STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

ORIGINAL

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

Case No.: 14803

APPLICATION OF APACHE CORPORATION TO AMEND ORDER R-13176 FOR A SECONDARY RECOVERY PROJECT, LEA COUNTY, NEW MEXICO.

REPORTER'S TRANSCRIPT OF PROCEEDINGS
EXAMINER HEARING

BEFORE: WILLIAM V. JONES, Technical Examiner
DAVID K. BROOKS, Legal Examiner

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March 15, 2012

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, WILLIAM V. JONES, Technical Examiner, and DAVID K. BROOKS, Legal Examiner, on March 15, 2012, at the New Mexico Energy, Minerals and Natural Resources Department, 1220 South St. Francis, Drive, Room 102, Santa Fe, New Mexico.

REPORTED BY: Irene Delgado, NM CCR 253
Paul Baca Professional Court Reporters
500 Fourth Street, NW, Suite 105
Albuquerque, New Mexico 87102

A P P E A R A N C E S

FOR THE APPLICANT:
JAMES BRUCE
P.O. Box 1056
Santa Fe, NM 87504

I N D E X

EXAMINER BROOKS: Okay. We call Case Number 14803, application of Apache Corporation to amend Order R-13176 and for a secondary recovery project, Lea County, New Mexico. Call for appearances.

MR. BRUCE: Mr. Examiner, Jim Bruce of Santa Fe representing the applicant. I have one witness.

EXAMINER BROOKS: Very good. Witness will stand and identify yourself and be sworn.

MR. NELSON: John Nelson.

(Witness sworn.)

MR. BRUCE: We only have one cross-section, and we will give another copy to the court reporter.

JOHN NELSON

(Sworn, testified as follows:)

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Will you please state your full name and city of residence?

A. John Nelson, Midland, Texas.

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

A. Apache Corporation as a petroleum engineer.

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

A. I have.

Q. And were your credentials as an expert accepted as a

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matter of record?

A. They were.

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

A. Yes, it does.

Q. Are you familiar with the engineering matters involved in this case?

A. Yes.

MR. BRUCE: Mr. Examiner, I tender Mr. Nelson as an expert petroleum engineer.

EXAMINER BROOKS: He is so qualified.

Q. Mr. Nelson, could you summarize what Apache seeks in this case?

A. We were -- we were approved doing a pilot secondary recovery project in the Blankenship Well Number 2 back in 2009, and that would inject water into the Blinebry, Tubb and Drinkard Formations, and now we are seeking to add the Paddock Formation, which is just above the Blinebry, to the injection permit.

MR. BRUCE: Mr. Examiner, just for making your file complete, this is a copy of the original order.

EXAMINER BROOKS: Okay. That was Order Number R-13176?

MR. BRUCE: That's correct.

EXAMINER BROOKS: Okay. Go ahead.

Q. Now, this order was granted a while ago. Did -- take a step back -- did Apache commence injection into this well?

A. We did. We did.

Q. Okay. What is Exhibit 1?

A. Exhibit 1 is a land plat showing the well. It's highlighted on my exhibit. Should be highlighted on yours.

EXAMINER BROOKS: It doesn't appear to be.

THE WITNESS: Okay. It's in Section 12, Township 20 Range 38.

EXAMINER BROOKS: Okay. You've got -- Will has a copy, so --

THE WITNESS: Okay.

A. It is in the northwest quarter of southwest quarter of Section 12, about 21 hundred feet from the south line, about 550 feet from the west line, and that's the Blankenship Number 2.

Q. Let's present a few exhibits to set up why Apache needs to amend the order. As you said, this is -- this is an older well, is it not?

A. It is.

Q. And you did, after the last order, you did convert the well to injection?

A. Yes.

Q. Could you identify Exhibit 2 and discuss the work

that was done on the well?

A. Exhibit 2 is a wellbore diagram going all the way back to when the well was spud in 1957, and it goes all the way up to and includes the work we did to convert the well to injection. The well was originally producing from the Drinkard Formation. They came uphole and tried the Tubb in 1979 and squeezed it off. It doesn't look like they produced much from the Tubb then. And in 2005 the previous operator, Capataz Engineering, they came in and they perfed the Paddock and produced from the Paddock, and that's from depths 5946 to 6055.

And then in 2007 the Tubb formation was opened and produced, and the Drinkard was plugged off. So when we went into this well to convert it, we only wanted to inject into the Blinebry, Tubb and Drinkard formations, but the Paddock was open and the Drinkard was plugged off. So we fixed those two, we squeezed off the Paddock perforations and we drilled out the plug over the Drinkard.

And our original intention for this flood is to test the feasibility of the Blinebry, Tubb, Drinkard flood and House Field. We have several analogous Blinebry, Tubb Drinkard plugs just to the south, and we think the House Field might be a good candidate for waterflood as well.

However, after we converted the well to injection, we never actually opened up the Blinebry perfs. The

Blinebry, up until this point, had never been produced from. So we never went in and opened up the perfs. We were only injecting into the Tubb and Drinkard.

Q. So the original order approved Blinebry, Tubb, and Drinkard injections, but you did not open it up in the Blinebry?

A. Yes, that's correct.

Q. Let's turn to Exhibit 3 and discuss what happened more recently in this well.

A. Exhibit 3 kind of details the events when we went in to open up the Blinebry and to start injecting into that, and along with the Tubb and the Drinkard. This was just a few months ago in December -- and do you all have the right one? I think -- yeah, that's it.

Q. Exhibit 3?

A. Yeah. We initially went in and we perfed and acidized the Blinebry and selected intervals, and we realized, when we did the acid job in the Blinebry, it communicated up into the squeezed perfs in the Paddock, and those sightly broke down; we lost pressure on the back side. So it indicated that we have some kind of communication on the back side, either behind the wellbore or out in the reservoir between the Blinebry and Paddock Formations. And we think a big reason for that is, when they perfed and opened up the Paddock in 2005, they fracked it.

And if I can just point you really quickly to -- I believe it's Exhibit 7 or 8, and it shows the C-105 form in which they --

Q. The C-105 is Exhibit 7.

A. Exhibit 7, yeah. And it just shows on here that they indeed fracked the Paddock. It was from 5946 to 6055 using 52,000 pounds of 20-40 sand, and we think this is the primary cause for the communication between the Blinebry and Paddock. So when we tried acidizing the Blinebry, it communicated up to the Paddock, broke down the perfs. So we went in and we sought to squeeze off the Paddock, again. We had done this in 2009 when we converted this to injection, but it broke down, so we did this again.

And before doing that, we isolated the Blinebry formation by placing a plug at the top of the Blinebry and one below to isolate the Blinebry from the Paddock above and the Tubb below. We went in and we squeezed off the Blinebry -- sorry -- the Paddock perfs, and the squeeze was successful. We tested it and went back in. We drilled out the plug over the Blinebry, and the cement had gone into the wellbore down into the Blinebry and the Tubb. So it had communicated again back down to the Blinebry, and then the Blinebry had communicated down to the Tubb. The Tubb was fracked in 2007, so that was probably a big reason why.

So we drilled out the plug over the Blinebry and

drilled out all the cement and realized the entire Blinebry that we had just perfed and opened had been squeezed off. So we went back in, re-perfed the Blinebry, re-acidized doing the pinpoint injection job, and the Paddock perfs held that time.

So we went back in, drilled out the plug over the Tubb, realized the entire Tubb had been squeezed off, so we drilled out all the cement in the Tubb, realized that the Drinkard was still fine. None of the cement made it down to the Drinkard, thank god. So currently, if I could point you all to Exhibit 4 --

Q. And before you move on to that exhibit, the last two pages of Exhibit 3 are simply the sundry notices that Apache filed describing in more detail it's work.

A. Right.

Q. And go ahead to Exhibit 4.

A. Exhibit 4 details the work that we did, and the wellbore diagram on the left shows the current state of the wellbore. So the Paddock is squeezed off, but the -- the squeeze job is not holding, and the Tubb is squeezed off, so currently we've got perfs in the Blinebry, and we've got perfs in the Drinkard. And we went in -- we figured at that point, okay, that's fine, let's just get the Blinebry and get the Drinkard injecting. The Tubb, we'll come back to later and re-perf it. So we had to test the back side, and, again,

the Paddock would not hold.

So at this point we spent up to about $175,000, and we have no assurance that in the future a squeeze job in the Paddock is going to hold in the Paddock and that we wouldn't get communication down to the Blinebry.

Q. So, in short, you are requesting to be allowed to inject into the Paddock in order to be able to inject properly into the previously-approved zones?

A. Right. Yes.

Q. Let's move on to your next exhibit. In your opinion, will the Paddock zone be harmed if you are allowed to inject into it?

A. No, it shouldn't be. The Paddock in this area is not productive; it's generally wet. There are no producing wells in this area, and Exhibit 5 shows a base map of the area. If we even zoomed out from here, you would see there is no Paddock production for a few miles in any direction. But Exhibit 5 shows the base map, and the colored circles on top of each well indicate which formations are present in those wells, and it might have been present at some point in the past or currently producing. Only -- as you can see, only the Blinebry, Tubb, Drinkard, Abo, and San Andres Formations are productive in this area. There is no Paddock.

Q. Okay. And then Exhibit 6 is the cross-section,

correct?

A. Exhibit 6 is the cross-section, and I think something that -- the big point that we want to make is that we don't intend to -- to sweep or do any kind of injection into the Paddock. Again, it's mostly wet in that area. There is no hydrocarbons to be produced or recovered in the Paddock in this area. So it's only the Blinebry, Tubb, Drinkard that are target formations to inject into, but because the Paddock perfs aren't holding up, we need to put the injection packer just above the Paddock perfs, and we need a way to inject into the Blinebry, and the only way we can do that is to include those Paddock perfs which are just above it. But regardless, we are not going to be assured that any of the water we are injecting into the Blinebry is going to stay in the Blinebry because we have these fractures between the two formations that were created back in 2005 when we fracked the Paddock.

So the cross-section, getting to that, shows on here, I think we have the bottom of the San Andres near the top, and then the Paddock, the Glorieta and Paddock are kind a third of the way down from the top. That's -- the pink line would be the Glorieta top, and the Paddock would be just beneath that, and --

Q. Mr. Nelson, we were discussing, what I would like to emphasize is, will the water be contained from the top of the

Paddock in the well?

A. We believe it will. As you can see, the depth scale is on the left-hand side here. The Paddock in this area is about 400 feet thick. We will be injecting our northern-most point in the Blinebry. I believe it's 6178. So we have hundreds of feet before we get up even to the top of the Paddock. And from what you can make out in the cross-section here is the Paddock in this area generally has some pretty tight sections where there is some silt and clay areas where it will probably prevent any water moving all the way through the Paddock potentially up into the San Andres. We don't think that will happen. Even if it did -- going back to the base map -- there are a handful of San Andres producers in this immediate area, we operate all of them. None of them are big producers at all, but, again, we don't think any of the water will get out of the Paddock at all.

Q. And again, Exhibit 7 is just the C-105 for the well, when it was completed for a shorter period of time in the Paddock, correct?

A. Yes.

Q. Now, up in the upper, right-hand corner, it says, "House, Blinebry," but these depths are definitely Paddock depths.

A. They are definitely Paddock. We went back through and I believe Paul Koutz verified these are part of the

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Paddock. They were incorrectly identified as Blinebry when I did this.

Q. Again, even though you are adding the Paddock to this zone, the water will be -- the water will be confined into the injection?

A. That's right.

Q. What is Exhibit 8?

A. Exhibit 8 here is the C-108 form. This is the new C-108 that asked to include the Paddock as a formation to inject into.

Q. And obviously a C-108 was also presented to the Division when the original application was presented?

A. Correct.

Q. Does this application change any material aspect of the injection program?

A. It shouldn't. I know that currently we're injecting -- or before we had the issues with the Blinebry, I believe we were injecting at around 2000 PSI, and we had done a step rate test after we converted the well to injection, and we got the maximum injection pressure increased. So now that we have the Blinebry, if we are -- if we are able to eventually inject back into all three zones, the BTD, at the same time, I imagine we'll be doing another step rate test to see what kind of max pressures we can get before we fracture the rock.

Q. But the injection volume will remain the same as previously?

A. They should.

Q. And does the C-108 contain the usual data on fresh water in the area and water analyses?

A. Yes.

Q. And just again as a reminder, what is the overall focus of this pilot project?

A. Really, it's to test the injectivity and the feasibility of the waterflood in the Blinebry, Tubb, and Drinkard Formations in House Field. Like I said, we have a few analogous BTD waterfloods just to the south here in the Blinebry Drinkard units, it's the Web -- and just to north of that is the Warren Unit, which is an existing Blinebry, Drinkard floodwater as well. The rock in the House Field, the quality of the rock kind of diminishes as you move northeast from the Blinebry Drinkard Units, so this is a pilot to see if it's going to be feasible or not.

Q. Were all the offset interest owners and surface owners where the well is located notified of this application?

A. They were.

Q. And is that reflected in Exhibit 9?

A. Yes.

Q. Now, when you turn to the third page of Exhibit 9,

there is interest ownership set up by tract. Where did this data come from?

A. This came from our land department.

Q. And have you discussed the info on this exhibit with the land department?

A. I have.

Q. And a lot of these data -- a lot of this data comes from leases operated by Apache, does it not?

A. Yes.

Q. So you have Division order files on these interest owners?

A. Yes, we do.

Q. On the non-operated Apache tracts, did you send -- did Apache send out a landman to check the pertinent county records?

A. We did.

MR. BRUCE: Mr. Examiner, considering how many notices I sent out, I didn't get any back. There are -- the last three pages of the exhibit show that notice was left at certain of these people, which they are the correct addresses, they just weren't picked up. But none of the notices came back as undeliverable.

Q. In your opinion, Mr. Nelson, will the granting of this application be in the interest of conservation and prevention of waste?

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A. Yes.

Q. Now, looking at the exhibits, Exhibit 6, the -- the cross-section, who prepared that?

A. This was prepared by our geologist that's on my team who resides over in Lea County, New Mexico.

Q. Who is that?

A. Bob Johnson.

Q. And did you review that exhibit with him so that you were confident of the results of that?

A. I did.

Q. And Exhibit 8 was prepared by somebody in your regulatory department?

A. Yes.

Q. Beverly Hatfield?

A. That was Beverly Hatfield.

Q. Did you review the exhibit and do you agree with the contents set forth in Exhibit 8?

A. I did, and I do.

Q. Were the remaining exhibits either prepared by you or under your supervision or compiled from company business records?

A. Yes, they were.

MR. BRUCE: Mr. Examiner, I move the admission of Apache Exhibits 1 through 9.

EXAMINER BROOKS: 1 through 9 are admitted.

(Exhibits 1 through 9 admitted.)

MR. BRUCE: And I have no further questions of the witness.

EXAMINER BROOKS: Very good. Mr. Jones?

EXAMINER JONES: Okay, Mr. Nelson, have you had any results to date from the injection?

THE WITNESS: No, we haven't. We really haven't. I've looked at the pattern plots from the surrounding wells, and we haven't seen much of a response yet. I think a big reason for that is because we haven't been injecting into the Blinebry, which is one of the target formations, as much a target formation as the Drinkard would be. The Tubb in this area isn't as big of a play as far as the recovery goes, but we think a big part is the fact that we have not been able to inject into the Blinebry.

EXAMINER JONES: Okay. But basically do -- were you the one presenting this in 2009?

THE WITNESS: I wasn't.

EXAMINER JONES: Do you agree with the feasibility of the water play in these reservoirs?

THE WITNESS: I do, absolutely do.

EXAMINER JONES: But why?

THE WITNESS: There is sufficient amount of oil in place, unrecovered oil --

EXAMINER JONES: Okay.

THE WITNESS: -- that would definitely be recoverable by secondary, and I think, with all the different leases that we have in the area, that this is -- this entire area is just prime for unitization should the waterflood work, but we have no reason to believe that it wouldn't work given the success of the waterflood to the southwest.

I said the rock quality isn't as good, and, relatively speaking, it's not as good as the Blinebry Drinkard Units, but it's still very well sufficient for a waterflood.

EXAMINER JONES: Wouldn't it be better to use a regular pattern instead of inverted?

THE WITNESS: It would.

EXAMINER JONES: You would see results faster.

THE WITNESS: I agree, and we actually intend to expand the pilot here.

EXAMINER JONES: In this case you might tell directional permeability, though.

THE WITNESS: We could, and I haven't noticed any myself, but I think we would notice that. In general, in this area, I think we see, as far as the fracture, the natural fracture point goes, it's northwest to southeast, but I agree with you that we should expand the waterflood a little bit and that a normal five spout would be better than inverted.

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EXAMINER JONES: Another way to recover more is to drill more wells, though. Do you think that's -- competing with that method, with waterflooding method, what do you think?

THE WITNESS: Last year in 2011 we drilled probably eight wells in the House Field, and they are all on varying density, well density anywhere from 10 to 40 acres, and the results that we have seen going down to 10, 20 acres in this area might be a little difficult. We think it's possible further south in the Blinebry Drinkard units. In fact, we are doing a pilot waterflood right now, but I think -- I think waterflood here with our -- the oil in place that we have is a good opportunity.

EXAMINER JONES: So ultimate primary, what do you think is out here as a percent of the original oil in place?

THE WITNESS: Anywhere from 8 to 14. That's kind of like the typical gas for the Permian.

EXAMINER JONES: Okay.

THE WITNESS: Yeah.

EXAMINER JONES: And I didn't see what you might expect from the secondary. A little less than that, maybe?

THE WITNESS: I think so. Probably, I think an ratio may be five to one, so anywhere from maybe five, so if we get lucky, maybe 10 percent extra.

EXAMINER JONES: Did you look at the cement that was

pumped from this well and try to figure out why?

THE WITNESS: We could not find any cement bond logs for this well, for whatever reason, but we looked around, there was a group of us, and we could not come across a cement bond log.

EXAMINER JONES: But the actual cement that was pumped at this depth and temperature and for a while there you couldn't get oil field cement, so was that a factor, you think?

THE WITNESS: I would say probably not just because we use the same kind of cement everywhere we do squeeze jobs. We probably do a handful each week just around the Permian Basin just for Apache, and we haven't had this kind of issue in any of our other wells that I know of. And then, even if the cement was the issue, we would still have the issue of the fracture that we created out in the formation.

EXAMINER JONES: Speaking of that, each one of these has to be fractured, probably, and do you have any idea of -- is there any results from your melting pot of whether it fracked up or fracked -- or screened out, or -- I mean what --

THE WITNESS: No. We -- we really have no idea. This was in 2005. It was a different operator that did that, and, as far as I know, they didn't do any kind of injection or analysis to see what kind of spread or length they got.

No microseismic or anything was done.

EXAMINER JONES: Okay. But there is no chance of -- what cement top would it be in this well? Obviously it didn't do very well over the Paddock to Blinebry, but do you think it's pretty competently cemented up above that?

THE WITNESS: I do. That was the -- that would have been the original cement --

EXAMINER JONES: Okay.

THE WITNESS: -- that the well had, yeah.

EXAMINER JONES: Okay. I don't have any more questions.

EXAMINER BROOKS: Well, I have no questions for this witness. Anything further, Mr. Bruce?

MR. BRUCE: No, sir.

EXAMINER BROOKS: Very good. Then Case Number 14803 will be taken under advisement. And this docket will stand adjourned.

* * * * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 14803 heard by me on 3-15-12

David K. Brooks Examiner
Oil Conservation Division

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REPORTER'S CERTIFICATE

I, IRENE DELGADO, New Mexico CCR 253, DO HEREBY CERTIFY THAT ON March 15, 2012, proceedings in the above-captioned case were taken before me and that I did report in stenographic shorthand the proceedings set forth herein, and the foregoing pages are a true and correct transcription to the best of my ability.

I FURTHER CERTIFY that I am neither employed by nor related to nor contracted with any of the parties or attorneys in this case and that I have no interest whatsoever in the final disposition of this case in any court.

WITNESS MY HAND this _____ day of March 2012.

Irene Delgado, CCR 253
Expires: 12-31-2012