

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE 1663

TRANSCRIPT OF HEARING

MAY 12, 1959

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NEW MEXICO OIL CONSERVATION COMMISSION

Examiner Hearing - Daniel S. Nutter

Santa Fe, , NEW MEXICO

REGISTER

HEARING DATE MAY 12, 1959 TIME: 9 a.m.

NAME:	REPRESENTING:	LOCATION:
Hal M. Stierwalt	Sunray Mid-Continent Oil Co.	Farmington, Wyo
F.S. Brooks	" " " "	India, Okla
P.T. McCrath	U.S.G.S.	Farmington
OR Hall	self	Reeswell
Pat Kimberlin	Sunray Mid-Continent Oil Co.	Tulsa, Oklahoma
Richard C. Nutter	Amerada	Parsons, Colo.
Morris R. Jones	Northwest Prod. Corp.	Albuquerque
William R. Looze	Sunray Mid-Continent Oil Co.	Tulsa, Okla
Charles Whit	Phillips Petroleum Co.	Santa Fe
Jason Kellahin	Kellahin + Fox	Santa Fe
Burns H. Evers	British-American Oil Prod. Co.	Albuquerque
R.H. Stewart	STG of Texas	Mills, N.M.
Emeroney	Phillips Petroleum Co.	Midland
John L. Sparr	Phillips Petroleum Co.	Albuquerque, N.M.
Francis Dutton	Sun Oil Co.	Box 2000 Dallas
Nancy Royal	N.M. State Bureau of Reporting Service	Santa Fe

NEW MEXICO OIL CONSERVATION COMMISSION

_____, NEW MEXICO

REGISTER

HEARING DATE _____ TIME: _____

NAME:

REPRESENTING:

LOCATION:

Paul E. Stry
 Geo. Taylor Hester
 H. C. BRATTON

State Engineer
 Shell Oil
 Henry B. Bartlett

santa fe
 Farmington
 Roswell

T. O. Davis

The Atlantic Refining Co.

Casper

Wm. Davis

Humble

Midland

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
MAY 12, 1959

IN THE MATTER OF: :

CASE 1663 Application of British American Oil Produc- :
 ing Company for permission to institute a :
 water injection project in San Juan County, :
 New Mexico, and for the promulgation of :
 special rules and regulations in connection :
 therewith. Applicant, in the above-styled :
 cause, seeks an order authorizing it to in- :
 stitute a water injection project in the :
 Bisti-Lower Gallup Oil Pool to inject water :
 into the Lower Gallup formation through two :
 wells in Sections 1 and 12, Township 25 :
 North, Range 13 West, San Juan County, New :
 Mexico. Applicant further proposes that :
 special rules and regulations be promulgated :
 governing said project, including the right :
 to transfer allowables from injection wells :
 to producing wells. :

BEFORE:

Daniel S. Nutter, Examiner.

T R A N S C R I P T O F P R O C E E D I N G S

MR. NUTTER: The hearing will come to order, please.
The first case this morning will be Case 1663.

MR. PAYNE: Case 1663. Application of British Ameri-
can Oil Producing Company for permission to institute a water in-
jection project in San Juan County, New Mexico, and for the promul-
gation of special rules and regulations in connection therewith.

MR. ERREBO: Burns Errebo of Modrall, Seymour, Sperl-

ing, Roehl & Harris of Albuquerque, appearing on behalf of the British American Oil Producing Company. We will have one witness this morning, and he is here and may be sworn.

(Witness sworn)

WAYNE ROGERS,

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. ERREBO:

Q Will you state your name?

A Wayne Rogers.

Q In what capacity are you employed by the British American Oil Producing Company, Mr. Rogers?

A I am district engineer of the northwest district.

Q Have you ever testified before this Commission?

A No, sir.

Q Will you briefly give the Examiner the experience that you have had, and also your education?

A I graduated from Texas A & M College in 1949 with a B. S. degree in petroleum engineering. I worked for British American for ten years; two years as production engineer in East Texas and Gulf Coast, two years as field engineer in Wyoming, two years in the general office, assistant to the chief engineer, district engineer in the Central district, superintendent in Southern Oklahoma, now district engineer in the Northwest district.

Q Now, has your experience with British American included actual work on water floods?

A I have had experience in that, yes, sir.

Q And is also included experience in reservoir engineering?

A Yes, sir.

MR. ERREBO: Are his qualifications acceptable?

MR. NUTTER: Yes, sir.

(Whereupon, British American's Exhibits were marked for identification.)

Q Mr. Rogers, will you now refer to what has been marked Exhibit No. 1, and explain to the Commission Examiner what that means, what it shows?

A Exhibit No. 1 shows the area in question, which is the barrier system that we propose to put into effect between the proposed West Bisti Unit, which is currently in engineering study, and the Sunray, I call it the central Bisti Unit. It also shows the two British American Wells, the Marye No. 2, and the Marye No. 5, that we are asking for authority to convert from producing wells to water injection wells along this barrier system. It also shows the three wells that Sunray proposes to make into the water injection wells along the east side of the barrier.

Q How will you identify the wells which are involved, both British American and also Sunray's wells?

A British American Marye No. 1, British American Marye

No. 5, and the Sunray Federal "C" 5, and the Federal "C" 3, and then the well that is -- has been used as the injection well in, the Pilot LPG Well, we propose to convert it also into water injection.

Q Now, the proposed Sunray Unit lies to the east of the line which strikes that, lies to the east of the east boundary of the British American Marye lease lying in Sections 1 and 12 of Township 25 North, Range 13 West, is that correct?

A That is correct.

Q And the British American proposed West Bisti Unit lies to the west of that line, is that correct?

A Yes, sir.

Q Actually, that Unit is still in its formative stages, is it not?

A It is in the engineering stages. We have almost completed the engineering stage.

Q And would you say that it's nearing completion insofar as the consummation of the Unit is concerned?

A It is down to where we will actually start negotiating for unitization, yes, sir.

Q Will you proceed?

A Well, the Exhibit also shows the British American Marye lease, and the lease there in Section 35 of Township 26 North, 13 West is also the Marye lease there. It shows the producing wells and the dry holes in that immediate area.

Q You are saying, then, that the British American acreage which covers Section 1 and Section 12, and Section 35 is all one lease, is that correct?

A That is correct.

Q And that was all a part of the same base lease, is that correct, that was issued by the U. S. Government?

A Yes, sir.

Q Now, do you have any idea why you call one the Marye "B" and one Marye?

A No, sir, I don't know. That was prior to my time.

Q But that has no significance whatsoever as far as identity of ownership is concerned?

A No, sir.

Q And you have been informed by persons within your Company, who have such information, that the royalty ownership as well as the working interest ownership insofar as Sections 35, 1, and 12, is one and the same and is identical, is that correct?

A That is correct.

MR. NUTTER: Mr. Rogers, does that also include overriding royalties?

A Yes, sir.

Q (By Mr. Errebo) Do you have anything further that you care to mention before we go to the next Exhibit?

A No, sir, I don't.

Q Will you then refer to Exhibits 2 and 3, and identify

them, and explain what is reflected on those Exhibits?

A Exhibits 2 and 3, they are both comparable. Exhibit 2 is for Marye No. 2, Exhibit 3 is for Marye No. 5, the two producing wells that we propose to make into water injection wells. It shows a sketch -- gives a sketch showing the perforated interval, the top of the Gallup sand, the total depth, where the 5 1/2 casing is set, top of the cement, where the 9 5/8 surface pipe is set. It also shows the proposal that we have in mind of injecting water into these two wells down the tubing string. We will set -- we propose to set a bridge plug or squeeze cement off the perforations below zone 1 of the Gallup sand. We also propose to set a packer on the tubing, keeping the water within the plastic coated tubing for injection purposes, then into zone 1.

Q Now, I believe this Exhibit reflects, does it not, that the casing is cemented to the surface?

A No, sir, it does not. The casing in Marye 2 is cemented from a total depth of 4982 up to 4375. Now, the surface pipe, which is set at 230 feet, is cemented from 230 feet to the surface. And Marye No. 5, the top of the cement behind the 5 1/2 is at 4270. The 9 5/8 is cemented from its casing point of 225 feet to the surface.

Q Now, in Exhibit No. 2, you made a study of the log of this well?

A Yes, sir.

Q And right now all of the perforations shown are

opened, are they not?

A That is correct.

Q This well is being pumped?

A Yes, sir.

Q You propose to inject into the upper portion of the Lower Gallup sand, isn't that correct?

A That is correct.

Q And for what reason?

A The development of the second and third zone is primarily east of this barrier line that we are mentioning, talking about, to the west; we feel there would be very little or practically no secondary recovery possibility in the second and third zones, or very little.

Q Actually those zones contribute little, if any, to the current production from those wells, isn't that correct?

A That's correct.

Q As a matter of fact, your Exhibit No. 3 shows that the entire Gallup section has not even been perforated, does it not?

A That is correct.

Q Do you have anything further that you would care to give with regard to these two Exhibits?

A No, sir.

Q Now, will you refer to your Exhibit No. 4? Briefly explain it.

A That is a sketch of the surface equipment we propose to use on the two injection wells. We propose -- No. 4 there is a two-inch flaco meter which will measure accurately the volume of water to be injected into each of these two wells. There will be one on each of the two zones.

Q There will be the same wellhead assembly on each well, and that is typically shown on Exhibit No. 4?

A Yes, sir.

Q Is there anything further you have in regard to that Exhibit?

A No, sir.

Q Will you state at this time where British American plans to obtain the water which it will inject into these wells, if this application is granted?

A We have drilled a well, a sketch of that is shown on Exhibit No. 5, we call our Douthit water supply Well No. 2. It is on the Douthit lease. It is located approximately in the NW of the SE of Section 28, 26 North, 13 West. The exact footage is shown here on this Exhibit.

Q Actually, that well is not shown on the plat?

A No, sir, it is not.

Q However, that is the section which is immediately west of Section 27?

A Yes, sir. This well was recently drilled to a total depth of 2600 feet. We set 7-inch casing at 2599. The 7-inch

casing is slotted from approximately 2,086 feet down to the 2590, or total depth. We cemented the 7-inch casing from 2,039 feet to the surface.

Q And this will be producing from what formation?

A This water production is from the Cliff House Menefee sands.

Q Now, do you have any information as to whether or not this is a blanket sand in the area of this portion of the Bisti Field?

A It is our opinion that it is a blanket sand, yes, sir.

Q Now, have you made any tests to determine the capability of the Douthit No. 2 to produce water?

A Yes, sir, we have.

Q Is that information reflected on your Exhibit No. 6?

A Yes, sir.

Q Will you refer to that Exhibit and explain it?

A For testing this well, we ran a string of tubing and planned an Amerada pressure bomb at the bottom to try to get pressure reading. We injected gas down the tubing because it was available and near the site; injected gas down the tubing and lifted the water out through the annulus. Exhibit No. 6 shows the water supply capability curve, which indicates that we were, well, for example, where we have steady flow, we were able to produce approximately 5,750 barrels per day, had 500 pounds of pressure on the bomb, the bomb being at the bottom of the tubing. We also

produced at the rate of 8,000 barrels per day and read 550 pounds on the pressure bomb. The well was shut in two different periods while it was being tested; both times it reached a static fluid level of 858 feet from the surface.

Q Now then, from the study of the capability of this well to produce water, is it your opinion that it will produce sufficient water to furnish the British American wells with water for their injection program?

A For the barrier system, yes, sir.

Q Now, is British American and Sunray Mid-Continent Oil Company entering into any type of relationship with regard to Sunray's obtaining water from this well?

A Yes, sir.

Q And is it your opinion that this well will also produce sufficient water to enable Sunray to inject water into their injection wells?

A Yes, sir.

Q Now, with regard to the chemical properties of this water, has a test been made?

A Yes, sir. We had a chemical analysis run by Production Properties, Incorporated in Dallas, Texas, the concern that runs all of your water samples throughout the country.

Q And is that shown on Exhibit 7?

A Yes, sir.

Q Is there anything significant that you would like to

call to the Examiner's attention at this time which is reflected on this Exhibit?

A The chemical analysis of the water shows that should be contained in a closed system to minimize the corrosion effect.

Q Now, that corrosive effect will arise from the presence of what chemical property?

A Well, the hydrogen sulfide, I think is the main one.

Q Now, the tendency of a water that has hydrogen sulfide in it is to corrode steel and iron when it is brought into contact with steel and iron in the presence of oxygen or, in other words, in air, is that correct?

A That is correct.

Q You plan to minimize that, No. 1, by keeping a closed system whereby this water will not come in contact with the area, is that right?

A Yes, sir.

Q And No. 2 by using cement lined pipe, is that right?

A We propose to use cement lined pipe in the water supply lines and the injection lines.

Q Do you feel, then, that any difficulty will arise in your program of injection as a result of the precautions which you have taken?

A We think definitely we will minimize any effect by taking these precautions, yes, sir.

Q Now, have you made any tests or any studies to determine the compatability of the water which you plan to inject with the water which is found in the formation?

A Yes, sir. Production Properties, Incorporated also made compatability tests.

Q And what were the results of those tests?

A Their recommendation is that by using a closed system the supply water from the Cliff House Menefee will be compatible with the Gallup sand formation water, when it comes in contact with it in the formation, would have no detrimental effect.

Q Do you have anything further with regard to that Exhibit?

A No, sir.

Q Now, have you made a study of the Lower Gallup sand to determine its capabilities, receiving water in volumes, and at the pressures which you plan to use in injecting water into the two British American Wells?

A We made water injectivity tests on the Douthit "B" 3.

Q And is that shown on your Exhibit No. 8?

A No, sir, it is not -- excuse me -- yes, the injectivity test is shown on Exhibit 8. It is not shown on this map back here; the well is located on the NW SE of Section 20, 26 North, 13 West.

Q Will you briefly state what the significance of the

test is as reflected by this Exhibit?

A The Douthit "B" 3 is not a good well. In fact, it also has three feet of marked log pay or separation in the Gallup sand. The injectivity test indicates that at 600 pound surface pressure, we were able to inject 1872 barrels of water per day rate into the Douthit "B" 3. It also shows that 750 pounds, we would have been able to put in 8784 barrels per day; 910 pounds you could have put away 13,348 barrels per day.

Q Now, do I understand you to say that this is the capability of the well tested?

A Yes, sir.

Q Actually, you have more feet open --

A That is correct.

Q -- to the well bore than your injection well?

A That's correct.

Q In view of that, this test, do you foresee any difficulty in being able to inject the required amount of water into your two injection wells?

A No, sir.

Q Now, can you state what the present production is from the Marye "B" 2 -- correction -- the Marye No. 2 and the Marye No. 5?

A Marye No. 2, on the last state GOR test, produced 42 barrels of oil per day. Marye No. 5 produced 121 barrels per day, making it a top allowable well.

Q And now, you will want to transfer the allowable which these wells are now making, will you not, --

A Yes, sir.

Q -- to other wells on this lease?

A Yes, sir.

Q That's on this pay squeeze, so that would be to other wells in Section 1 and in Section 35, as shown on your Exhibit No. 1?

A Yes, sir.

Q And what is your proposal in that regard?

A We propose to make up the current allowable for the Marye No. 2 and Marye No. 5, being a total of 150 barrels per day from the other wells in the Marye lease.

Q Now, actually, I think there is some question that you will be able to make up that entire amount?

A I believe that we can make up the entire amount.

Q This barrier system is being instituted with full cooperation between Sunray and British American, is that correct?

A That is my understanding.

Q Actually, they are entering into an agreement which will cover and provide for the creation of this barrier?

A Yes, sir.

Q Is it your opinion that the establishment of this barrier system will result in a prevention of waste and protection of correlative rights by virtue of enabling the institution and

furtherance of a program of water and fluid injection which will result in a higher ultimate recovery?

A Yes, sir.

MR. ERREBO: I believe that's all we have at this time. We would like to offer in evidence Applicant's Exhibits Nos. 1 through 8.

MR. NUTTER: I am not too sure I have these Exhibits identified properly, Mr. Errebo. 1 is the plat?

A 1 is this plat.

MR. NUTTER: No. 2 is the schematic of the Marye No. 2?

A Yes, sir.

MR. NUTTER: No. 3 is the schematic of the Marye No. 5?

A Yes, sir.

MR. NUTTER: No. 4 is the wellhead equipment on the injection well?

A Yes, sir.

MR. NUTTER: 5 is the water supply schematic?

A Yes, sir.

MR. NUTTER: 6 is your pressure drawdown test?

A Yes, sir.

MR. NUTTER: 7 is the water analysis, --

A Yes, sir.

MR. NUTTER: -- and it is the injectivity test?

A Yes, sir.

MR. NUTTER: Without objection, British American's Exhibits 1 through 8 will be admitted in evidence in this case. Does anyone have any questions of Mr. Rogers?

MR. PAYNE: Yes, sir.

MR. NUTTER: Mr. Payne.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Rogers, referring to Exhibits Nos. 2 and 3, what type packer do you propose to install there?

A Sir, we have not gone into that, but it would be something comparable to a Lane well BOCL packer or some type packer that would be retrievable. Now, we could do this, one other alternative would be to set, oh, say, a permanent type packer, but we would rather not set that.

Q Now, Mr. Rogers, referring to Exhibit No. 7, did you run a similar chemical analysis of the Cliff House, or rather the Gallup sand produced water?

A Yes, sir, we did. I don't have it present. In fact, this analysis here was flown back to me by this laboratory yesterday, and I did not get one on that. I can furnish that to you.

Q Your understanding is, though, that the properties in the Gallup sand produced water are similar to those from the -- similar to those of the Cliff House Menefee water?

A It is -- actually, it is a better quality water than

this.

Q The Gallup water?

A Yes, sir.

Q Now, Mr. Rogers, your application also asks for the authorization to transfer allowables from injection wells to producing wells. Do you have any proposals or recommendations along that line? What I mean is, do you propose to, say, transfer the entire allowable from an injection well to one producing well?

A No, sir. I would suggest on the current GOR, or the last GOR test taken, we tried to maintain the producing rate at 125 barrels per day or less, which would give us the top allowable, say, of 108 or 104, whatever it is. We have also tried to stay about 125 percent above the current allowable when we make these tests. We would propose to take tests again showing that the well might be able to make 140 or 150, or something like that, and then try to proportionate it out to the other wells in the lease. Not all from one well, no, sir.

Q And then, of course, a transfer would be to other wells on the same basic lease, right?

A Yes, sir.

MR. PAYNE: I believe that's all. Thank you.

MR. NUTTER: Any further questions of Mr. Rogers?

A May I do this, retract one statement that I made? The man over the phone did give me the one on the produced water. I had momentarily forgotten that I do have it here in pencil sketch

and can read it off.

MR. NUTTER: Yes, sir, read it into the record, please.

A The dissolved solid was 52,001, sodium was 19,191 parts per million, iron was 87, barium was 50, calcium was 709, magnesium was 146, chlorides were 30,850, bicarbonates, 964, sulphates zero. The test of hydrogen sulfides, zero, oxygen zero, carbondioxide 171.

MR. NUTTER: Do you have anything further?

A No, sir.

MR. NUTTER: Anyone have any further questions?

QUESTIONS BY MR. NUTTER:

Q Mr. Rogers, I think you stated that the number of feet that was opened in the Douthit "B" 3, when you took this injectivity test on it, is less than the number of feet that is opened in these two wells that you are talking about here today?

A Sir, I didn't intend to infer the number of feet opened, but the microlog section shows only three feet of microlog pay in the Douthit 3. Considerably more than that is opened, but it only has three feet of net pay on the marker log.

Q In how large an interval?

A Sir, it would be comparable -- I don't know the exact figure, but I would say something like 100 feet.

Q Well, you are not proposing to inject into a hundred feet here in these two wells here, are you?

A No, sir.

Q As a matter of fact, the perforations that you propose to inject to are closer to 20 than --

A In the Marye No. 5 it would be 20 feet, yes, sir, and Marye No. 2 it would be 18 feet.

Q Do you have an idea of how much actual microlog pay you've got in those intervals?

A We have -- in Marye No. 2 we have perforated 18 feet; we have 10.7 feet of microlog pay. In the Marye No. 5 we have 20 feet perforated; we have 14.7 feet of microlog pay section.

Q So, despite the fact you have much less perforated interval in these two wells, you have more microlog pay than you do in the other well?

A Yes, sir. When I mentioned that hundred feet, all I was doing -- if you look at Marye No. 5, for example, we have in that well effectively perforated from 4820 down to 4914, which was approximately 100 feet. In Marye No. 2 we had perforated from 4858 with blank zones down to 4964, which is a little over 100 feet. I was presuming that in the other well we might have that much in it. I don't have the record on it. I know that considerably more than three feet was perforated. All that indicates that with three feet of maximum pay in that well we were able to put these volumes of water -- inject these volumes of water at certain pressures, which indicates on the barrier that we can put in 500 to 1,000 barrels per day, which is less than what we are injecting the other pay. We have maybe two or three times more net pay;

we can certainly put it away at lesser pressures.

Q Are they perforated on the three benches?

A Yes, sir.

Q The No. 2 Well is perforated on the 3?

A That's right.

Q The No. 5 is perforated only in the upper two, correct?

A I would have to check a log on that. Actually, your Marye No. 5 is also perforated in 1, 2 and 3 bench.

Q Well, is it perforated below 4914?

A No, sir, but the Marye No. 2 now -- I think probably what you are wondering there, when they completed that well, they perforated everything they could possibly perforate in the 1, 2, and 3.

Q So the group of perforations from 4922 to 64 is not in the third bench?

A It is in the third bench on this log, it just isn't developed. In other words, they grabbed every little foot they could get.

Q How do you know these lower perforations in these two wells are not productive at the present time?

A Engineering study of the West Bisti Unit, proposed West Bisti Unit, shows that as we go west from the barrier, the two sands are not developed. Looking at micrologs, there isn't any -- there is very little microlog pay, if any, and it certainly

is our assumption that the wells are -- that these zones are not contributing in these wells, and what they have contributed, they are probably below the economic limits if you try to produce them only.

Q But they still may be producing oil, is that correct?

A Well, for example, in the Marye No. 2, the production at the present time is 22 barrels per day, and as ratty as the No. 2 and 3 zones are, in my opinion, they are not contributing any production into that well. The best zone, the zone No. 1 is only capable now of putting out 22 barrels per day. Electric log analysis will certainly back that up, and you can -- just the general appearance of the logs show that.

Q Do you think that they were productive at one time?

A They might have put out slight production, yes, sir.

Q After this packer has been set, will it be possible to take productivity tests of the upper set of perforations only?

A Yes, sir. If we were going to do that, though, we would prefer to leave the packer out, being a pump well.

Q Now, I note on your Exhibit No. 5, and I think you stated in your testimony that your initial test on this water supply well was by the injection of gas down the tubing?

A Yes, sir.

Q Now, has any attempt been made to recover this gas used for gas lift at the water well?

A This gas is from the British American gathering

system that we put in the entire field, conserve the gas and put back into the ground. We dug this water supply well within three or four hundred feet from this compressor plant to where we could use this gas. During the four or five days that the tests were being run periodically, that gas was being dissipated because it was picking up hydrogen sulfide. If we find it more economical to use the gas for a permanent gas lift of the water supply, we will have to set a separator to separate the gas from the water, and also scrubbers to get the hydrogen sulfide and other adverse chemicals out of the gas back into the compressor plant, and we plan to put in a rotation system taking the rest back into our regular gathering system and putting it back into the ground as we are doing now. By so doing, we will be using the energy from the gas, but we will be wasting no gas by this rotation system.

Q Is that the plan of British American, to use that procedure?

A That is the plan we have in mind, this well was completed very recently, and what we have done, we have taken this energy over there to see what kind of water supply we have.

Q I think you said in your remarks, if it were economic to do that?

A My reason for saying that, the engineering department is also looking at the possibility of putting a reader pump in there which would necessitate electricity; electricity isn't available. We don't think we could go to a beam pump or a

casing pump -- I mean a beam with a casing pump; we wouldn't get the volume we need. In my opinion right now, tentatively, right now, I think gas would be the most economical means of lifting.

Q Including reprocessing the gas and stripping off the hydrogen sulfide?

A Yes, sir.

Q In any event, British American will use a reader system or beam pump, which wouldn't require gas or will strip the gas and reseal it?

A Reseal it or put it back in the ground without wasting it, yes, sir.

Q You will do one of the two things?

A Yes, sir, or I might add a fourth, a Peerless turret pump, which we will not use. It is a fourth mechanism that we might look at.

Q Now, Mr. Rogers, when you start injecting -- what is your proposed injection rate into the two wells?

A We have picked a rate from 500 to a thousand barrels range which we think will certainly -- we think we would inject a volume some place in between those two figures.

Q Is that into each well?

A Yes, sir.

Q So you will be injecting from a thousand to two thousand barrels into your two wells there?

A Yes, sir. Now, I might mention this: this again would have to come back to the agreements that are being worked out between Sunray and British. There may be a difference of opinion there. I would say a thousand would be maximum in any well. Conceivably we might finally agree that it should be 200, 300 or 400 barrels per day, but in our thinking it should be from 500 to a thousand barrels per day per well.

Q Now, is this thing planned so that the injection of water into your two wells as well as the injection of water into the Sunray wells will commence at approximately the same time?

A They should start -- they will start at the same time, yes, sir. See, we will be furnishing water to the Sunray wells and then the agreement will start out on the same day.

Q Now, you've voided considerable space in that reservoir by the production of oil in the past several years, correct?

A That is correct, yes, sir.

Q Now, when you start injecting water, you are going to have a fillup of that voided space. There is bound to be some oil left in the interval between these injection wells. Now, when you get this fillup and that water bank goes up there, and the water from both sides of this Township line meets the oil bank that is in the middle, what is going to happen to that oil, how is it going to be produced? This fillup, I presume, is going to trap the oil from the fillup in between the two sides?

A I think very probably that in any water flooding system, you will run into that where there will be a small amount of oil trapped like that.

Q Generally, in a water flood system, you have a producing well in between the two producing wells?

A Yes, sir.

Q How are we going to produce the oil that is trapped in between the two wells here?

A Your flood banks, of course; well, they should advance relatively the same, but in our opinion, across the barrier system, we believe that we will actually flood out the larger portion of the oil that is in place -- remains in place at the present time. For example, the British American Marye 2 will be flushing oil, of course, certainly in all directions. The other wells will also. I still think that we will be able to flush most of that oil even though some from Sunray may be flushing west the British American may be flushing a little bit east; by putting in the same proportion in each well, we will get most of the oil that might be in place.

Q Well, is the thickness of the pay and the porosity the same from one well to the next?

A The thickness of pay is different in each well. Porosity and permeability, we think, is relatively average depth.

Q Will the rate of injection be calculated so as to cause a fillup?

A I think it should be --

Q Uniformly and in each well, considering the amount of porosity and voided space it has to fill?

A I think the amount of water injected in each of the five wells should be proportionated out, possibly on net effective pay.

Q What is the purpose of the water barrier, Mr. Rogers?

A The purpose of the water barrier is that British American and other companies are proposing the West Bisti Unit by engineering study or from engineering study. We propose to put in a water flood, what I will call the Central Bisti Unit, to be operated by Sunray is to be an LPG secondary recovery program. Therefore, we've got to have the barrier between the two separate units to protect rights of each side of the barrier system.

Q And it's British American's proposal, then, at a later date to water flood.--

A Yes, sir.

Q -- this Unit to the West of this Township line?

A That is correct. We have almost completed all of the engineering studies on that. The studies will be presented to the operators, and the West Bisti Unit will go to water flooding in the immediate future.

Q What sort of a pattern do you anticipate will be used for the water injection?

A On that we are proposing a, as I call it, a line

drive to where we have a line NE,SW, every other row of producing wells to make injection wells out of those.

Q Do you anticipate, Mr. Rogers, that this barrier in itself actually amounts to a secondary recovery project?

A It is the initial phase in the proposed secondary project that we have in mind.

Q Do you anticipate that the injection of water into these five wells will enhance the producing rates of any of the offsetting wells?

A To any of the offsetting wells?

Q Yes, sir.

A Yes, sir.

Q So, in effect, it will be secondary recovery in itself, won't it?

A I would say that it will be secondary recovery along the barrier, yes, sir.

Q Or increased primary recovery?

A Yes, sir.

Q Mr. Rogers, you stated that you had planned to use a BOCL retrievable type packer, but you could use a permanent type packer, which is preferable in this instance and why?

A Well, I know the retrievable type packer would be preferable because at a later date, for some reason that we don't know right now, in case we had to work the well over for any reason, it would save the expense of moving in either cable tools

or trying to knock the other one out to work on it, work on the well below the packer. We certainly prefer to remove the packer.

Q You could work down the tubing, couldn't you?

A Again, it would depend on what type workover we might have.

Q What do you propose to do here in the actual plug-back operation, set a bridge on the first producing perforation or what?

A That is the way I have shown it there. Actually, you don't have --

Q Is that the top of the cement plug --

A Sir?

Q -- or is this the top of a cement plug here?

A One proposal would be to set a bridge plug, and certainly we could put a cement cap on top of it. We are limited with space there; the other would be to actually go in and squeeze cement off the other perforations. With that many perforations opened, I think that would be -- it would be difficult to do. It would be very expensive.

Q Now, is the British American's ultimate plan to water flood the upper set of perforations only?

A We believe the secondary recovery from water flooding will be almost entirely from the No. 1 zone.

Q So when you get into your full scale water flood project, you plan to plug back all of the wells in this same

manner?

A No, sir, we do not.

Q What will be your next water injection well to the northwest from your Marye No. 5?

A Sir, that has not been approved by the operators. I can tell you what I think it will be. Tentative plans which have not been approved by the other operators in the proposed West Bisti Unit would be to make the Hospash State No. 4 and No. 5 injection wells. No. 5 is located in the SE of the NW of 36, 26 North, 13 West. The No. 5 previously mentioned is in the NW of the SE of Section 36.

Q And then from there on to the NW, just every alternate row?

A Yes, sir.

MR. NUTTER: Any questions of Mr. Rogers? Mr. Spann?

MR. SPANN: My name is Charles C. Spann, attorney at law, Albuquerque, New Mexico, representing Phillips Petroleum Company.

QUESTIONS BY MR. SPANN:

Q Mr. Rogers, in other applications before the Commission, I am referring specifically to Case No. 1559, and Order No. R-1315 that was entered therein, special rule No. 8 was adopted wherein so-called transfer wells were proved as such only after application was filed with the Secretary Director of the Commission, and notice given to the offsetting operators in the area.

Now, are you familiar with that rule?

A No, sir, I am not.

Q Well, I would like to read it for the record. Rule 8, and I am referring to Order No. R-1315, Order in Case 1559, which is the application of Sunray Mid-Continent Oil Company for an order authorizing a gas injection project in the Bisti-Lower Gallup Oil Pool in San Juan County, New Mexico, and for the promulgation of special rules and regulations governing said project.

Rule 8 provides: "No well in the project area shall be assigned any allowable transferred from any other well or wells in the project area unless and until said well has been approved by the Commission as a duly authorized 'Transfer Well.' To receive approval for any such Transfer Well, the Project operator shall file application with the Secretary-Director of the Commission for permission to transfer allowable to the well, setting forth therein the well's current allowable and the maximum allowable which will be assigned to the well. Copies of the application shall be provided to all operators owning acreage offsetting the proration unit on which the transfer well is located. The Secretary-Director may designate the well as a Transfer Well subject to the maximum expected allowable for the well if, within 20 days after receiving the application, no objection to the designation is received. The Secretary-Director may grant immediate designation as a Transfer Well provided waivers of objection are received from all such offset operators."

Now, would you look at that and tell me if you have any objection to the promulgation of that special rule for your area, your project? I am referring just to Rule 8.

A I was reading the formula.

Q Excuse me.

A The only objection I possibly would have would be of the well's acreage factor, I believe. I would think in this case that we ought to go to net acre feet of oil in place, possibly work on that basis.

Q Will you have --

A Otherwise, I have no complaint to make about that rule.

Q Well, you have an identical rule applicable to some of your gas injection areas, isn't that true?

A Yes, sir.

MR. ERREBO: Mr. Spann, are you advocating -- is Phillips Petroleum Company advocating the adoption of Rule 8?

MR. SPANN: Yes sir.

MR. ERREBO: And Rule 8 only?

MR. SPANN: Well, that's the only particular special rule we have that we would like to, yes. We approve of the project as a whole, and would merely suggest that that rule be adopted.

MR. ERREBO: Mr. Spann, I believe in answer to your question, the witness actually referred to some of the provisions

of Rule 9, did he not? Actually, so far as interpreting the rule, Rule 9 has no relation to Rule 8.

MR. SPANN: I do so understand.

MR. NUTTER: I think Mr. Spann asked the witness if he had objection to the adoption of Rule 9, and the witness replied that he had no objection.

A Rule 8.

MR. NUTTER: Rule 8, and the witness answered that he felt the acreage factor in Rule 9 might not be appropriate. Do you agree to the adoption of Rule 8 relating to transfer wells in the manner in which transfer wells should be designated as transfer wells, to receive the allowable of other wells?

A May I have a minute here, please?

MR. ERREBO: Could we have a minute to study?

MR. NUTTER: Yes.

(Discussion off the record.)

MR. ERREBO: Mr. Examiner, I assume that prior to transferring the allowable to any given well, in administering the operation of these rules, the operator so desiring transfer of the allowable could submit a new production test on the well, is that correct?

MR. NUTTER: I presume that a Commission Order entered in this case would provide for that, yes, sir.

MR. ERREBO: I believe we have no objection, certainly, to the inclusion of a rule similar to Rule 8.

QUESTIONS BY MR. NUTTER:

Q Mr. Rogers, if my memory serves me correct, after British American Oil Producing Company got its gas injection project authorized for the Douthit and Marye and Salge leases, as provided in this Order 1316, they designated or had designated all of the wells in this area as transfer wells. Now, would it be your understanding that the fact that the wells were designated as transfer wells to receive allowables for gas injection wells up in the northwest end of your properties here, would not apply to being classified as transfer wells for this water injection project?

A That is right.

Q And that you would have to obtain designation as transfer wells for the water injection project separately and apart from the previous designation?

A That is correct. If I may explain there, as soon as the West Bisti Unit is formed, and we are ready to go into our water flood secondary recovery project, at that time certainly we won't be putting the gas in, and we will be selling the system and everything, we hope, to El Paso Natural.

Q Now, transfer wells in this instance would be limited to the Marye lease itself?

A That is correct.

MR. ERREBO: Mr. Examiner, the Marye lease there is the Marye base lease without relation to Marye "B" or Marye.

Q (By Mr. Nutter) Now, you show two locations there in Section 1, Mr. Rogers. Is British American drilling or planning to drill those locations?

A Sir, the map that I had the draftman prepare this from had locations on there that we made engineering study on. I can't look at the map and say which one we actually propose to drill. We do propose additional drilling in the West Bisti Unit, not necessarily each one of these places where the location is made.

Q I see.

A Now, we have the Marye No. 8, which is shown as a dry hole, there in Section 1.

Q Yes, sir.

A We have approval from our management to go back in and try to recomplete that well thinking of it as being a drainage point for secondary oil. Whether that has any bearing here or not, I am not too sure, but there would be a drainage point which would help us to get some of this oil that we were talking about as being trapped.

Q Now, Mr. Rogers, are you acquainted with the operation of LPG injection project in the Four Corners area there of those Townships?

A Not completely.

Q You do have a number of wells in that project, don't you?

A Yes, sir.

Q How much is that well currently producing?

A It is 200 something -- no, excuse me, I am sorry -- 127 barrels per day was the May allowable on that well.

Q As I recall, Mr. Rogers, the Commission some little while ago issued an order authorizing allowables in excess of the standard allowable for the wells in this injection project. I believe the purpose of this excessive allowable was to more properly evaluate the thing in a lesser length of time. Now, do you feel that that project has advanced to the point where it has been evaluated?

A I do, yes, sir.

Q Do you feel that it is time that maybe these wells should be operating under the normal allowable provisions of the Commission?

A Yes, sir, and the LPG pilot project, of course, would be dissolved at the time we start putting water in for the water barrier.

Q So then this well would not have an allowable in excess of the standard allowable, but would revert to the top unit allowable?

A Would revert to the top unit allowable.

Q In the Bisti Pool. And British American would have no objection to that?

A Of course, that would be one of the wells that we

would be asking for additional allowable, --

Q It would be?

A -- earned by transfer at the barrier.

MR. NUTTER: Any further questions of Mr. Rogers?

Mr. Loar?

MR. PAYNE: One moment, please.

MR. WHITE: I am Charles White of Santa Fe, New Mexico, for Gilbert, White & Gilbert, appearing on behalf of Sunray Mid-Continent Oil Company, and have associated with me Mr. Bill Loar, attorney of Mid-Continent out of Tulsa.

MR. NUTTER: Thank you. Mr. Loar?

QUESTIONS BY MR. LOAR:

Q Mr. Rogers, is the purpose of this water injection -- will it be an attempt to balance injection on the east side of this common boundary line against the west side?

A Yes, sir.

Q I notice that you put a limitation of approximately a thousand barrels a day on the injection into any of these wells. Did I understand you correctly?

A I didn't intend to put a limitation on, but by our engineering study we don't believe we would want to put, or would put in over a thousand barrels.

Q Would you not need some flexibility in order to maintain approximately a thousand barrels a day? Wouldn't you need some flexibility in excess of the thousand barrels at various

times?

A I think it would be a good idea to have limitation, yes, sir.

Q Do you think approximately 1500 barrels a day as a maximum would be sufficient --

A I would be in complete agreement with that.

Q -- even though the balance rate might be in the neighborhood of a thousand barrels or less?

A Yes, sir. That's per well.

Q Per well?

A Per well, yes, sir.

MR. LOAR: That's all.

QUESTIONS BY MR. NUTTER:

Q How about a minimum rate, Mr. Rogers?

A Do I have to go that route?

Q You would have to have a minimum to establish a barrier.

A Sir, I don't believe that British American would ever want to inject less than a minimum, less than three hundred barrels per day.

Q You think three hundred barrels a day would be sufficient to achieve fillup in an orderly fashion?

A I think the fillup could be achieved with a greater rate than that, but in picking a minimum and maximum, I think the range from three hundred to fifteen hundred a day would be reasonable.

MR. NUTTER: Any further questions?

REDIRECT EXAMINATION

BY MR. ERREBO:

Q Mr. Rogers, actually what you are asking for here is a -- asking the Commission to allow a rate which will give the operators, or the operator in this instance, flexibility in injecting water into those wells according to the developments as they may occur in the injection program?

A That is correct.

Q In other words, you may want to inject more or less at various times?

A Yes, sir.

Q Now, with regard to the barrier system, as a whole, which you are proposing here and which Sunray will later propose today, do you consider that essential to the institution of your overall program of water flood in the proposed West Bisti Unit?

A I think it is essential to have it between the two secondary projects.

Q Is that interval part of that?

A Yes, sir.

Q As a result of the institution of water flooding on the West Bisti Unit, you expect to recover substantial additional amounts of oil which would not otherwise be recovered, is that true?

A Yes, sir.

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Q And certainly, then, the additional oil recovered under that plan would far exceed the possibility of any loss that might occur from oil being entrapped in the barrier area, isn't that correct?

A Yes, sir.

Q And actually with the injection wells being staggered along the line, on each side of the line, there is not much possibility, is there, of oil being entrapped?

A I think the possibility is slim, that we would trap much oil in the barrier system between the injection wells.

Q It would be a relatively small amount?

A Yes, sir.

Q Also, in order to institute this system of water flooding, which you propose, which will be in the upper part of the Gallup, isn't that correct, --

A Yes, sir.

Q -- you will plug off the lower zones?

A In the two injection wells?

Q Yes.

A Yes, sir.

MR. ERREBO: I believe that's all.

MR. NUTTER: Any further questions? The witness may be excused.

(Witness excused)

MR. NUTTER: Does anyone have anything further they

wish to offer in this case?

MR. WHITE: Sunray Mid-Continent as an offset operator, has no objection to the granting of the application. And by way of information to the Commission, it is the present intention of Sunray Mid-Continent to fully cooperate with the applicant in the establishment and maintenance of a water barrier.

MR. KELLAHIN: Jason Kellahin of Kellahin & Fox, Santa Fe, New Mexico, appearing for Amerada Corporation. While Amerada does not own any properties within the immediate vicinity of this particular project, it is felt that this is an essential part of the overall plan for secondary recovery in this Pool, and Amerada is in accord with the application of British American.

MR. NUTTER: Mr. Spann?

MR. SPANN: Phillips Petroleum Company, as an operator in the immediate vicinity, approves the application. However, they would urge the adoption of a special rule or regulation similar to Rule 8 in Order No. R-1315, which is the approval of the project wells by the Secretary-Director.

MR. NUTTER: Anyone else? If not, we will take the case under advisement and take a ten-minute recess.

(Recess)

