STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
12 OCTOBER 1983

EXAMINER HEARING

IN THE MATTER OF:

Application of Phillips Petroleum Company for the amendment of Division Orders R-3181 and R-3181-A, Lea County, New Mexico.

CASE 7974

BEFORE: Richard L. Stamets, Examiner

TRANSCRIPT OF HEARING

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

MR. STAMETS: We'll move on to Case 7974.

MR. PEARCE: That case is on the application of Phillips Petroleum Company for the amendment of Division Orders R-3181 and R-3181-A, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner please, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of the applicant and I have one witness to be sworn.

MR. PEARCE: Are there other appearances in this matter?

(Witness sworn.)

MICHAEL BROWNLEE,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

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

A I'm Michael H. Brownlee. I'm a reservoir engineer for Phillips Petroleum in Odessa, Texas.

Q Mr. Brownlee, have you previously testified before the Division as a reservoir engineer and had

your qualifications accepted and made a matter of record?

A Yes.

Q And as a reservoir engineer for Phillips Petroleum Company have you made a study of the facts surrounding this particular application?

A Yes, sir.

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

MR. STAMETS: He is considered qualified.

Q Mr. Brownlee, let's skip the first exhibit, which is not identified by exhibit number but is the Commission Form C-108, and have you turn to what we've labeled as Exhibit Number One, which is a plat showing the Vacuum Abo Unit of Lea County, New Mexico.

Using that as our first exhibit, Mr. Brownlee, would you please identify for us what is indicated by the blue hatched line running from the northeast to the southwest corner of the map?

A The blue hatched line is the outer boundary of the Vacuum Abo Unit as it exists today.

Q All right, sir, and what is the significance of the red lines that have divided the unit into three parts?

A The area between the two red lines is the pressure maintenance project area as it exists today, as outlined by Order 3181-A.

Q All right, the original Commission Order 3181 is the one that approved the pressure maintenance project and that's the area contained within the two red lines?

A Essentially, yes.

Q And then that order was subsequently changed by Order Number R-3181-A.

A Correct.

Q All right. What's the significance of the three wells that are identified in various ways on the exhibit, some are circled in red and I think others are identified in yellow? What are those three wells?

A All right, those three wells, all of which have a cross through them, are the three gas injection wells by which we are injecting gas into the unit at this time, and it's the existance of those three wells that provides for the project area.

Q All right, sir. What do you propose to do now with this application?

A With the approval of this application we will amend order -- the two orders that we've discussed to allow for the injection of water into this unit through the 10 wells that are shown with the arrows through them on Exhibit One.

Q You'll continue to use the gas injection wells as gas injection wells.

A That's correct.

Q And what we're doing is adding then the ten -- converting ten producing wells to water injection wells.

A Right.

Q All right, sir, what else to you want to do?

A Well, by the injection of water, we also wish to expand the project area, the pressure maintenance project area, to include everything within the boundaries of the unit.

Q All right, sir.

All right, let's go to a map that's on a little larger scale, which is Exhibit Number Two, Mr. Brownlee.

All right, what have you depicted on Exhibit Number Two?

A Well, as required by rules on the Form C-108 we've identified all of the wells within the half mile radius, or a two mile radius of each of the proposed injection wells.

We've also drawn in a circle -- ten circles, actually, which just the intersections are shown here, and identified on a table which we'll talk about later, all of the wells that do penetrate the Abo formation.

The yellow line is the unit boundary and the ten red arrows do point at the proposed injection wells.

Q Before we get into the other requirements

of the Form C-108, let's talk about what you propose to accomplish with the water injection wells patterned in the particular configuration you have recommended.

A Well, geologic data was submitted during the first hearing whenever we did get the pressure maintenance order, and that data does show that this is a reef, is a massive reef structure with the high point on the structure actually being -- running lengthwise along the center of this unit.

By injection down structure into these -- into these wells on the back and fore fronts of the reef, we do plan to recover approximately 14-million barrels of oil by repressuring and by moving the oil up structure into wells where it can be recovered.

Q What happens to this Abo Reef as you move to the south and east?

A The area inside the unit is a massive reef. Now as you can see there, as depicted by the triangles, there are other wells completed in the Abo to the -- to the southeast; however, those wells are not actually on the massive reef itself. Those are detrital deposits; however, they are designated as the Vacuum Abo as a field name, but don't actually share in the same -- in the same reservoir.

Q All right, sir, what happens when we move to the north and west of the reef? What kind of wells do we find out there?

A To the north and west we really don't have any -- any Abo producers. The formation is just not there to be produced.

To the, let me go on directly to the --

Q Yeah, let me, before you leave, on the north and west, what kind of wells do we find out in that area?

A Our deepest completions are in the Glorieta, which are approximately 2500 to 3000 feet shallower than the Abo formation.

Q All right, sir. Now, on the southwestern corner here, adjacent to the Texaco and Getty acreage, what happens to this Abo Reef formation at that point?

A The actual producable high of the structure exists on Section 7, Township 18, Range 35, on tracts leased by Getty and Texaco and Exxon.

The structure tends to run from a low on the very northeastern part of our unit to a high, as I just quoted, on Section 7.

Q What will be the source of the water that you'll use for injection water in the ten injection wells?

A At present we are going to use just produced water and this produced water will come from Rice Engineering Vacuum 35 Salt Water Disposal System, which they operate in Section 35 of Township 17, Range 35.

Q All right, I see in the northeast corner

of Section 35 there are at least two salt water disposal wells indicated on the exhibit.

A Right. Those are Rice's.

Q All right, Rice Disposal System takes produced water from your unit and is disposing of that water into those disposal wells?

A Correct.

Q And you propose then to take the water, instead of disposing of it into the disposal wells, to re-inject it in your injection wells.

A That's correct.

Q What other sources of water will you have?

A It hasn't been contracted as yet but we -- but Mobil operates a Ogallala completed fresh water well in Unit B of Section 5, Township 18, Range 35, and it's not shown on this map, but it's just outside our unit boundary.

Q Okay, in Section 5, Unit B --

A Right.

Q -- there is a --

A There's a fresh water well.

Q There's a fresh water source there?

A Right. And we feel that that water can also be used for injection in the future.

Q The current pressure maintenance order, R-3181, as amended, shows what I'll call a rather complex formula for determining allowables and all the rest for the

gas injection wells.

Now, insofar as that order is concerned, is it necessary to amend any of those pressure maintenance provisions?

A No.

Q All right, what we're talking about doing is inserting the use of water for the injection into these ten wells.

A That's true.

Q You have some specific proposals; we'll talk about language shortly.

Before we leave the exhibit, then, Mr. Brownlee, within the area of review, I assume you've made a tabulation of all those wellbores that have penetrated the Abo.

A Yes.

Q All right. That tabulation is exclusive of four plugged and abandoned wells where -- for which you have prepared or are preparing schematics.

A Correct.

Q All right, let's turn to those now.

I've got a couple exhibits before I get to that one, Mr. Brownlee.

Let's talk about your production forecast. First of all, Exhibit Number Three is your past history on the -- on the pressure maintenance project. Would you identify that exhibit for us?

A Yes, sir. It's just a, for a matter of record, the unitization was done February 1st of 1967, produced under primary recovery until gas injection was started in March of 1970.

We've produced approximately 47-million barrels of oil inside the unit since that time.

At present we produce approximately 2000 barrels of oil a day, 5000 barrels of water, 3.8-million cubic feet of gas, and we inject approximately 1.2-million cubic feet.

Q All right, sir, let's look at Exhibit Four, which is the forecast of what you anticipate will happen with the water injection.

A At present we have, as is shown by this blue highlighted line at the top, we have about 15,000 barrels of water available for injection. For simplicity's sake I started it at the first of the year.

We have enough gas to move our gas injection up to about 2-million cubic feet a day and continue that through 1991, which is a point picked solely because it's on a dip, it's on the decline side of the -- of the oil production forecast.

The oil production forecast shows that we have a 15-year project which will peak in about 1989 at 6000 barrels of oil a day.

Q What's the source of the gas used in the gas injection wells?

A The gas is residue returned to us from Phillips' Lea plant after processing.

Q Gas produced on the unit?

A Yes, gas produced on the unit.

Q Let's go to Exhibit Number Five, now, Mr. Brownlee, which your tabulation of wellbores penetrating the Abo.

Was this prepared by you or compiled under your direction?

A Yes.

Q In your review of the various wellbores that penetrate the Abo, Mr. Brownlee, are you aware of any of these wellbores that constitute what I will call problem wells?

A No, all of the wells, predominantly the cement on the production casing ties back into the intermediate casing and even in the cases where it does not, the top of that cement is identified well above the Abo, the top of the Abo Reef.

Q Generally what is the location vertically of fresh water sources in the area in relation to the Abo?

A The Ogallala is the -- is the fresh water that's used in the area, and it's approximately 50 to 100 feet deep.

Q Are there --

A Well above this zone.

Q And what producing horizons exist between

the Glorieta and the Abo?

A None.

Q Well, do you have San Andres production?

A San Andres production exists above the Glorieta. I should make note here that we are in the geographical location of the East Vacuum-Grayburg-San Andres Unit, which is already -- is a pressure maintenance project and has already taken great care and caution to seal off any contomination from the San Andres up.

Q All right. Leaving the tabulation, Mr. Brownhlee, let's go to Exhibits Six, Seven, and Eight, which are three of the four wellbore schematics for plugged and abandoned wells in the area.

A Exhibit Six is the Standard of Texas, now Chevron USA, (inaudible) No. 1, located in Unit O of Section 4, Township 18, Range 35.

This well was the original well drilled, actually, drilled to the Devonian, with casing set at 9072 feet, below the Wolfcamp correlation point.

Q In your opinion as a reservoir engineer, Mr. Brownlee, has this well be properly plugged and abandoned to isolate the Abo formation?

A Yes.

Q All right, sir, let's go to Number Seven, then, and have you give us your opinion about the way this well has been plugged and abandoned.

A Again, the Cities Service State K No. 5

that has met state regulations in the manner in which it was plugged and sealed off the Abo formation such that we don't expect any problems.

Q All right, sir, let's go to Exhibit Number Eight.

A Again, the same, Phillips Santa Fe No. 3, with cement plugs covering the Abo formation.

Q All right. The fourth plugged and abandoned well for which we need to submit a schematic is in Section 35, is it not, Mr.Brownlee?

A Yes, it is.

Q And where in Section 35 is it?

A It's in Unit A of Section 35. It's Well No. 2 and it's marked with a plugged and abandoned designation. It's on what is designated there as TBC&O lease. That well is actually, as I've come to learn, was actually drilled and completed by Mac Jones, and also abandoned by that company.

I did not realize that at the time when I was doing the search for the plugged and abandonment. I have since had an associate go to the Division Office in Hobbs yesterday, and we should have a schematic ready for -- to put in the mail to the Commission tomorrow.

Q All right, sir. Based upon the information you've learned about that well, do you have an opinion as to whether that well has been properly plugged and abandoned?

A I don't know yet.

Q All right, sir.

Let's turn now to Exhibit Number Nine and Ten. Let's look at those together.

Nine is your written summary of how you're going to convert the producing wells to injection and then Ten is the tabulation of all the wellbore schematics for the injection wells.

A Five of the wells, five of the ten wells that we plan to convert to injection have been plugged in the Abo formation, not such that the entire Abo formation is plugged but such that when the water encroachment came into the well we plugged them back so that we could get more economical completions.

Those five are designated there at the top of Exhibit Nine.

What we basically plan to do is to move in a completion unit and drill out the plugs that are there, reperforate those lower intervals, acidize so as to stimulate them, and then put the wells on injection in accordance with regulations.

The other five wells do not have these plugs and we will go with completions just as they are.

Q What is your proposed injection volumes for each of the injection wells?

A Should average about 2000 barrels a day with a maximum of up to 4000.

Q Do you know whether or not these injection wells will take the water under gravity or will you require some surface pressure?

A With current bottom hole pressure surveys that we've run, we don't feel that we will incur any surface injection pressure at all for some time.

Q So if the order by the Division approves a surface limitation of not to exceed .2 of a pound per foot of depth, you can live within that pressure.

A Sure.

Q All right, let's go to Number Eleven and have you tell us what is indicated by this exhibit.

A As I said earlier, the water sources we'll have will be from Rice Engineering and from the Mobil fresh water source well, and that is, as on the front page of this, Water Source Well No. 8, and that is -- it's designated here as Rice, but that's actually Mobil's well. That's our fresh water well.

What we've done is actually taken and gotten analysis of those two waters and since the Rice system does contain so much Vacuum Abo water, we feel that -- that the Vacuum Abo analysis would be real similar and we've actually run some mixtures from the -- between the salt water disposal system and the Water Source Well No. SO-8, looking for any problems in particulates falling out, precipitants forming, and this is actually the data that we built and analysis of that doesn't show that we will have

any serious problems with plugging or contamination of the Abo Reef by injection of this water.

Q How do you propose to handle the water that comes from the Rice Disposal System back into the injection wells in order to insure that hydrocarbon contaminants that may exist in that water are not re-injected in the injection wells?

A We have allocated money for a skim and separation tank that might pick up any of the contaminants.

Q All right.

MR. KELLAHIN: If the Examiner please, the geologic data that's necessary to complete the application is found in abundant quantities in the case file in 3181.

We'd like to incorporate that by reference if you'll permit us to do so.

MR. STAMETS: Yes, we will be happy to do that.

Q Mr. Brownlee, let me direct your attention now to the specific previous orders that have been entered on the pressure maintenance project, and have you identify for us the exact language that you would propose to have included in the new order in order to accomplish what you seek.

In that regard, let's refer to Exhibits Twelve, Thirteen, Fourteen, and Fifteen.

I have marked Fourteen and Fifteen your

proposed rule changes.

Twelve is Exhibit 3181; Thirteen is 3181-A.

Let's start with Order R-3181 and let's turn, I think, to page three and at the end of not rule one but at the end of paragraph one and just before we start paragraph two, right in the middle of the page? All right.

A We propose to insert the two paragraphs shown on Exhibit Fourteen, which would expand -- outline the pressure maintenance project area to include all area inside the unit boundary.

I'm sorry, pardon me.

Paragraph one is for the actual conversion of the ten wells.

Q It identifies the ten wells to be converted to water injection.

A Right.

Q Paragraph one of this order talks about approval of the wells for gas injection, right?

A Right.

Q And we're inserting just below that paragraph a new paragraph, which would be numbered, in order to do it correctly, would be number two and three.

A Right.

Q Number these two and three and then the existing number two becomes number four.

All right, sir, apart from that change,

where does the next change occur?

A The next change would occur, would be special rule number one.

Q On the same page.

A Right.

Q All right, sir.

A This rule was amended in 3181-A, and it pertains to the project area that I've just discussed awhile ago.

Q The amendment at this point would include the expansion of the project area to include the entire area of the unit.

A Right.

Q All right. All right, there is one more change, I believe, Mr. Brownlee, and I think that occurs on page four of this order.

A Right, in rule seven, approximately halfway through that paragraph, there is a phrase that says this: "As a well receives a substantial response to gas injection"...now I've highlighted on that page the word "gas".

We would like, since we are going to have both gas injection and water injection in this projection at this time, we would like to delete that word from the order.

In most, in several other points in this order the word "injection" will -- is used by itself without the adjective "gas" there, so we would just like to really

stick with the same type of language as used throughout the rest of the order.

Q By the deletion of the word "gas" form order -- rule number seven, then the only thing you have done is added the availability of using water injection wells.

A Correct.

Q And it won't change any of the other formulas or calculations as to how the different credits are applied for the gas injection.

A That's right.

MR. STAMETS: Okay, on page five of that first order there's a formula for determining, oh, the wells daily adjusted allowable, and that takes into account only gas injection. Now is that going to continue to be the case?

A Yes, sir.

MR. STAMETS: And is there going to be a bonus for the water injection at all?

A No, sir.

MR. KELLAHIN: Gets an allowable but it doesn't get that gas injection bonus.

MR. STAMETS: Okay.

A The allowables for the injection wells are outlined on rule five, page four.

MR. STAMETS: Okay, very good.

MR. KELLAHIN: If the Examiner

please, we do not have available for you the required notices to the offsets and the surface owners. We are getting those and would like to submit those subsequent to the hearing, if that's acceptable.

That concludes my examination of Mr. Brownlee.

We would move the introduction of Exhibits One through, I believe, Sixteen is the last one.

MR. STAMETS: The exhibits will be admitted.

Were those notices indeed made?

MR. KELLAHIN: Yes, but we didn't make them within the fifteen days prior to the hearing date and so we need to notify, explain to all those people that we've had the hearing but they still have the option of object.

MR. STAMETS: All right.

Are there any questions of the witness?

MR. KELLAHIN: We'd be happy to draft an order for your review, if you would like.

MR. STAMETS: I would really appreciate that under the current circumstances that have absolutely nothing at all to do with this case.

If there are no questions the witness may be excused and if there is nothing further the case will be taken under advisement.

C E R T I F I C A T E

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

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7924 heard by me on 10-12 19 83.

Richard L. Stamets, Examiner
Oil Conservation Division