STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

28 November 1984

EXAMINER HEARING

IN THE MATTER OF:
Application of Phillips Oil Company for a waterflood project, Eddy County, New Mexico. CASE 8418

BEFORE: Michael E. Stogner, 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. STOGNER: We will now call Case Number 8418.

MR. TAYLOR: The application of Phillips Oil Company for a waterflood project, Eddy County, New Mexico.

MR. KELLAHIN: If the Examiner please, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of the applicant.

MR. STOGNER: Are there any other appearances in Case Number 8418?

MR. KELLAHIN: Mr. Chairman, my witness is again Mr. John Upchurch.

I would like the record to reflect that Mr. Upchurch is still under oath and has been qualified and accepted as an expert reservoir engineer.

MR. STOGNER: Is Mr. Upchurch your only witness in this case?

MR. KELLAHIN: Yes, sir.

MR. STOGNER: Let the record so reflect.

JOHN L. UPCHURCH,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Upchurch, as a reservoir engineer for Phillips Oil Company, have you previously testified before the Commission with regards to other waterflood projects?

A Yes, I have.

Q And are you familiar with the Commission's current Forms C-108 and the procedures and requirements of the Commission with regards to the approval of a secondary recovery project?

A Yes, I am.

Q Have you caused to be prepared the Commission Form C-108 for this case and all the attachments?

A Yes, I have.

MR. KELLAHIN: Mr. Examiner, the set of C-108 and attachments that I've marked as Exhibit One to this case are slightly different than the ones filed in the Commission file insofar as Mr. Upchurch has updated that information, and with your permission, sir, if we can use the current package of exhibits, then we'll all have the same set to work from.

MR. STOGNER: Thank you, Mr. Kellahin.

Q Mr. Upchurch, let me direct your attention to the first attachment to the C-108, which is a plat. Would you identify that plat for us?

A Yes. This is a copy of a portion of the Eddy County map showing Sections 23, 24, 25, and 26 of Township 17 South, 29 East, and Sections 19 and 30 of Township 17 South, Range 30 East, and it has highlighted on it the wells that Phillips plans to convert to injection.

Q This map is submitted in order to satisfy the requirement about submitting a map that identifies all wells and leases within a two mile radius of any proposed injection well.

A Yes, that's correct. The sort of circular outline on the map is the two mile radius from the proposed injection wells.

Q Have you also prepared a map that shows the wells within the one mile radius of any of the injection wells?

A This is a half mile radius.

Q I'm sorry, the half mile radius of any.

A Yes, that's the -- the next map shown on the --

Q All right, sir, let's turn to that. Using the second map, Mr. Upchurch, would you give us a general description of what Phillips Oil Company proposes to do with this project?

A Yes. We propose to go in and convert 23 currently shut in or producing wells on the Burch BB, the Burch C, the Keely A, the Keely B, the Keely C, to injection and to waterflood that -- those leases. In addition, we'll

also waterflood the Dexter Federal lease.

Q How have you identified the proposed injection wells?

A All the wells we propose to convert to injection are identified with an arrow.

Q Would you generally describe for us what vertical interval will be subject to the flood?

A We plan to waterflood the Lower Grayburg and San Andres formations from approximately 2300 feet down to 3500 feet.

Q In your opinion is that an interval that is conducive and suitable for secondary recovery by a waterflood project?

A Yes, I feel that it is.

Q Is this waterflood project one done under a cooperative lease arrangement or a unit agreement or what fashion of agreement?

A It will be done on a cooperative basis between the Phillips Oil Company leases in the area.

Q And how will you allocate the production back to the individual leases?

A We plan on producing the wells into their own -- into our tank battery system and then the production will be allocated back to each well based on that well's well test and then we'll just sum up all the well tests for the given leases.

Q Is that a method in your opinion that is

fair and reasonable and equitable, not only the working interest owners but to the royalty and overriding royalty owners?

A Yes, I feel that it is.

Q Let's use this map as a guide for us, Mr. Upchurch, with regards to having you identify for us wells that we'll characterize as potential problem wells.

A There's a couple wells that could be considered potential problem wells.

The first well is the M Dodd B Well No. 3. It's in the northeast quarter of the southwest quarter of Section 14 up near the very top of the map. It's exactly one-half mile from the Burch BB Fed No. 19 and it was drilled in 1940 and plugged and it was not plugged to today's standards.

Q All right, you have a subsequent schematic of the wellbore for that well, do you not, Mr. Upchurch?

A Yes, I do.

Q We'll come back and talk in detail about that well --

A Okay.

Q -- and your opinions concerning that well.

Would you identify for us by using this exhibit any other well or wellbore that may be potentially a problem well?

A There is three more wellbores that I feel

might be potential problems.

There's a well in the northeast quarter of the northeast quarter of Section 25. It's labeled the Deep Unit No. 5. It's labeled as a dry hole. That may be a potential problem.

And in Section 30 in the northeast quarter of the northwest quarter, Deep Unit No. 6, and also in Section 30 in the northwest quarter of the southwest quarter the Deep Unit No. 4.

Q One, two, three, four, you've identified for us four potentially problem wells. Has your examination and study of this information for this pool indicated any other potential problem wells?

A No, it has not.

Q All right. After the second map, Mr. Upchurch, you have a well data sheet?

A Yes, that's correct.

Q Would you describe for us what's contained on that sheet?

A Okay. The C-108 form requires a tabular formation of all the data concerning the operation of the proposed injection wells.

Part A of this well data sheet describes the injection tubing and the sealing system or the packer that we'll be using when we convert these wells to injection, and Section B explains the injection formation, its depth, and the original purposes of the well.

Q All right, following that exhibit is a tabulation of wellbore information with regards to the proposed injection wells?

A Yes, that's correct.

Q Have you also provided schematics of the method that you propose to use to convert these wells for injection?

A Yes, I have. That's included on -- following the table of injection wells.

Q All right, sir, let's turn, then, to the schematics for the injection wells, Mr. Upchurch, and you have 23 schematics?

A Yes, that's correct.

Q One for each of the injection wells.

A Yes.

Q Is the method of completion for injection for the injection wells similar in each of these cross sections?

A Yes, it is.

Q Schematics? All right. Would you simply pick the first one and describe for us generally what you will do?

A Right now this well is completed as a producer with perforations in the liner that's set below -- it's a 4-1/2 inch liner set below the 7-inch casing. What we plan to do is go in, remove the current production tubing, perforate the additional Grayburg zones up to approxi-

mately 2400 feet, rerun in the well a plastic-lined tubing string, 2-3/8ths plastic-lined tubing string to approximately 2300 feet with a Baker Model AD-1 externally and internally plastic-coated packer at the bottom of the tubing, set a packer, and inject into the -- into the Grayburg-San Andres from 2400 to 3558.

Q What will you do with the annular space between the tubing and the casing to monitor any leaks?

A We'll install a pressure -- pressure gauge on there to monitor for any leaks that we have.

I might also say that the -- in between the tubing and the casing we will have an inert packer fluid.

Q In your studies of this area, Mr. Upchurch, have you determined whether or not there's any open faulting or other hydrological connections between the injection interval and any fresh water sources?

A There's no faulting or other connections in the area, to my knowledge.

Q In your opinion is the proposed method for the completion for injection in each of these wells one that is suitable and in the best interests of conservation will isolate the injection fluids and confine them to the injection interval?

A Yes, I feel that the system that we have proposed will do that.

Q Is the proposed system one in which the

casing strings are adequately cemented in such a way that injection fluids will not migrate into fresh water sources?

A Yes, I feel that they're adequately cemented.

Q Commission guidelines with regards to injection pressures, Mr. Upchurch, provide that you will have a surface limitation pressure of 0.2 psi per foot of depth. Are you aware of that guideline?

A Yes, I am.

Q And what do you propose to do in relation to that guideline?

A We propose to hold our injection pressures at or below those guidelines until such time as we can run step rate injectivity tests to determine the parting pressure of the formations. Then we would ask for administrative approval to increase those pressure limitations.

Q Because of the volume of injection wells that you're dealing with, Mr. Upchurch, is it necessary that the order also include an administrative procedure for the drilling of other injection or producing wells at unorthodox locations?

A Yes, we feel that that would make it much simplier to prevent waste by allowing us to drill wells in order to recover additional hydrocarbons once we see how the injection seems to be going.

Q All right, sir. Let's turn past the schematics of the injection wells and have you go to the

tabulation of offset wells.

A Yes.

Q What are you doing here?

A This is in order to fulfill the requirements to show all wells within a one-half mile radius of all the proposed injection wells. It's listed here in order of section and then the wells are listed in alphabetical order in that particular section.

I show the lease and well number, its location within the section, its total depth, when it was drilled and what type of well it was drilled as, the hole size, casing sizes, where the casing was set, the cement, the top of cement, how it was arrived at, and then in the remark section show the perforated or open hole interval, and any other pertinent information on the well.

Q All right, sir, let's turn past that tabulation and go to the set of wellbore schematics for plugged and abandoned wells.

A Oh, I might add that since this is such a large area and Marbob as the offset operator is currently involved in drilling additional wells, there were three wells that when I prepared this table of offset wells were not yet available. Those three wells are included following the tabulation.

Q All right, sir. Let's go now to the schematics on the plugged and abandoned wells and you've identified for us earlier four plugged and abandoned wells

that have at least initially been determined to be potential problem wells.

A Yes, that's correct.

Q Let me direct your attention to the Marbob M Dodd B No. 3 Well, which was the first well you identified, and explain to the Examiner why this well may pose some -- some risk?

A Well, this well was drilled back in 1940 and was abandoned as a dry hole. When they abandoned the well they cut and pulled the 7-inch casing at a depth of 1836 feet; spotted heavy mud from total -- from the TD up to 950 feet where they put two cement plugs, totaling 40 sacks; put more heavy mud-laden fluid up to 450 feet; spotted ten more sacks and then put ten -- or then put a cement plug at the surface. The volume of that plug was not recorded.

If this well were to be plugged today, the Commission would probably require a cement plug across the interval, the open hole interval from 2292 to 3029 and a plug at the 7-inch casing and a plug at the base of the surface pipe.

Q Is this well located within an area that Marbob proposes to use as a waterflood area?

A Marbob currently has a waterflood on their M Dodd B Lease. The exact distance of any injection wells from this well, I don't know.

Q Will, in your opinion, the operation of Phillips' waterflood project on its leases pose a risk to

owners to the north as a result of the quality of plugging on the Dobb B No. 3 Well?

A No, I don't feel that it will. The closest injection well to this is the Burch BB No. 19. It is a half mile away. Had this well been an additional foot to the north it would not have even needed to be included in this listing, and also the heavy mud that was normally used back in the thirties and forties when these wells were drilled, after it sits in there for a long time the solids tend to fall out of it and they make an effective plug.

So I don't feel that there's any danger from this well.

Q Are there producing wells between your closest injection well and this Marbob well --

A Yes, there are.

Q -- that produce from the same interval that will be subject to injection?

A Yes, there are two; Marbob operates two producing wells in between this well and the closest injection well, and I don't feel that this well will even be within the waterflood response area from our Burch BB No. 19.

Q All right, let's go to the next potential problem well and direct our attention to the schematic for that well, Mr. Upchurch.

A Okay. The next well with a potential problem is the Grayburg Deep Unit Well No. 5. It's three

pages over.

This well was drilled by General American Oil Company in 1960 to the Abo. They set cement or set production casing at a depth of 6838 and circulated cement to the surface.

They perforated the Abo from 6655 to 6679 and swabbed approximately 17 barrels of oil a day. At the time General American did not feel that that was commercially productive and they temporarily abandoned the well and it's been sitting there ever since that time.

Q What would you recommend or propose with regards to this well prior to the drilling -- or prior to the use of the closest injection well for injection?

A Well, I don't think this well will be a problem because Phillips plans to re-enter this wellbore and attempt an Abo completion. We plan to go in and set a tubing string and attempt to pump the Abo.

If that proves unproductive, then Phillips will plug the well to the satisfaction of the Oil Conservation Division and their Artesia Office.

Q All right, sir, let's turn then to the next potential problem well. I think it's the Grayburg Deep Unit No. 6.

A Yes. This well was also drilled in 1960 by General American Oil Company. They drilled it down to the Abo and found that the Abo was not productive. They spotted two plugs, one at 6350 to 6500 and one at 4545 to

4900. There's no cement plugs across the San Andres or at the base of the surface pipe, and Phillips plans to re-enter and properly plug this well again with the approval of the NMOCD in Artesia.

Q All right, sir, let's go to the last potential problem well, the Grayburg Deep Unit 4 Well.

A This well was also drilled by General American Oil Company in 1960. It is drilled to a depth of 7953. It was never completed and no cement plugs were set.

Phillips plans to re-enter this well and properly plug the Abo and then set a string of either 4-1/2 or 5-1/2 inch production at a depth of approximately 3500 feet and produce the Grayburg-San Andres as a part of the proposed waterflood.

Q All right, sir, if you'll turn now to the next page after that schematic. Describe for the Examiner generally what the proposed method of operation will be.

A After converting the 23 wells to water injection, Phillips plans to start injection at a rate of 300 barrels of water -- average rate of 300 barrels of water per day per well, or a rate of 6900 barrels of water per day for the whole project.

The system will be a closed injection system, and as I stated before, we will live with the Commission injection pressure requirements of .2 psi per foot.

We plan on injecting produced water with fresh water make-up that we plan on purchasing from the Mal-

jamar fresh water system, which is operated by Yates Petroleum Company.

Q Have you caused to have analysis of the produced water and the Maljamar fresh water conducted and a compatibility test made, Mr. Upchurch?

A Yes. We had UniChem, International in Hobbs, New Mexico, secure a sample of the fresh water and produced water and run a series of compatibility tests on them that are shown on the following page. What this is, it's a listing of the -- of the composition of the water in the mixtures. It reads from left to right, starting with 100 percent fresh water and then steps over until the last column is zero percent fresh water and 100 percent produced water.

UniChem reported no significant problems with compatibility between these two waters.

Calcium and/or sulphate scaling is likely but that's a problem that we'd anticipated and that we will treat for when we convert the wells to injection.

Q Have you caused to have a search made to determine whether there are any producing fresh water wells within the area of review?

A To the best of my knowledge there are no fresh water wells producing within one mile of any proposed injection well.

Q The fresh water basin in this area is the Ogallala formation?

A Yes. I have received that information from the Oil Conservation Division geologist in Artesia. He said the Ogallala was present there but we could find, my field people and I could find no producing wells in the area that we can secure a sample from.

Q At what approximate depth does the Ogallala formation occur in this area?

A Approximately 300 feet.

Q In your opinion will the proposed waterflood project be adequately cemented to isolate the producing intervals and the injection intervals from the Ogallala?

A Yes, I feel that it will.

Q Have you also caused, Mr. Upchurch, to have the owner at the surface of each injection well, plus all operators within a half mile radius, to be notified of this application?

A Yes. We've notified actually all operators within a one mile radius. Those operators and the surface owners are listed in the copies of the certified mail that we sent to them.

The offset operators are Marbob Energy, Tenneco Oil, Anadarko Production, Ray Westall, Southland Royalty Corporation, Bassett and Burney Oil Corporation, and the surface owners in the area are the Federal Government and we've notified the Bureau of Land Management and the State of New Mexico, and we've notified the Land Commissioner of the State of New Mexico.

Q When you said you've made a notification, what is it that you've sent those individuals and companies?

A We sent them a completed copy of the C-108 with the attachments that we've included here today.

Q In your opinion, Mr. Upchurch, will approval of this application be in the best interests of conservation, the prevention of waste, and the protection of correlative rights?

A Yes, I feel that it will.

Q To the best of your knowledge, information, and belief, have you complied with all the requirements of the Commission rules, including those contained within Form C-108?

A Yes, I have.

MR. KELLAHIN: That concludes our examination of Mr. Upchurch.

We would request that the Commission use the C-108 as Exhibit Number One in this case and so move its admittance.

MR. STOGNER: Exhibit One will all of the attachments will be admitted into evidence.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Upchurch, I'd like to refer now to the second map.

A Yes.

Q Your attachment. In there, on the map there shows to be a Grayburg Keely Unit. Was this unit originally set up as a waterflood unit or exploratory unit?

A It's a waterflood unit wholly operated and owned by Phillips Oil Company and it waterfloods the Keely subsection of the San Andres which exists from approximately 3400 to 3500 feet.

It's a Federal unit and it was approved, I believe it was in 1943.

Q None of those leases within that unit will -- will be affected with your proposed waterflood today, is that right?

A Well, they -- some of the wells in there will receive an effect from this -- this proposed waterflood but they're not part of our project.

Q Right, that's what I was getting at.

At this time you wish to convert 23 wells to injection wells, is that right?

A Yes, that's correct.

Q How many, do you have an approximate number of the total number of injection wells you might have if this is successful?

A If this project proves to be successful, we plan on expanding it up to the northeast and -- well, to the east, the north, and the northeast.

Phillips operates an additiona. 3-1/2, 4 sections up there, so we would double the number of injec-

tion wells we have if we decide that the operation is successful.

Those leases are all, with the exception of the Burch A, it's all the same leases. They're discontinuous leases in that you may have some Burch BB in Section 23 and also in Section 30.

So this application would - or if we are allowed to convert these wells, then the additional wells would be covered in that they're no longer the first injection well on a lease.

Q Are all leases within your area here, are they -- do they have the same working interest owners?

A Yes, they do. Phillips Oil Company operates all leases and we have 100 percent working interest in each lease.

Q Do you have a proposed name for this waterflood project?

A Yes, we'd like to call it the Burch-Keely Waterflood.

Q Okay, let's see. I'd like to refer to the schematics of your problem wells, as you call them.

A All right.

Q Or as we will call them.

Let's first refer to the Grayburg Deep Unit Well No. 5. In looking at this the total depth at 7225. The 5-1/2 inch casing was run to 6838.

By the information on this, the cement on

the 5-1/2 was circulated all the way back up to the surface, is that right?

A That's correct.

Q The Burnsdale -- is that how you pronounce that -- Oil Company M Dodd B Well No. 3?

A Okay. Yes.

Q That was dry and abandoned in 1940, is that right?

A Yes, that's correct.

Q Do you have the actual surface location of this well?

A No, I don't. I don't have the footage location.

Q I can find that in our files later.

A Right.

Q You made a statement that if this well was within a foot north it would have been outside the mile and a half.

A Yes, that's right.

Q I mean half mile.

A It's exactly one-half mile north of the proposed Burch BB No. 19.

Q When Mr. Kellahin was questioning you on this, and correct me if I'm wrong, which I'm sure you will, Mr. Kellahin, he alluded -- or there was a -- it was alluded about a Marbob waterflood project. Is this a proposed project, that you're aware of?

A No. Marbob actually operates a waterflood. I believe that it's in Section 15. They M Dodd A Lease covers a large area, and I believe they have a -- it's classified as a waterflood. There's not very many injectors, but they have been receiving administrative approval for some unorthodox locations in Section 14 based on the fact that it's part of a waterflood area.

Q Do you know the name of that waterflood, by any chance?

A No, I don't.

Q Do you know if that waterflood of theirs extends over into Section 14?

A I don't know if it does or not. I don't think that they have any water, current water injection wells in Section 14.

Q Are you aware of any other injection wells within this proposed formation that is as close if not closer to the M Dodd B Well No. 3?

A No, I'm not aware of any other injection wells.

One -- one thing I might point out, in my talking with the cementing companies about the way they used to abandon these wells, and we -- we've run several bond logs out there in order to see where the top of cement is on some of our wells, and what we found is that it's very difficult to pick a top of cement because of that heavy mud that they displaced cement with is -- sets up after an ex-

tended period of time and on a bond log looks exactly like cement.

So were we to re-enter this M Dodd B No. 3 Well, we probably could not just drill the cement plugs and clean out. We would probably have to, for the most part, redrill the well, and it would be very doubtful if we could get into that 7-inch casing where it was cut there at 1836.

Q Thank you, Mr. Upchurch.

Let's now refer to both the Grayburg Deep Unit Wells Nos. 4 and 6, and I believe there's no question that those are somewhat problem wells for this injection zone.

If Phillips were required to repair both these wells and the other two also, would Phillips propose that these be repaired or replugged or re-entered or whatever Phillips plans to do with these wells before injection operations start?

A Yes, we wouldn't have any objection to that. It's going to take us quite a bit of time to install the injection system and we -- in fact, this No. 4 Well we plan on recompleting that within the next several months, and if necessary, we would plug the No. 6 Well before injection commences.

MR. STOGNER: I have no further questions of Mr. Upchurch.

Are there any further questions

of this witness?

MR. KELLAHIN: If the Examiner please.

MR. STOGNER: Mr. Kellahin.

REDIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Upchurch, with regards to the Marbob well, in your opinion would it be necessary to have either Phillips or Marbob replug that well before injection could take place in any of your injection wells?

A In order to protect the fresh water, no, I don't feel that's necessary.

Q Are there any of the injection wells in the area of the Marbob well that ought not to be converted to injection before some remedial action is taken on that well by Marbob?

A No, I don't feel that that's necessary.

MR. KELLAHIN: I have nothing further.

MR. STOGNER: Does anybody else have any further questions of this witness?

If not, he may be excused.

Mr. Kellahin, do you have anything further in Case Number 8418?

MR. KELLAHIN: No, sir.

MR. STOGNER: Mr. Kellahin,

would you please supply me with a rough draft order --

MR. KELLAHIN: Be happy to.

MR. STOGNER: -- for the proposed waterflood?

MR. KELLAHIN: Yes, sir.

MR. STOGNER: Is there -- does anybody else have anything in Case Number 8418?

If not, this case will be taken under advisement.

(Hearing concluded.)

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. 8418, heard by me on November 28 1984.

Michael E. Stogner, Examiner
Oil Conservation Division