1,700 feet, length, with a pay height of 50 feet, which is approximately what the P2 is, with a vertical to horizontal permeability ratio of .3, which is probably about what, we're seeing a vertical to horizontal ratio, the increase, the ratio, of horizontal to vertical productivity, initial productivity, is 6-to-1.

The wells in this area were IP'd anywhere from 30 barrels a day to 90 barrels a day. Mr. Johnson, with Petroleum Development Corporation, has wells that will produce close to top allowable, if they don't produce top allowable, 80 barrels a day. So, a well of this length could be five to six times.

So, even if it's an average of 60 to 70 barrels a day, we're still well above the 320 barrels a day. So, I do have reason to believe that we could get a well of that magnitude productivity.

FURTHER EXAMINATION

BY MR. STOVALL:

Q. Mr. McWhorter, let me ask you a question. This is 40-acre spacing in this pool,

right?

A. That's correct.

Q. You're asking that the southwest quarter be a single project area, if you will, a nonstandard proration unit of 160 acres, is that correct? We're calling it "project area" because you've already dedicated for the spacing units to existing wells?

A. That's correct.

Q. And what you're asking for is the allowable based upon the total project area. I assume you're aware that in some of the early horizontal well cases that crossed proration unit boundaries, that the Division took the approach that you can get an allowable for each, if you will, standard proration unit that the horizontal well came in contact with?

A. Yes, I am aware of that.

Q. Are you familiar with the order that was entered in Mr. Johnson's latest cases, the Petroleum Development cases, that had project areas where he was going in and crossing boundaries where there were wells? I think there were four of them that we heard together.

A. Right. Yes.

Q. Is your recollection the same? My recollection is that that order granted the allowable for the project, and I'm thinking of one, there was one that was a 320-acre project area, if I remember, and he was going to do two or three horizontal wells within that project area.

A. Right, that's correct.

Q. And he requested for that 320-acre project area, I think that was also 80 barrels or 40, if I'm not mistaken, an allowable for the 320-acre project area of 80 barrels, times the number of 40-acre proration units that were contacted by either a horizontal wellbore section or a vertical wellbore, in that that would be able to be produced out of any of the wells, vertical or horizontal, within the project area. Does that sound familiar to you?

A. Yes.

Q. Is that what the Division granted?

A. I'm not going to say that that's exactly it.

Q. I don't want to hold you to that, because we can look up the order. Is that your recollection?

A. Yes.

Q. I mean, that's my recollection is that that's what we granted.

A. Yes.

Q. And, essentially, that's what you're asking for here, is it not, because you would like to be able, if you're successful with this well, you would like to be able to have the flexibility to shift the 80-barrel allowables for each of the existing wells, to the horizontal well, if it proves capable of producing up to 320 barrels?

A. Up to 320 barrels a day, yes, that's correct.

Q. And if it's not capable of that kind of production level, what you're saying is, let each well--well, let me go back, and that may be another question on this.

Each of the vertical wells could then have its 80-barrel a day allowable, could produce up to the 80 barrels, but the total project area couldn't produce more than the 320? Is that making sense?

A. I think I understand what your point is, yes.

Q. In other words, let's say this horizontal well was capable of producing 100.

A. Yes.

Q. And you produced it at a rate of 100 barrels?

A. Right.

Q. Within the 160 acres, you would have, if my math is correct, 220 barrels of allowable left?

A. That's correct.

Q. Which you would, I presume, want to produce that allowable from the vertical wells?

A. If it were possible.

Q. Assuming they would produce something?

A. Yes.

Q. Now, it would be my sense that the way to manage that would be to say you can produce it up to 80 barrels per day from any one of the vertical wells, and up to the 220--in other words, if you had two that produced 80, you could produce 160 out of those, and you would have 60 barrels left to allocate to the other two? Does that make sense to you?

A. Right.

Q. Is that a sensible solution to that?

A. Uh-huh. If we're still preserving the intent of being able to produce 320 barrels a day as a top allowable for this horizontal well.

Q. Are any of those wells top allowable wells in that 160 acres now?

A. No. These wells are in an advanced state of depletion, and they make, maybe, one or two barrels a day.

Q. So we don't have an issue as to what these wells can produce, it's just the horizontal well that has the potential?

A. That's exactly right.

Q. Okay. Let me do one follow-up question on that. The horizontal section, you are proposing to keep it 330 feet from the north half of the southwest quarter?

A. Yes.

Q. If this is a project area, why would you want to do that? Would you not want the flexibility to, say, go a little bit northwest?

A. Right.

Q. If the 160 acres is the project area, why would you want to artificially keep yourself from going towards the north half of the project area?

A. I see what you're saying. No, that is correct. And any depictions of a straight east/west oriented wellbore are purely diagrammatic, in the effect that, as I testified earlier, the exact orientation that we will take within the boundaries of the project area will be determined after our logging suite is evaluated.

I.e., I think what you're getting at is, we may want to take a tract a little bit more to the northwest or to the southwest, within the 160-acre project area.

Q. So, what you really need to do is stay 330 feet from the outer boundaries of the 160 and not worry about the interior lines, similar to what Mr. Johnson requested?

A. Right. But I think we're asking for 100 feet.

Q. From the interior lines? From the line that divides the quarter section in half, or 100 feet from the outer boundaries?

A. From the outer boundaries of the quarter section.

Q. Which is, again, similar to what Mr. Johnson got?

A. Very similar. I think that's what he

asked for.

Q. What you're really asking for is the same thing that he got? We're not unprecedented here?

A. We liked it.

Q. Okay. It appears that you have basically oriented this thing from east to west, kind of trying to split the difference between the north two wells and the south two wells in that quarter section, is that correct?

A. Well, it's not exactly like that. The reason we chose that location, we believe that location, based upon the vertical well drainage areas, will encounter more pressure. We would like to stay in an east/west direction, as much as possible, to take advantage of the high reservoir pressures that would be encountered along that direction.

Q. What you're trying to do is get to the outer edges of the drainage circles for the vertical wells?

A. Right. If we needed to, though, as I stated earlier, based upon the evaluation of the logs, if we need to take a little bit different tack, we will, as far as the orientation.

Q. But your feeling is that this well, if oriented substantially in this direction, will drain from both the north half of the quarter section and the south half of the quarter section?

A. Yes, that is true.

Q. So, it doesn't necessarily make sense to require it to contact either of those north two quarter-quarters?

A. That's exactly right. My contention is that just the spatial location of the lateral crossing two 40-acre boundaries, is not really indicative of the total drainage area of that lateral.

Q. This really has nothing to do with the approval of this case, but could you see, conceivably in the future, a secondary recovery, where you drill a horizontal well like this, and then pressure-up from the vertical wells? Is that feasible?

A. Well, that's not only a concept, it has been done within the industry. And there's quite a bit of research still being done about drilling horizontal injection wells and horizontal producing wells in secondary recovery projects.

Arco has done it in steam floods in California, so this is something that's already been implemented in the industry.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. McWhorter, I don't recall right offhand what we did with the Petroleum Development Corporation cases, whether or not we granted them an allowable because there were vertical wells within the proration unit. It may be a moot issue in this case. You may, in fact, get your 320-a-day allowable.

If that precedent has been set in the PetCo cases, I would like to just advise you that, in the future, if you put on any more of these cases, the allowable question may be raised again, if you, in fact, don't have the same situation where there's vertical wells.

A. I see. Okay, sir.

Q. I would hope--the Division has not yet seen a whole lot of evidence, testimony or anything else regarding drainage in horizontal wells. We've seen a lot of initial applications for horizontal wells. We haven't seen a lot of the follow-up results of the horizontal

wellbores. I would hope to see a lot more, and maybe we could start adjusting some of our policies based on some of the evidence we've seen. I would hope that if you would get a good producing wellbore, you might bring some of that evidence back in and try and help us out on that point, so maybe we can get these straight in the future.

A. Very good. Yes, sir.

EXAMINER CATANACH: With that, I don't think I have anything else of this witness.

MR. CARR: We have nothing else in this case, Mr. Catanach.

EXAMINER CATANACH: Okay. There being nothing further, Case 10863 will be taken under advisement.

(And the proceedings concluded.)

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10863. heard by me on November 4 1999.

David R. Catanach, Examiner
Oil Conservation Division

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 November 11, 1993.

CARLA DIANE RODRIGUEZ, RPR
CSR No. 4