BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
January 27, 1960
EXAMINER HEARING

IN THE MATTER OF:	
Application of British-American Oil Producing Company for a pressure maintenance project in the Bisti-Lower Gallup Oil Pool and promulgation of special rules in connection therewith.	Case 1867

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IN THE MATTER OF:

Application of British-American Oil Producing Company for a pressure maintenance project in the Bisti-Lower Gallup Oil Pool and promulgation of special rules in connection therewith. Applicant, in the above-styled cause, seeks an order authorizing a pressure maintenance project in the Bisti-Lower Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Lower Gallup formation through 17 wells. Applicant further proposes that special rules be adopted governing said project including the transfer of allowables from injection and shut-in wells to producing wells in the project and for establishment of an administrative procedure to convert additional wells to injection.

Case 1867

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: We will proceed to Case 1867.

MR. PAYNE: Application of British-American Oil Producing Company for a pressure maintenance project in the Bisti-Lower Gallup Oil Pool and promulgation of special rules in connection therewith.

MR. ERREBO: Burns Errebo, Modrall, Seymour, Sperling, Roehl and Harris of Albuquerque, appearing on behalf of the

applicant, British-American Oil Producing Company. We will have two witnesses, possibly three. I would like to have the three witnesses, if you desire, sworn at this time.

MR. UTZ: One moment please, let me call for appearances. Any other appearances to be made in this case? You may proceed with swearing the witnesses.

(Witnesses sworn.)

MR. ERREBO: We would like to call as our first witness Mr. Nelson Williamson.

NELSON H. WILLIAMSON

called as a witness, having previously been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. ERREBO:

Q Will you please state your name, occupation, by whom you are employed and where?

A Nelson H. Williamson, British-American Oil Producing Company, Division Exploitation Geologist, Denver, Colorado.

Q Mr. Williamson, how long have you practiced as a geologist?

A Approximately eleven and a half years.

Q Are you familiar with the geology of this oil pool?

A Yes, I am.

Q How long have you been working in the area of this pool?

A Approximately ever since the pool was discovered.

Q Have you previously testified before this Commission as a geologist?

A Yes, I have.

Q I will ask you to first refer to the structure map which has been marked Applicant's Exhibit No. 1, the copy that's on the board, and briefly state what it shows.

A Exhibit 1, which is the structure map contoured on top of the Lower Gallup pay zone in the Bisti-Gallup Field, is contoured on ten foot interval, and it shows a regional dip of about 50 feet to the mile. This is approximately a regional dip in the whole area. It shows the dip to be to the north generally, striking east-west and trending more or less northwest, southeast on the western limits of the field.

This exhibit and map shows the continuous uninterrupted dip of this particular pool and does not show any major or even minor interruptions in this dip due to structural closure or to reversal or to any strong nosing in the area. So it does show a pool here which is not interrupted in any way by any structure.

Q Mr. Williamson, are you familiar with the unit area of the proposed West Bisti-Lower Gallup unit?

A Yes, I am.

Q Does this map cover the area of that unit?

A Yes, it does.

Q Mr. Williamson, will you refer to Exhibit No. 2 and explain what it shows?

A Well, Exhibit No. 2 is this map over here, and this is an index map of the cross sections which you see appearing over here. It's a map which shows relationship of the cross sections to the field area.

Q Will you refer to Exhibits 3, 4, 5 and 6 and state what they show?

A Exhibit 3 is the cross section which is shown as AA[1] on the index map and is a cross section along the main axis of the Bisti-Gallup Field. This cross section is placed, the logs are placed on a plus 1300 datum and the correlation lines are on the top and base of the Lower Gallup pay zone.

The purpose of this, using this pay zone or the upper zone is due to the fact that it is the most continuous through this part of the field and it's easier to see the correlation, and there is practically no difference in the structure as far as the other two zones are concerned.

Now, as you can see on the north end of the cross section which is actually outside the limits of the unit area, the sand is pretty well gone and then as you go along the main axis of the field you see that there is no stratographic or structural reason for the pool to be separated in any way. The sand is continuous throughout this main part of the field there.

Then on the western end, a transverse cross section which is BB^1 shows the shaling out of the Lower Gallup sand zone to the north. Then going, I might add at this point the sand is continuous and there's no interruption of the sand across the western end until you reach the northern limits of the area. Then, coming down southeast into about the central portion of the field is the north-south cross section CC^1, which goes across that portion of the field, and again you see there is no interruption of the sand until you get to the northern edge of the field where it is still present but very, but in very minor quantities, and if we correlate that or if we approach that we could see that the same thing is happening there that happened here where eventually your sand is gone.

Going farther southeast we come to the cross section DD^1, which is on the eastern limits there of the area, and again we see that the same is continuous there, but as is present all along the northern edge, there's a tendency towards shaling out and eventually if we carried the cross section far enough north we would see there is a shaling out completely of the sand.

MR. UTZ: Is the left-hand log on that a dry hole?

A Yes. Are you speaking of this one right here or this one here?

MR. UTZ: No, sir, the DD^1, the last one over here.

A No.

Q The left-hand one. A Oh, this one.

MR. UTZ: The left hand.

A El Paso, yes, I believe that is a dry hole, El Paso Kelly State No. 10. Isn't it shown as a dry hole there?

MR. UTZ: Yes, it is.

Q Mr. Williamson, I notice that you have shown the first bench or bench No. 1 on your cross sections. Have you shown that bench for a purpose? And I notice that you don't show the other two benches.

A Well, primarily since the zone one is continuous throughout this portion of the field, whereas zones two and three are not as continuous, and it's much easier to correlate the top zone.

Q Actually you've seen the engineering exhibits which will be presented by a subsequent witness, have you not?

A Yes, that is true.

Q And those included, isopacks which do clearly show the present and location of the other two benches as well as the first bench?

A That's right.

Q From a geological point of view, Mr. Williamson, do you feel that this reservoir is subject to pressure maintenance by the injection of water?

A Yes, as a geologist I would say that this has excellent possibilities for pressure maintenance by injecting water, since

it is a closed reservoir and we have evidence of shaling out to the north, to the south and to the west. And structurally, there's very little that enters into it structurally.

Q By that you mean there's no structural discontinuity?

A True, that's right.

Q This is, is it not, an offshore sand bar?

A Yes.

Q Do you have anything further you care to state at this time?

A I believe that's all I have.

MR. ERREBO: That's all we have from this witness.

MR. UTZ: Are there questions of the witness? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Williamson, I note on your cross sections BB^1, CC^1 and DD^1 that you show a closing or shaling out on the north side. However, the exhibits seem to indicate an open structure on the upstructure side or south side. Has this shaled out on the upper section also?

A Did you say a closure of structure?

Q I say your exhibits seem to indicate an open structure on the south side.

A Yes.

Q Has this shaled out?

A Yes, it has shaled out to the south. I didn't carry the cross section far enough south to show that. We have evidence of that to the south.

Q You carried your cross section DD' through two dry holes. How much farther do you have to go on the south side? El Paso No. 9 and 10 wells.

A Until it shales out?

Q Yes, until you show the shaling out.

A It would have to go farther south than that, because sand is still present there. It would have to go as far south as, let me see here. Well, it would have to go as far south as this well in Section 11, and possibly even farther south than that. Now we have exhibits which will show the net sand, will show the net microlog pay which was determined by the Engineering Committee, and I think those questions will all be answered when those exhibits are shown.

Q I see.

A I'm not attempting at this time to define the limits of the pay area. That has been determined by the Engineering Committee. At this point I'm only trying to show the continuity of the sand and structure.

Q I was wondering if there was any possibility of any additional acreage not included in the participating area possibly

being productive.

A I can't answer that because that has been determined by the Engineering Committee.

Q Now, the zone that you have depicted on your exhibits and called zone one is the same zone that Mr. Taylor referred to in the participation formula as bench one?

A That's right. These tops, the top and the base of this sand was taken from the Engineering Committee report as the tops they used, top and base they used.

MR. NUTTER: Thank you.

MR. UTZ: Any other questions?

BY MR. UTZ:

Q Mr. Williamson, can you give a geological analysis why the wells in Section 2 were dry?

A The El Paso Kelly State wells you mean?

Q Yes, sir, wells 9 and 10 I believe.

A I understand that there's possibility of mechanical difficulties in completion. There may be water problems. I am not fully aware of the problems which they had in these wells. I would hesitate to give an opinion on that.

Q You have nothing to show the permeability in this zone that you've cross sectioned?

A No, this, as I stated before, these things were determined by the Engineering Committee. I would prefer to let them

answer those questions.

Q The cross section on Well No. 9 looks like a pretty good section, doesn't it?

A On cross section No. 9?

Q I mean Well No. 9, the log I mean.

A Yes, it looks like a very good sand.

MR. UTZ: Are there other questions of the witness? If not, the witness may be excused.

(Witness excused.)

WAYNE ROGERS

called as a witness, having previously been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. ERREBO:

Q Will you state your name and by whom you are employed, please?

A Wayne Rogers, employed by British-American Oil Producing Company.

Q In what capacity and where are you located?

A I am located in Denver Colorado as District Engineer of the Northwest District.

Q Have you previously testified as an engineer before this Commission?

A Yes, sir.

Q You have had approximately how many years' experience as an engineer?

A Ten and a half years.

Q Does that cover field and reservoir experience?

A Yes, sir.

Q Does that also include experience in various forms of fluid injection?

A Yes, sir.

Q You are familiar with the proposed pressure maintenance project in the West Bisti-Lower Gallup Oil Pool?

A Yes, sir.

Q Has an Engineer's Committee been formed and functioning to determine and develop a plan of pressure maintenance for this area?

A Yes, sir, they have.

Q What is your connection with that Engineer's Committee?

A For the past year I have been Chairman of that committee.

Q When was the committee formed, and can you state what has been the nature of their work?

A Originally the committee was made up of members of each one of the companies in what we call the Sunray Central Bisti Unit and the proposed West Bisti Unit. Work was done by that committee approximately, it was started by that committee approximately a year and a half ago.

In approximately October or November of 1958 the committee was formed to separately study what we call the West Bisti Unit, and as of that time British-American was designated to be the operator and British-American representative is the Chairman of that Engineering Committee.

Q Actually all the operators are entitled to representation on the Engineering Committee, are they not?

A Yes, sir.

Q Which of all of those operators have been the most active on the committee?

A The most active committee members have been representatives of Phillips, Skelly, El Paso Natural Gas Products Company and British-American.

Q Does the plan which you will propose this morning represent the combined thinking of some of these companies on the Engineering Committee?

A Yes, sir, it does.

Q Have they approved what you will present here this morning?

A Yes, sir.

Q How many meetings would you estimate that this committee has had to work on this matter?

A I would say approximately ten or twelve.

Q Will you first refer to your Exhibit No. 7 which appears

on the board and explain to the Staff and the Examiner the designation of the wells and the other things which are shown on the map? I notice in the upper right-hand corner that that is labeled West Bisti Water Flood. Now, does that refer to the general meaning of that term rather than the meaning which has been given it by order of the Commission?

A That is a general term that we used, actually indicating that we propose to inject water. It does not strictly adhere to the present thinking of the Commission as to what a water flood and pressure maintenance project is.

Q Later on in your testimony you plan to present evidence and your opinion that this is a pressure maintenance project as defined by the Commission and also according to your thinking and that of the other operators?

A Yes, sir.

Q Will you proceed to explain what is shown on that plat?

A Exhibit 7 is a plat which shows the entire West Bisti area, including all leases that are within two miles of that area. It indicates the proposed participating, and the proposed or recommended unit boundary. The unit boundary was arrived at in attempting to get a buffer zone between the participating area and the outer limits of the unit boundary. It also includes recommendations made by U.S.G.S. and the State as a boundary that

has been recommended by the Engineering Subcommittee.

The plat also indicates all of the wells within the participating area, indicating that those wells are producing from the Lower Gallup sand. It also shows the proposed facilities for injecting water into the Lower Gallup sand, indicating the injection lines, the water supply lines, indicating the 17 initially--

Q Excuse me, Mr. Rogers. You might refer to how those various facilities are indicated on the exhibit.

A The blue or black dots indicate producing wells throughout the West Bisti area. The ones that have a series of three arrows pointing into the dot with solid lines to those wells are the initial 17 wells that we propose to convert to water injection.

I also, on this exhibit, have outlined those in red pencil to make it a little easier to see. The map indicates the possible 15 wells that we later may come back in and request administrative approval to convert to water injection wells. Each one of those 15 wells are indicated by a circle around the well, or around the blue dot also having a series of three arrows pointed into the well, and are connected by a broken line that means, according to the legend in the lower left-hand corner of the exhibit, possible additional water injection wells.

The map also indicates the location of what we call a satellite water injection plant. It's a plant that was put in to take care of the barrier system that was set up between the

proposed West Bisti Unit and the Sunray Central Bisti Unit. This was in Case No. 1663, when I referred to the wells on the west side of the barrier line, being the B. A. Mayre No. 2 and the B. A. Marye No. 5 wells. If I refer to the three wells on the east side of the line they were heard in Case No. 1664.

Q Those are wells which are presently injection wells, are they not?

A Yes, sir, we have been injecting water into the five wells on the barrier since last, either July or August.

Q You say "we", you mean British-American, Sunray in cooperation with each other?

A Yes, sir.

Q Proceed.

A Is it necessary to specify the exact location of those wells?

Q No, sir, I think they show on the exhibit.

A The plat also indicates that we have water supply well No. 2 that is shown here just to the east of the center of Section 28. It is indicated by a black dot with three arrows pointing out and labeled W. S. W. No. 2. That well has been drilled. It also shows the water supply well No. 3 that is immediately northeast of the center, Section 35, Township 26 North, Range 13 West in both cases. That water supply well is indicated similarly to No. 2 and has also been drilled.

The plans that we have, we propose to drill water supply well No. 4 in the approximate location shown, which is southeast of the center of Section 27, Township 26 North, Range 13 West. That's about all I have from that exhibit.

Q Mr. Rogers, can you state to the Commission the reasons underlying the decision of the Engineering Committee and the Operators Committee to pick this particular pattern of water injection?

A The Engineering Subcommittee made what we felt like were exhaustive studies regarding the type of water injection pattern to set up. The five spot pattern would require too many injection wells, and we didn't feel like it would have the highest efficiency. The peripheral type and semi-peripheral, peripheral wells that would have to be converted to injection wells along the outside boundary of the participating area completely encircling it, would also require a great number of injection wells.

The semi-peripheral would be a type drive where you would have wells possibly along the north edge of the participating area or possibly along the south edge. The next method looked at was the alternating rows of wells to be converted to injection wells which we would call a line type drive. By doing this we have looked at approximately 32 wells that might be converted to water injection. Engineering studies show that we should be able to, or would be able to efficiently flush the Lower Gallup sand by

using every fifth row of wells, using a line type drive, and that is what we have here shown on the exhibit. For example, at the north end we have two water injection wells in Section 13, being the British-American Navajo No. 2 and Navajo No. 3. That is in Township 26 North, Range 14 West, and then coming down to the fifth row, southeast of that we propose to convert those three wells into water injection wells, and that was carried on throughout the field from the northwest end to the southeast end. It is our opinion that that will effectively and efficiently flush the Lower Gallup sand.

Q Actually then, this pattern of injection is best suited to this long shape that the field has, is that correct?

A We believe it is, yes, sir.

Q You feel like that is the most efficient pattern that can be used in this instance?

A Yes, sir.

Q Is there anything further that you desire to discuss at this time with regard to this particular exhibit?

A Later on another exhibit I will substantiate it. The participating area was chosen to include all productive tracts that are known to be productive either by having producing wells upon them or in two cases we have, for example, a 40-acre tract in the southeast, southeast of Section 19, 26 North, 13 West that was included because it has producing wells on three sides of the

well with a dry hole immediately west. Of course that was the reason for leaving out the southwest of the southeast of 19 because it had a dry hole on it.

Q That will actually be shown more thoroughly in the subsequent exhibit?

A Yes, sir. While I'm at it, the other one I probably should mention is the 80-acre tract in the North Half of the Northeast Quarter of Section 35, 26 North, 13 West. The British-American Mayre "B" tract has no well on that 80 acres. However, it is surrounded by producing wells on all four sides. Consequently it was included within the participating area. The participating area then does not include any tracts that does not either have a producing well on it known to be productive, and certainly does not include any that has dry holes on them.

Q Will you then refer to your next six exhibits and discuss them as you desire? They are all quite similar to each other. Exhibits 8, 8-A, 9, 9-A, 10 and 10-A.

A Exhibit 8 is an electric log of the British-American Oil Producing Company Marye No. 2. It is located in the northeast, northeast of Section 12, 23 North, 13 West, was previously mentioned as a water injection well in the barrier system. This electric log indicates that the top of the Lower Gallup sand is at 4853 feet KB. That is also the top of Zone 1. It indicates the base of Zone 1 is 4880, also being for simplifying it, the top

of Zone 2. It also indicates the base of Zone 2 at 4897. Which simplified is the top of Zone 3 and indicates the base of Zone 3 at 4966 feet. This was one of the logs studied on one of the 63 wells within the unit.

Q That actually is located in the southeast portion of the pool, is it not?

A Yes, sir, it is at the southeast end of the West Bisti Unit along the barrier. Exhibit 8-A is a microlog survey of the same well, and on it we have indicated the Zone 1, Zone 2 and Zone 3. Exhibit 9 is an electric log of the British-American Oil Producing Company Salge B #5.

Q What part of the project area is it located in?

A The Salge B #5 is located in the central part of the proposed West Bisti Unit. More specifically, it is located in the northeast, northeast of Section 33, 26 North, Range 13 West. It, again, indicates, or we have indicated on it by red pencil the Zone 1, Zone 2 and Zone 3 as discussed a moment ago on the Exhibit 8.

Exhibit 9-A is the microlog survey on Salge B #5, again indicating Zones 1, 2 and 3. Exhibit No. 10 is an electric log of the British-American Oil Company Navajo No. 3 that is located at the extreme northwest end of the participating area, its location being the northeast, southeast of Section 13, Township 26 North, Range 14 West.

Exhibit 10 is the electric log survey on that well and

indicates the presence of Zone 1, also indicates that Zone 2 and Zone 3 are either absent or of inferior quality.

Q Do you feel that these three logs taken together are typical of the logs of the various injection wells which you will use?

A Yes, we do, since we have chosen one from the three portions of the field.

Q I don't know if you have stated it previously or not, but you might now, how many producing wells are there in the project area?

A There are --

Q Presently producing wells.

A There are 63 wells in the project area. One is shutin, being what we show here on Exhibit 7 as the C. M. and W. No. 1, Elliott No. 1, located in the northwest, northeast of Section 30, 26 North, 13 West, the British-American Oil Company's Douthit B #5 which has been used by approval of the Commission as a gas injection well to conserve gas. It is presently shut in and it is located in the southwest, northeast of Section 28, 26 North, 13 West. Then, the two previously mentioned British-American wells, the Marye No. 2 and Marye No. 5 which are water injection wells that are currently being used in the barrier system.

Q Do you have any further observation as to this series of six exhibits which you have just discussed?

A I probably should make a comment, which I haven't done, that Exhibit 10-A is a microlog survey on Navajo No. 3 on which we have indicated Zone 1, and it is in the northwest end of the field.

Q Will you then proceed to discuss and explain Exhibits 11, 12 and 13?

A Exhibit 11 is entitled the British-American Oil Producing Company Bisti-Gallup Field, should be shown as West Bisti or qualified that way. It is an isopach map drawn on the microlog separation of the Lower Gallup sand Zone 1. This map was drawn after the Engineering Committee had studied all logs within the immediate area, being the participating area or unit area, and their logs.

The positive separation that was shown on the microlog was analyzed in this Zone 1 and the appropriate figures are shown underneath each well. For example, taking a well, for an example the British-American Douthit No. 18, which is located in the northeast, northwest of Section 29, 26 North, 13 West, had 7 feet of microlog separation or pay as indicated on the microlog for Zone 1.

Similar to that the map indicates the amount of net pay under each well in Zone 1. The contour interval of the isopach map is a two-foot interval, and it also, of course, shows the continuity of the Zone 1 throughout the proposed West Bisti Unit.

Exhibit No. 12 is an isopach map drawn on a two-foot contour interval using the corrected S.P. pick on all of the wells within the West Bisti Unit, and it also is on the Lower Gallup sand bench No. 1, or Zone 1, as we show it on the map. Zone 1 and bench 1, being synonymous. The purpose of drawing the isopach map using the S.P. is to evaluate each well in the West Bisti Unit insofar as the S.P. log is concerned. It also is used to try to calculate the oil in place by using the S.P. curve.

In the participating formula one of the perameters being that one-third credit is given to Zones 1, 2 and 3 by S.P. pick or S.P. isopach map. I believe that's all I have on that one, Mr. Errebo.

Q Proceed to the next exhibit, please.

A Exhibit 13 is an isopach map that is drawn on a two-foot contour interval, after analyzing the S.P. curve, or S.P. logs on all the logs in the West Bisti Unit, and it is drawn on the Zone 2 or bench 2 of the Lower Gallup sand. The same explanation that I gave for the Zone 1 S.P. would hold true for the Zone 2 S.P.

I believe one of the important things, of course, to show on this isopach map is that it does not as fully cover the West Bisti area as the Zone 1 microlog or S.P. isopach Zone 1.

Exhibit No. 14 is an isopach map drawn on a two-foot contour of the West Bisti Unit area drawn on the data that was accumulated

by engineering study of the S.P. curve on the electrologs for the Zone 3 of the Lower Gallup sand. Again, it does not show as full a coverage within the area as the Zone 1 maps.

Q These isopachs then were used in determining the boundaries of what you designated the initial participating area, were they not?

A Yes, sir. However, back to the first exhibit that I had, I think that was Exhibit 7, we have included all productive acreage within the zero isopach line on Zone 1. Now, by that, if there are no wells on a tract that are still within the zero isopach line but have no producing wells on the tract, certainly they were excluded from the participating area. They are generally in the buffer zone, but all of them were jointly used, yes, in determining the participating area.

Q Do you have any further comments in connection with this series of exhibits?

A No, sir.

Q Will you then proceed to Exhibit No. 15 and explain that exhibit? Actually I believe Nos. 15, 16 and 17 are of the same nature and you might explain all three of those.

A Separately?

Q However you desire.

A Exhibit No. 15 is a schematic drawing of the downhole condition of British-American Marye No. 2. It is located in the

northeast, northeast, Section 12, 25N, 13 West. This well is presently a water injection well that we are using in the previously mentioned barrier system. It is also to be used as a water injection well in the West Bisti Unit as awhole. The schematic drawing indicates that the well was drilled to a total depth of 4982 feet, a string of 5½" casing was set on approximately bottom and cemented from there up to 4375 feet, which is well above the top of the Lower Gallup sand.

The drawing indicates that the Lower Gallup sand Zones 1, 2 and 3 have been perforated and are taking water at the present time, or at least water is being injected into this well in all three zones. It indicates the proposed method of completing a water injection well being to use plastic coated tubing that will be set on a packer, the packer being immediately above the top of the Lower Gallup sand. Water will then be controlled through the tubing string and will be injected into the Lower Gallup sand below a packer.

It also indicates that a string of 9 5/8" casing is set at 230 feet KB and the drawing does not show this but that is cemented from 230 feet to the surface. A 12 foot cement plug is in the bottom of the casing to prevent any migration of the water from below the casing shoe that is down through the casing.

Q Are 16, 17 and 18--

A Yes, the 16 is the Salge B #5 in the southeast part

of the field, showing the condition of the well. Exhibit 17 is of a Navajo No. 3 which is in the northwest end of the field, previously described.

Q These are the same three wells scattered throughout the field that you showed electrologs on previously?

A Yes, sir.

Q They were picked in order to try to present a representative picture to the Commission of the injection wells, is that correct?

A Yes, sir. I may have made a wrong statement a moment ago, Salge B #5 has not been converted to a water injection well. The drawing shows how we propose to convert it to a water injection well if the unit is formed. The same thing is true of Navajo 3.

MR. UTZ: What size tubing was that?

A This is two-inch tubing.

Q Do you have anything further in connection with those three exhibits?

A No, sir.

Q Will you proceed then to explain Exhibit No. 18?

A Exhibit 18 is a drawing showing the equipment that we propose to put on to each one of the water injection wells. I don't think it's necessary to go into too much detail on it. However, if you will note, No. 5 on the drawing is a Floco Meter.

We propose to put a water meter on each one of the injection wells in order to determine how much water we are putting into each well separately rather than trying to spread it out by calculating it. We also propose to put a pressure gauge to indicate the injection pressure each day and a recording of that will be made.

Q Do you have any further pertinent points relating to that exhibit that you care to discuss?

A No, sir, I don't think so.

Q Will you then proceed to Exhibit No. 19 and explain what that shows?

A Exhibit 19 is a schematic sketch of the British-American Douthit water supply well No. 2. It was previously pointed out on Exhibit No. 7. This well was drilled to a total depth of 2600 feet, a string of 7" casing was set at 2590 feet and cemented from 2,027 feet up to the surface. It indicates that the 7" casing is slotted throughout the Cliff House and Menefee, and we do not indicate it on here, but the water supply zones are from the lower Allison, Cliff House and Menefee zones.

The water supply well No. 3 that has been drilled and was previously mentioned and pointed out on Exhibit No. 7 is different to this one only in that it has a string of 9½" casing in it instead of a string of 7". Water supply well No. 4 previously mentioned, we propose to drill it and equip it with 9 5/8" casing, but producing both of the other wells from the same zones that

we have indicated here on this drawing.

Q How do you propose to lift the water out of the wells?

A Since we have 7" casing in the No. 2 well we propose to lift it with a Reda pump. Water supply well No. 3, even though it has 9 5/8" casing, we propose to use a water, I want to back up and correct that. Water supply well No. 3 is the well that is producing water from these zones and is being furnished to the barrier system, and it is being pumped by a Fairbanks Morris turbine pump. We propose to use the Reda pump also in water supply well No. 4 when we drill and equip it.

Q What is the basic difference between these two types of pumps?

A The pump used on water supply well No. 3 is a turbine pump, it's set approximately 1200 feet deep and has numerous boles in it that work in a turbine or centrifigal action and is powered by gas engine, whereas the Reda pump works from electricity and has the electric motor. It generates surface and electric motor in the pump itself. It can be set at deeper depths and certainly can produce more water than we're able to produce from this other one.

Q Now, refer to Exhibit No. 20 and explain what that exhibit shows.

A Exhibit 20 is a drawdown curve. It's entitled "British-American Oil Producing Company. Bisti Water Supply Well No. 2, Douthit Lease". We ran capability or drawdown tests on this well

to determine how much water we could produce and how much of a drawdown, fluid level drawdown we would actually experience. The curve indicates that the static fluid level was standing 858 feet, that is from the bottom of the hole. This was tested by gas lifting or putting gas down the tubing through perforations in the tubing and lifting water through the annulus.

A pressure bomb was isolated below these perforations and pressure recordings were made. It indicates, for example, that we can produce 8,000 barrels of water per day as shown on the curve by a point with a bottomhole pressure exerted on the bomb of some 550 pounds approximately. The static pressure was some 750 pounds plus a minus 5 pounds. So it indicates that the well is certainly capable of putting out a greater amount than 8,000 barrels of water per day without pulling the fluid level too low.

Q Is it your opinion then, based on this information, that these wells will supply an adequate amount of water for the project as you now foresee its needs?

A Yes, sir. The three water supply wells we propose to have will supply, will actually supply a greater amount than we need at the time.

Q I believe your next exhibit, is it not, is Exhibit No. 21, which is a chemical analysis of the water?

A Yes, sir.

Q Will you explain that exhibit?

A Exhibit 21 is entitled "Chemical Analysis of British-American's Douthit Water Supply Well #2". It shows the various components in the water. This analysis was run by a consulting engineering firm from Dallas, Texas. Without taking too much time on the exhibit, the one thing that we do have is 13.6 parts per million hydrogen sulphide. Therefore, we feel like we have a corrosive water, it is not corrosive to an extreme limit, but it is corrosive.

Consequently, we have designed our facilities, including our injection pumps and our lines and so forth, to combat any type of corrosion. The injection lines will be cement lined, the pumps will have anti-corrosing materials in those to prevent corrosion. That is the reason we propose to inject the water into plastic-coated tubing in the water injection wells, which will prevent corrosion of the tubing and isolate the casing from any corrosive action, because it will not come into contact with water that is above the production packer we propose to use.

The chemical analysis also indicates, and we have this from the consulting engineering firm, that it is compatible, with the produced water that is found in the Lower Gallup sand. The waters are compatible. There will be no detrimental effect to the formation or to the reservoir.

Q Has the presence of calcium carbonate presented any problem?

A Yes, sir. We ran what we call a quality control study of the entire barrier system checking the lines, checking the water supply well, the injection wells and so forth, and we found that we had a calcium carbonate deposition in our lines and in our equipment. At the injection wells primarily because it was a way down the line from the water supply line, I mean from the water supply well had very little calcium carbonates to these points, but it did present a problem that we could eventually have some plugging action if we didn't try to counteract it. So we used a chemical, injected it down the annulus of the water supply well and then made an additional quality controlled study some thirty or forty days later and found that we had eliminated the precipitation of calcium carbonate which would eliminate this danger to possible plugging of the formation, and we feel that that will effectively control it in the other supply, in the other water supply wells.

Q Is that all you have as to that exhibit?

A Yes, sir.

Q Will you then proceed to Exhibit 22?

A Exhibit 22 is entitled "West Bisti-Gallup Field, Arithmetic Average BHP". It indicates that the Mayre No. 1, which is a British-American well, had a bottomhole pressure of 1516 pounds on March 18, 1956. Tests were run every few months since that time and the bottomhole pressure has declined what

we feel like rather rapidly; the last survey we had in June indicated that the West Bisti Field average was down to 887 pounds average. The bubble point pressure in the Lower Gallup sand is 1140 PSIG. Therefore, this curve indicates the drop in pressure that has been experienced in the Lower Gallup sand and points out the importance of instituting a secondary recovery project in order to recover more ultimate oil.

Q Do you have anything further in connection with that exhibit?

A No, sir.

Q Will you proceed then to the next exhibit, which is No. 23?

A Exhibit 23 is a summary sheet entitled "Pertinent Data, West Bisti-Lower Gallup Sand". I don't think it's necessary to go into each one of these items that I have listed here. However, I'll be glad to discuss any of them if necessary.

Q Would you point up what that exhibit shows as to the original primary recoverable oil as compared to the remaining primary recoverable oil?

A The original recoverable primary oil is 6,320,000 barrels. The cumulative production to October 1st, 1959 was 2,723,111 barrels from the West Bisti Field.

MR. NUTTER: Are you referring to the 5,141 acres that are participating?

A Would you ask that again?

MR. NUTTER: Are you talking about the reserves, are you referring to the 5,141 acres that are participating?

A Yes, sir.

MR. NUTTER: Thank you.

A I should mention that the participating acreage is 5,141.24, but I didn't show that fraction. The original recoverable primary oil that I have previously mentioned is for the participating area.

Q What percentage then of the oil which was originally recoverable has been recovered?

A 14.45%. In trying to bring this up-to-date, the estimated cumulative production to February 1st, 1960 is estimated to be 3,250,000 barrels, which leaves an estimated remaining primary recovery on 2-1-60 of 3,070,000 barrels.

Q Actually, Mr. Rogers, I believe that you intended to give me, actually what I asked you for was the percentage of remaining primary. You gave me a figure of approximately 14%. Actually isn't that closer to 50%?

A Yes, sir. I didn't understand your question completely. Approximately 51.4% of the recoverable primary reserves has been produced, or will be produced, by February 1st, 1960.

Q Now, then, based upon that information and the information shown by your Exhibit No. 22, would you classify this as a

pressure maintenance project or a water flood project as defined under Rule 701?

A This will be a pressure maintenance project by water injection.

Q Actually you are familiar with the provisions of Rule 701 as presently in effect, which among other things defines a pressure maintenance project as one which has not reached the advanced or stripper stage of depletion?

A Yes, sir.

Q It's your opinion that this project is not so qualified?

A That's right.

Q Do you have any further information that you care to call the Staff's attention to and the Examiner's attention to in connection with this?

A Yes, sir, we estimate a commencement date of water injection of June 1st, 1960. We have calculated and estimate a secondary recovery of 6,800,000 barrels from the pressure maintenance project, which would give us a total primary and secondary recovery to depletion of the project of 13,120,000 barrels of oil. This being 30% of the original oil in place that we felt like was recoverable.

We estimate that we will use eighty-seven and a half million barrels of water. We propose to inject the water between 12,000 and 16,000 barrels per day, using the initially proposed 17

injection wells asking for administrative approval to possibly convert an additional 15 at a later time if engineering study and experience from the operation of the project indicates that we need additional injection wells.

We estimate the maximum injection pressure will be 1200 pounds per square inch at the surface of the injection wells. We propose to maintain our pressure certainly below the critical pressure and we think the critical pressure would be 2800 pounds at the surface. We propose, however, to not inject over 1200 pounds of pressure at the surface.

Q Do you have anything further in connection with this exhibit?

A No, sir.

MR. UTZ: We'll take a ten-minute recess.

(Whereupon a recess was taken.)

MR. UTZ: The hearing will come to order. Will you proceed?

Q (By Mr. Errebo) Mr. Rogers, have you given consideration to pool rules and regulations for this project?

A Yes, sir.

Q And have you prepared such proposed rules?

A Yes, sir.

Q Are they set forth as Exhibit No. 24?

A Yes, sir.

Q Will you proceed to discuss each of the provisions of those rules and regulations to the extent that you may see fit?

A On Exhibit 24, Rule 1 reads: "The project area (initial participation area) of the British-American Oil Producing Company, West Bisti Water Injection Pressure Maintenance Project shall comprise that area described as follows:".

Q That is the area that has been set forth in your Exhibit No. 7, I believe?

A That is right. If it isn't necessary to go through each one of these, that is the exact participating area that we did describe in Exhibit 7.

Q Will you proceed now to the next rule, please.

A "Rule 2: The allowable for the West Bisti Gallup Sand Project shall be equal to the then current normal unit allowable for an 80 acre proration unit of comparable depth in Northwest New Mexico times the number of 80 acre proration units in the project area of the West Bisti Unit including those units having wells which are shut in or are used as injection wells, and those units or portions thereof having no wells.

Q Now, 80-acre spacing is in effect, is it not?

A Yes, sir.

Q In this pool, in this portion of it. Will you refer to your Exhibit No. 7 and explain the particular situations which you might say are not fully apparent by this rule which would be

covered by it?

A We propose that each 80-acre unit on which a well is located would be granted, as stated a minute ago, "the then current normal unit allowable for an 80 acre proration unit of comparable depth in Northwest New Mexico".

We also propose that fractional units get a proportional allowable according to their acreage, in this particular case a part of Section 18 and Section 19 within the participating area, Township 26 North, Range 13 West, on which we have the Riddle No. 1 well that was drilled on a hiatus or acreage within those sections on some 62.24 acres, that is that amount of acreage is within the unit.

Q By that you mean that is a correction all along a township line there, is that correct?

A I think that is correct, I think probably along a range line.

Q Or range line?

A Yes, sir. The rule proposes then that that particular well would be granted an allowable to be used in the aggregate or project allowable that would be equivalent to this fractional part of the 80 acres. For example, 62.24 over 80 times whatever the current 80-acre normal allowable is at any given month.

Q Do you contemplate that you would also assign the same allowable to the wells in the buffer zone?

A Yes, sir.

Q What information do you have that this buffer zone barrier has been effective to separate the Central Bisti Unit and the area now under consideration?

A Since approximately July 1st or August 1st, 1958 we have been injecting water into the previously mentioned barrier wells, two of them being on the west side of the barrier line, B. A. wells, three being on the east side which are Sunray wells. We have injected approximately 500,000 barrels of water combined injection into the five wells. We are satisfied and Sunray is satisfied that it is an effective barrier between the two projects.

A buffer zone being described as the zone, a buffer zone is that zone that coincides where two projects butt up against each other, so we would propose the same allowable for the buffer zone that we have previously mentioned.

Q Now, are there any other tracts or portions of units or full units which do not have a well on them at the present time within the project area?

A Yes, sir. The Southeast, Southeast of Section 19, 26 North, 13 West, a 40-acre tract does not have a producing well upon it. It's the one that I mentioned earlier having producing wells on three sides. However, the Southwest of the Southeast of that Section 19 has the dry hole on it. We would propose that this 40-acre tract be given a project allowable based upon the

acreage.

Q Does the information which you have indicate that that tract would be productive of oil under this proposed injection project?

A We believe, since it is outlined on three sides by producing wells, that because of the other engineering data, that it should have oil in place under it, yes.

Q Is there a full 80-acre unit within the interior of the unit, you might say of the project, which is undrilled at the present time?

A Yes, sir, the North Half of the Northeast Quarter, Section 35, 26 North, 13 West, the Marye "B", a British-American Lease, has no well drilled on that 80 acres. However, it is completely surrounded by producing wells on all four sides. From all information, certainly it should be productive and has oil in place under it. We would propose that it be given the top normal unit allowable, as a part of the project allowable.

Q Is there any other, you might say peculiar situation, in here which would be covered by these rules?

A Yes, sir, the British-American Douthit "B" #5 which has been used as a gas injection well under authority given to us by the Commission. That well is located in the Southwest, Northeast of Section 28, 13 West and 26 North. We have injected, in conserving gas from our properties in West Bisti Field, we have

injected some, oh, approximately a quarter of a million feet of gas. It is presently shut in because all gas is being sold and transmitted into El Paso's line. The well is shut in, however we request that it be given a current normal top allowable, at the time it was converted it was a top allowable well.

Q That well was a good well, I presume, before it was converted?

A Yes, sir, it was one of the top allowable wells.

Q And the injection of gas has now made that well incapable of producing oil at the present time?

A That's right.

Q And you would ask the Commission not to penalize British-American by having to conserve gas by injecting it into the well?

A That is right.

Q Do you believe that the rule which you propose for the assignment of allowable, Rule No. 2, is a fair and equitable rule?

A Yes, sir, I do.

Q Does it ask for the same treatment allowablewise that is being given to wells which are designated or classified as primary producers elsewhere in the San Juan Basin?

A Yes, sir.

Q Then it makes the allowable for this project subject to market demand, does it not?

A It does.

Q You aren't asking for special treatment?

A No, sir.

Q You aren't asking for a bonus?

A No, sir.

Q You are simply asking that this project be treated equally?

A That is correct.

Q Were the allowables assigned to other wells in the area?

A Yes, sir.

Q Now, do you feel that the transferred allowables should be the full unit allowable?

A Yes, sir.

Q And why do you feel that it should be the full unit allowable?

A Well, for one thing, it certainly would make it easier to administer in not being required to make monthly production tests on all the wells and not having to file lengthy detailed reports. We certainly propose to file reports that are required by the Commission to keep them up-to-date on it, but by being able to transfer top allowable, it would be much easier to administer.

Q You feel that the rule that you proposed here as to allowable and the rest of the rules which you will propose are

workable and relatively simple of administration?

A Yes, sir.

Q If new injection wells were to be drilled rather than converting old wells, that would, of course, involve considerable additional expense, wouldn't it?

A Yes, sir.

Q If these injection wells were stimulated so that their production was increased to say the top allowable, then they would be given that amount, wouldn't they, under the present rules of the Commission?

A They would.

Q Now, if they're stimulated instead by the injection of water, do you feel then that is a reasonable justification for asking for a full allowable for the wells which you transfer allowables from in order to convert them to injection wells?

A Yes, sir, I do.

Q Do you have any other observations on the allowable formula which you are presenting to the Commission here today?

A Not right at this moment.

Q I might ask you this, with the exception of say five or six 80-acre units, does each of the proration units within the project area either directly or diagonally offset an injection tract?

A Yes, sir.

Q Will you proceed to discuss Rule 3?

A "Rule 3: The project allowable may be produced from any well or wells in the project area in any proportion."

Q Excuse me, I might ask you at that point, do you feel that that is likely to cause waste?

A That this rule --

Q This rule could cause waste.

A I don't think it will, no, sir.

Q In other words, there is no bottom water here, is there?

A No, sir.

Q You see no reason why the operator who is conducting a pressure maintenance operation, should not be afforded full latitude in withdrawing production from the unit any place or at any rate that he may see fit in the exercise of his best judgment?

A I think we should be allowed that, yes, sir.

Q Proceed to Rule 4.

A "Rule 4: Conversion of producing wells to injection, or the drilling of additional wells for injection, shall be done only after approval of same by the Secretary Director of the Commission. To obtain such approval, the project operator shall file proper application with the Commission, which application shall include the following:

(1) A plat showing location of proposed injection well, all wells within the project area and offset

operators, locating their offsetting wells to the project area."

Q Actually, is not this rule, Mr. Rogers, almost identified with a similar provision in Rule 701 of the Commission?

A Yes, sir, it is.

Q I believe you might just omit a further discussion of that then.

A All right. "Rule 5: Each month the project operator shall submit to the Commission a Water Injection Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required."

Q Actually you aren't prepared at this time to go into the details of such a report, are you?

A No, sir, I am not.

Q You would be willing to sit down with the Commission at any time and attempt to work out some form of report which would be satisfactory?

A Yes, sir, we would. "Rule 6: The commission shall, upon review of the report assign a project allowable for the next succeeding month in accordance with these rules."

Q Now, you feel there that the timing of the submission of the report should be such that it would fit in with the Commission's studies made each month of the information submitted by the operators and other consideration to determine the next

month's allowable, is that correct?

A Yes, sir. "Rule 7: The Special Rules and Regulations for the operation of the subject project shall prevail against the Statewide Rules and also against the Special Rules and Regulations for the Bisti-Lower Gallup Oil Pool, if in conflict therewith."

Q Is it also your proposal that the rule presently in effect covering the buffer area which was adopted in Case 1663, I believe Order R-1416, superceded to the extent that it may be in conflict with the project as now proposed?

A Yes, sir.

Q Actually it would appear that these rules will cover the operations of the buffer zone, will it not?

A Yes, sir.

Q Do you have anything further which you care to offer at this time?

A Yes, sir, the proposed rules would set a definite ceiling for month to month in that it allocates current allowable each month.

Q Do you feel that a pressure maintenance project may be restricted from time to time as may be indicated by market demand without causing a loss in ultimate recovery and, in particular, I'm referring to this pressure maintenance project as you propose it?

A I think it can be, yes, sir. You might qualify that within reasonable limits. Reasonable limits being present time

40-acre allocation to 63 barrels per day, or that is it will be in February rather. And I would answer your question in the affirmative there unless it were restricted down to some 20 or 30 or 40 barrels, in other words quite an adverse restriction.

Q British-American is willing to produce from this project whatever the allowable may be from month to month?

A That is right.

Q Actually do you know how low the allowable has gotten in any recent year in New Mexico?

A In Northwest New Mexico?

Q Yes.

A Well, since pipeline outlets were available in Northwest New Mexico, I think the average is 52 barrels per day per 40-acre tract.

Q It has been considerably lower than that?

A I think it has been lower than that in three other months, or has been lower than that, yes, sir.

Q Actually then, from what you said, you don't feel that it's necessary to pick some arbitrary figure or some figure otherwise determined as a fixed figure which would represent the allowable for this project here on out, is that correct?

A That is right.

Q And is your reason for making that statement that the operator can fluctuate his production each month in accordance

with market demand?

A You said can fluctuate?

Q Yes. A That is right.

Q So therefore as compared say to water floods there is no need to give the operator a fixed allowable so that he may design his project in such a manner that it will not exceed in production the amount of that allowable?

A That's right. It is not necessary to do that in this pressure maintenance project we are talking about here.

Q Do you have anything further?

A No, sir.

Q These exhibits, were they prepared by you, under your supervision or by the Bisti Engineering Committee?

A They mostly were prepared by the Engineering Subcommittee under my supervision.

MR. ERREBO: That's all we have of this witness.

MR. UTZ: Any questions of the witness?

MR. PAYNE: Yes, sir.

MR. UTZ: Mr. Payne.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Rogers, prior to initiating this pressure maintenance project, do you propose to install an ACT system to handle the production?

A The Engineering Subcommittee made a lengthy study of that and at the present time the recommendations are not to put one in. However, we might in the future change our opinion on that. At the present time we do not propose that.

Q Do you propose to produce any wells outside the participating area into a tank battery with the wells in the participating area?

A No, sir.

Q So you wouldn't have to worry about a separate metering problem there?

A That is right.

Q Is your zone of injection to be the entire Lower Gallup perforated interval in each of the wells prior to the time they were converted?

A Yes, sir.

Q Now, referring to this El Paso State Well No. 9 in Section 2, 25 North, 13 West, did the Engineering Committee or Subcommittee draw any conclusion as to why that well was a dry hole?

A Yes, sir, that well was studied by the Engineering Subcommittee and it was our opinion that El Paso being a prudent operator had done everything in their power to make a well out of the well and it would not or is not a commercial well.

Q Now, on your Exhibit 1, the structure map, it would

appear that the structure is almost identified with your Marye Well No. 3 in Section 1, would it not?

A That is probably correct. However, structure is not the controlling factor in the Lower Gallup sand, it is more permeability and porosity development, not structure.

Q As I understand it, this El Paso State well was just temporarily abandoned, it hasn't been permanently plugged and abandoned?

A I'm sorry, but I can not answer that, I'm not sure.

Q Let me ask you this, do you know of any proposal to go back to reenter that well and try to make a producer out of it?

A To my knowledge, I don't know.

Q Now, I take it by your testimony that you are going to inject under pressure, is that right?

A We believe that we will have pressure, yes, sir, and that has been proven by the barrier system.

Q The water that you are going to inject is corrosive and you propose to use a plastic-lined tubing to take care of the corrosion problem?

A The water is corrosive, not to an extreme degree. We do propose to use the plastic-lined tubing to isolate any water action on the casing that is above the production packer.

Q You don't have any proposal at this time to run sweet oil in the annular space between the casing and the tubing?

A By injecting the water in the tubing and having the production packer in there we don't think it is necessary.

Q These wells are all relatively new, are they not?

A I think most of them have been drilled since '55.

Q So there's no problem in regard to the casing?

A No, sir, there should not be.

Q This is going to be a closed system, is it not?

A Yes, sir.

Q Do you have a log of the Marye No. 1 well?

A Yes, sir, I do, I have it with me.

Q In view of the fact, Mr. Rogers, that the unitized area depthwise is pinned on your Marye No. 1 well, it would appear that that's the crucial log, and if you wouldn't mind, we would like to have that as an exhibit.

A I would be glad to leave it with you. I think that was kind of a missight on our part. Would you like for me to describe this log?

Q Please, yes, sir.

A The British-American Marye No. 1 located in the Northeast, Northeast, Section 1, 25 North, 13 West, is a proposed recovery well. It is presently producing from the Lower Gallup sand. As part of the record we will give you a copy of the electrical log run on the Marye No. 1. This also was used as an exhibit in the barrier case which was 1663. It indicates the top

of the Lower Gallup sand at some 4833 feet KB. It indicates the base and also indicates the second zone and the third zone.

Q Now, you proposed under your rules that each injection well will get a normal unit allowable which it can transfer to the producing well, is that right?

A Yes, sir.

Q Why do you feel that the well is entitled to that amount rather than the amount which it was producing immediately prior to conversion?

A Considering the moneys that will be spent in putting the water injection program into effect, and not wanting to have that type of project penalized, we have proposed to use the top unit allowable on, that is for all 80-acre tracts within the West Bisti participating area.

I might point out that we aren't asking for any bonus at the present time because after 17 wells are converted to water injection wells, leaving some 46 producing wells, that will actually sustain a loss in production from what we are currently producing and would be considerably less than this ceiling that we were talking about. However, as the project responds to the water injection as we go in and make studies and do necessary changes to change the pumping equipment which may be too small, as long as we are in, within what we believe is our MER, most efficient rate of production we would like to have this ceiling to give

us something to be shooting at all the time rather than having the fixed allowable or just what the well is capable of producing right now. If the water injection wells were not converted to producing wells, we could go in and frack treat it, put larger equipment on and try to stimulate it. Those wells also would be stimulated by water injection and we would be allowed to produce greater and greater amounts from those up to this top unit allowable rather than curtailed to something that maybe we have been producing in the last three months or last month. We think it would be in accordance with the statutes, would create waste if we had to go in and drill additional wells in order to keep these wells as producing wells to get the largest allowable that we could.

Q Now, when it reaches the maximum point, that is top unit allowable for each well, you don't feel that the Bisti Pool would be getting an unfair share of the total allowable for Northwest New Mexico based on market demand from that area?

A As long as it is tied in with market demand, I don't think we would be getting an unfair share of it, no, sir.

Q Your project allowable will be tied to normal unit allowables?

A That is correct.

Q So that you don't have to inject at a constant rate or at any specific rate in order to prevent the physical waste of oil?

A I think that insofar as injection rates go, now you mentioned injection rates that we would probably try to make some study and recommend to the operator. I think that maybe is within the operator's discretion to determine how much water that is within the limits approved by the Commission; we might make a study and try to determine the net acre feet that we feel each acre might flush and try to vary the injection rates into the wells. Again, it may be advisable to inject a constant rate in each one within pressure limitations.

Q If you injected a constant amount into each one, then you wouldn't have your production rate tied to the allowable, would you, assuming the allowable dipped from 63 to 53, you couldn't keep injecting the same amount of water in your injection wells, could you?

A I think we could because on one of the exhibits showing the pressure decline in the field we have indicated that the pressure is some 700 or 750 pounds less than originally, and whereas we propose to inject quantities of water to maintain the pressure, which would be putting in water voidage equal to your reservoir voidage from current production. I don't think that would affect how much water we put in the reservoir if the production rate were decreased to 53 barrels a day, that is the allowable.

Q You have a leeway?

A Yes, we have such a leeway.

Q You control production rather than injection?

A Yes, because we would be glad to have the pressure go up 10 or 15 pounds.

Q Under your proposed rule you propose to give the units or portions thereof having no wells on them an allowable? Isn't this rather unorthodox procedure? You haven't spent any money drilling a well on that unit, and furthermore you can't be assured that it's productive, can you?

A We are as sure that it would be productive as possible without actually having drilled a well. Now, the 80-acre tract that I mentioned earlier on a British-American Lease is surrounded by production on all sides, the continuity of the reservoir and everything would certainly indicate that that particular 80 would be productive and has oil in place that will be produced. We don't feel like under secondary operations only that it would be to the benefit of the operators to spend the money to go drill a well.

Q Of course the El Paso State No. 9 was offset on two sides by producing wells too, was it not?

A Yes, sir. However, again, it is getting off to the Southwest where the permeability and porosity development just disappears.

Q I believe you testified that you felt that if new injection wells are drilled they should also get a normal unit allowable?

A Yes, sir.

Q Now, is that if they're drilled on an 80-acre tract or if you drill a second well on an 80-acre tract, one being the producer and one being the injection well, you wouldn't expect a full 80-acre allowable for each of them, would you?

A My personal opinion would be that if we drilled another well to be an injection well to an 80-acre tract, it should come in under the proportional acreage factor.

MR. PAYNE: In other words, you are saying, if you have two wells on an 80 it certainly should be prorated there.

MR. ERREBO: Mr. Payne, I don't believe that was his testimony. If it was --

MR. PAYNE: I am trying to straighten out what his testimony was.

A I beg your pardon. Let me dig back here.

Q All I'm getting at, if you drill a new injection well on an 80-acre tract and you have a well dedicated, you have that 80-acre tract dedicated to a producing well, you wouldn't want anything for that additional injection well, would you?

A May I take one moment?

Q Yes, sir.

A If I am understanding your question correctly, we are in Rule 2 talking about 80-acre proration units, and I don't believe that I testified that if on any given 80 acres where we have a producing well at the present time and we went in and twinned it or drilled an injection well on any part of that 80, I don't believe I intended to ask for a full top 80-acre allowable to that well when we have already a well on the 80 acres.

MR. PAYNE: That's what I was trying to bring out. Thank you, that's all.

MR. UTZ: Any further questions? Mr. Nutter.

BY MR. NUTTER:

Q Mr. Rogers, how many wells in this area currently are being used for injection?

A In the West Bisti, or west of the barrier line, there are presently two wells being used as water injection wells. Then on up in the field, the Douthit "B" #5 was used as a gas injection well to conserve gas.

Q The only other two water injection wells that you have are the Marye "B" #2 and the Marye "B" #5 in the water barrier?

A That is Marye No. 2 and Marye No. 5, Dan, instead of "B".

Q Thank you. Then you have the one gas injection well?

A Yes, sir.

Q Well now, have any of the producing wells in the neighborhood of the barrier received any response from water

injection into the barrier?

A Yes, sir, we have seen some response. I'm speaking purely on the west side.

Q Possibly your Marye 6 or your Marye 8 indicated response to the water injection?

A I don't remember exactly which well, but I have it where I can tell you specifically. You want me to specify which ones, Dan?

Q Yes, sir, and the amount of the response, if you please.

A The British-American Oil Producing Company's Marye No. 8 in the Southwest of the Southeast, Section 1, 25 North, 13 West, over the last three months of 1959, and I presume the first month of 1960, the decline has been arrested. There has been no response insofar as an increase from that well, and it is currently producing 26 barrels per day.

The Marye No. 6, located in the Southwest, Northeast of Section 1, 25 North, 13 West has also experienced an arresting of the decline over the past two to three months' time. It is presently producing 120 barrels of oil per day.

Q Do you think that the response of these two wells is such that you'd be able to say that this has been a pilot so-to-speak to indicate the success of a water injection project for the rest of the year?

A I think the data from the barrier can be used as a criterion of how the rest of the field might respond to it. We have not considered it to be a pilot, it was a cooperative project that had to be done between the two units to form the barrier. It could be used as one part of a pilot project.

Q Well now, is the British-American plan to put the 17 injection wells on almost simultaneously?

A Yes, sir.

Q So that you'll have the 17-well pilot in effect covering the whole project?

A Yes, sir, I think we would convert them and be ready within, oh, just a very few days of putting water into the 17 at one time, yes, sir.

Q And then, if experience dictates, then you could add another 15 wells?

A Yes, sir. Which certainly would be on down the line some, I don't know, two or three or four years, whatever time it takes to where we can make our study and evaluation and determine whether we need any more.

Q Do any of these wells have any perforations either above or below the point on the log that would be the equivalent of 4826 feet and 5,000 feet on the log of the Marye No. 1 well?

A What was your deepest depth that you mentioned?

Q It's the 5,000 foot point on the Marye No. 1.

A In other words, your question is, are any of the wells perforated above or below the three benches of the Gallup sand?

Q Above or below the unitized vertical limits.

A To my immediate knowledge there are none.

Q So all injection or all production would be in the unitized area or from the unitized area?

A Yes, sir.

Q Now, in the exhibits that depicted your two or three wells there that showed the casing seat and the amount of cement used, you indicated that the 5½ pipe had been cemented with some sacks. Were temperature surveys run, did you find that the temperatures were above?

A To the best of my knowledge the temperature surveys were run.

Q And in all cases the perforations are cemented off then?

A Yes.

Q Will your injection system be a closed system, Mr. Rogers?

A Yes, sir.

Q Will your water distribution system be buried?

A Yes, sir, it will have to be below the frost line.

Q Will that distribution system be plastic coated or in some manner treated that will be resistant to the corrosion of the water?

A It will be treated where it will be resistant to the corrosion, yes, sir.

Q Your Exhibit No. 11 indicates that the El Paso State No. 9 well had 7 feet of microlog separation and the CM and W well in the Northwest of the Northeast of Section 30 had 9 feet of separation. Your Exhibit No. 12 indicates that the El Paso well on the S.P. had 12.7 feet of pay and the CM and W well, 7.8 feet of pay. Exhibit 13 indicates that the Zone 2 of the El Paso well had 10.7 feet of pay while the CM and W had 4.1 feet of pay. And Exhibit 14 shows that Zone 3 of the El Paso well had 11.2 feet of pay and the CM and W well had 11.1 feet of pay. You mentioned that the El Paso well had not been included in the participating area here was the fact that it wasn't commercial. Was the CM and W well considered a commercial well?

A At the time they completed it they evidently thought it was commercial because they ran casing perforated, whether they fracked or not I'm not sure, but put pump equipment on it, that well, as another criterion to tell; production may not have been commercial, but it was completed as an oil producer and was commercial at that time.

Q How long did it produce, or is it still producing?

A It is shut in at the present time. I don't know exactly how long it produced.

Q Do you have any idea how much it's produced?

A I think it produced three to four thousand barrels, something in that magnitude. I don't know exactly.

Q The well probably never has paid out, has it?

A No, sir.

Q Well, now, it appears that from several of the criterions that you have gone by that perhaps this El Paso well is at least as good as or maybe better than the CM and W well. Do you know whether any mechanical difficulties occurred in the completion of the No. 9 El Paso well that precluded it from becoming a producer?

A I personally have not studied any of those possibilities, Mr. Nutter. I did feel like that the operator of the tract did everything in their power to make a commercial well out of it since that certainly is, I mean is their primary business. I think they were prudent in trying to make a well out of it.

Q Well now, if the well were a commercial well it would be on line and in the pattern to be included in this row of injection wells being the Hospah No. 2 and the Hospah No. 3, would it not?

A I think that's right, but let me check. If it were a commercial well it would be included and would be in line with those wells, yes, sir.

Q Do you think the injection of the water in the No. 9 would enhance the production of oil from your Marye "B" #6?

A It could possibly enhance it to a small degree, that being on the edge like that we don't think it would be of any great magnitude, if any. We do feel like that the proposed injection wells we have at the present time will effectively flush the zones in there anyhow. I think in getting over to the agreements between the operators, certainly at a later date if deemed advisable or necessary, they can expand the participating area, but the way it stands now the tracts cannot be brought into it that do not have producing wells on it with the exception of the one and a half tracts that I have previously mentioned.

Q You don't think that the fact that the dry hole was drilled on the tract up there on Skelly's Duff Lease indicates that the entire tract would be non-productive, do you?

A Meaning the east 40 of that particular tract?

Q Yes, sir.

A No, sir, we feel like that that tract will have oil in place that can be recovered again, since it's bracketed on three sides by wells that have produced.

Q How many orders are presently in effect in this area, Mr. Rogers, that have special rules for the operation and producing of the wells?

A West Bisti Unit. West Bisti Field.

Q Yes, sir, in this area.

A Two are the only rules that I know of, one being on the

barrier and then one on the Douthit "B" #5.

Q Do you propose that the rules that you have submitted here today would supercede those rules that are presently --

A Yes, sir, we do.

Q Now, your rules as proposed, don't provide for the shutting in of any high gas-oil ratio wells or transferring the allowable of any wells that are shut in for any reasons whatsoever if you superceded, those provisions would be lost, wouldn't they?

A Yes, sir.

Q I believe one or possibly both of the existing rules make that provision?

A Yes, sir, what we would propose would be to give just a straight top unit allowable, or normal unit allowable, for the Douthit "B" #5 80 acres. Consequently we would see no reason or need for the rules that you just mentioned.

Q So, in other words, you would have this top unit allowable assigned to every 80-acre tract in there whether the well was drilled or whether it was producing or shut in or regardless of its status?

A That is true.

Q You are asking for this even though you did not state that you weren't asking for any special treatment or bonus?

A We don't feel that we're asking for any special treatment or bonus.

Q You stated that you felt that one reason why the injection well should receive top unit allowable was that if they were stimulated that perhaps they could make top unit allowable prior to the time they were converted?

A Yes, sir. We don't subscribe to the theory that you should transfer only that from a well what it is capable of making, because we feel that in so many cases you might go out and stimulate your well and frack your well and do this and that and the other to the well to try to get that particular production up just to be able to get that much allowable transferred. We feel like that the project allowable should be tied to proration in the way we have proposed here and that each tract within that unit area be granted the top unit allowable.

Q Now, for instance, Mr. Rogers, your Douthit No. 2 in the Southwest Quarter of the Southwest Quarter of Section 28 is an injection well, on your ultimate injection pattern, what amount of oil is that well currently making?

A That was Douthit No. 2?

Q Yes, sir.

A In November it produced 20.1 barrels per day average.

Q You think any amount of stimulation could be given that well to make a top unit allowable well out of it today?

A I doubt that we could increase it to a top unit allowable by stimulating it.

Q But you would ask a top unit allowable for that well in the over-all project allowable?

A In the over-all project, yes, sir.

Q Mr. Rogers, you also stated in response to questions by Mr. Errebo that with the possible exception of five or six tracts in this proposed project that all of these producing wells either diagonally or directly offset injection wells. Did you mean directly or diagonally offset the injection wells as the entire 32 injection wells may be placed on injection, or the 17?

A The proposed 17.

Q I see. Mr. Rogers, would it be your interpretation of Rule 3, as you proposed it, that any well or that the project allowable could be produced from any well or wells in the project in any proportion and also your Rule 2 there where you have assigned top unit allowable to a well whether it was capable of making it or not, would the combined effect of these two wells amount to capacity production for the wells that you desire to produce at capacity?

A Not necessarily, because we don't know that we would have to produce any one well or wells at its capacity production.

Q It seems you would have ample allowable that you could produce the wells at their capacity, however?

A Would you repeat that, please?

Q It would seem that under your proposal you are going

to have adequate allowable to enable you to produce the wells at capacity, wouldn't you imagine?

A Of course, as long as that is within the MER and would not cause any physical waste there might be cases where we might be producing them at capacity.

Q Do you have a projected MER for this project after it gets under way?

A No, sir, we do not.

Q Now, you stated that you didn't anticipate any difficulty as long as the allowable stayed at 63 barrels, but I got the impression that maybe you had some doubts if the allowable should drop to 20, 30 or 40 barrels. What difficulties would you anticipate there?

A I think most of the difficulties would be strictly mechanical more than reservoir conditions. Of course, that's one thing that we're intimating here or asking for is to have our project allowable geared to market demand, taking the possible chance that the market demand will decrease and allowables will go down.

Q What would happen if they went down to 20, 30 or 40 barrels here today?

A I would suppose we would have to shut in certain producing wells throughout the field rather than trying to slow down larger purchasing units and pumping engines below there, pump

efficiency. I think it would be more mechanical then.

MR. NUTTER: I believe that's all, thank you.

BY MR. PAYNE:

Q Do you feel, Mr. Rogers, that the barrier completely isolates the British-American project from the Sunray-Mid-Continent project?

A British-American and Sunray, as operator of the Central Bisti, we are jointly in agreement that it does. We believe it does, yes, sir.

Q So that you wouldn't necessarily have to have the same system of proration in the two units?

A I don't think we would have to because even though the fields butt up against each other, we're talking about two completely different mechanisms of secondary recovery. I don't think they have to be geared to each other at all.

Q It would seem that the method to determine the project allowable for one should probably be the same one utilized in the other, wouldn't you think, as a matter of equity?

A With the barrier in there and being effective, we don't think equities are going to be involved insofar as migration of oil across that barrier in either direction. I don't think that we subscribe or agree with the requested allowable the way it was requested in the other unit to where we could say, yes, we would like to be geared to them. We think our method is the fairest and

best method.

MR. UTZ: Do you have another witness, Mr. Errebo?

MR. ERREBO: Yes, I do. He'll be very brief.

MR. UTZ: Do you have any objection to coming back after lunch?

MR. ERREBO: No, sir.

MR. UTZ: We will adjourn to one-thirty.

AFTERNOON SESSION

MR. UTZ: The hearing will come to order, please.

CROSS EXAMINATION (Continued)
of Mr. Rogers

BY MR. UTZ:

Q Mr. Rogers, do you have a record of how many marginal wells is in this proposed unit at the present time?

A Yes, sir, I have a record of what the wells produced, daily average in November, 1959.

Q Could you count them and give us a figure of those wells that didn't produce less than 53 barrels?

A Fifty-three per 40 or per 80.

Q Well, the normal unit allowable would be 106 barrels?

A Yes, sir.

Q Give me an idea how many marginal wells you had.

A 37 wells of the 63 in the West Bisti Unit.

Q I wonder if you would point out the undedicated

acreage in this unit. That is the acreage or the units which have no wells in the participating area.

A On Exhibit No. 7, the North Half of the Northeast Quarter of Section 35, 26 North, 13 West, has an 80-acre tract that does not have a well on it. Then, the Southeast, Southeast, Section 19, 26 North, 13 West, is a 40-acre tract within the participating area that does not have a well on it.

Q That's all? A Yes, sir.

Q Are both your No. 2 and No. 4 water wells drilled at the present time?

A Let's see, water supply well No. 2 is drilled. It is not equipped. Water supply well 3 is drilled and equipped. Water supply well No. 4 has not been drilled.

Q Again, how much water was it that you proposed to inject initially?

A From 12 to 16 barrels of water per day.

Q You feel that the No. 2, No. 3 will furnish you that much water?

A Actually No. 2 and No. 2 will not furnish as much water as we need, that's the reason for proposing the additional water supply well.

Q Which was the gas injection well that you spoke of this morning --

A That's the Douthit "B" #5, which is located in the

Southwest, Northeast of Section 28, 26 North, 13 West.

Q When you made an injection well out of that one, do you recall what the producing capacity was?

A I don't know what the producing capacity was. It was a top allowable well.

Q Top allowable at that time was what, around 52 barrels?

A It may have been, which would have been 104. It appears that we may have had a test on record at that time of 126 barrels per day, if I'm not misinterpreting my notes here, but it was a top unit allowable well.

Q But you really don't know how much it is capable of producing?

A Now?

Q At the time you converted it.

A No, sir, I have no record of what its capacity production would have been at that time.

Q But do you think it was capable of producing 126 barrels?

A Yes, sir, I do.

Q With reference to your Exhibit No. 24, I believe it was, 23, is it your estimate that you will recover by both secondary and primary methods 30% of the oil in place?

A Yes, sir, that particular figure is based on oil in place, Zone 1. It would be something less than 30% if you were

adding the Zone 2 and 3 into this particular calculation.

Q What percent oil would you feel that you would recover by just primary methods?

A The 6,320,000 barrels is the estimated recovery that we think we'll get with primary methods.

Q So that you have almost, you feel that you will almost double the recovery of oil by using pressure maintenance?

A Yes, sir.

Q Now, the total percentage figure of original oil in place, isn't 30% a little bit low?

A It may be a little low in relationship or comparing with all old fields, but in a field of this type right here I don't think it's too low, no, sir.

Q It's lower than what we would like to have because that's what we think the recovery would be.

Q Do you feel that there are other methods that would give you a better percentage of recovery?

A No, sir, we do not.

MR. UTZ: Are there other questions of the witness? If no other questions of the witness --

MR. ERREBO: I have further questions if the Staff doesn't have any more.

MR. UTZ: Apparently they don't.

REDIRECT EXAMINATION

BY MR. ~~ARREBO~~:

Q Mr. Rogers, are you familiar with the allowable provisions of Statewide Rule 701?

A Yes, sir.

Q Those are the rules which govern secondary recovery projects, are they not?

A Yes, sir.

Q They cover both pressure maintenance and water flood?

A Yes, sir.

Q The productive capacity of wells converted to injection are not considered in the assignment of allowables to water floods under those rules, are they?

A That is right.

Q Do you know what consideration is given to well status under the water flood ruless? Actually there's no consideration given, is there?

A That is right.

Q Transfer of allowables provided for?

A Yes, sir.

Q Under the water flood rules?

A Well, each tract gets the set allocation regardless whether it's in East New Mexico or Southwest.

Q So actually there is no mechanism set up for transfer of allowables?

A No.

Q Any transfer of allowables from high gas-oil ratio wells?

A Not that I know of.

Q No consideration is given to the actual productive capacity of the well within the unit in assigning the allowable, is it?

A That's right.

Q I think in response to a question from Mr. Nutter this morning with regard to whether the assignment of allowable in this case would result in capacity allowable, actually whether or not an allowable is a capacity allowable depends on several factors, doesn't it?

A Yes, sir.

Q Could you state what those factors might be?

A At the present time, of course, capacity production will be directly related to the type pumping equipment you have in subsurface and surface.

Q Whether or not it was capacity would also depend on market demand?

A Yes.

Q What the allowable was? A Yes.

Q It would also depend, would it not, on the stage of the life the project was in at the particular time?

A Yes, sir, I think it would.

Q It would also have a particular bearing upon the coincidence of a low allowable and high production, or the converse of that?

A Yes.

Q Now, you expressed the opinion that difficulties might result from a lowering of production from 63 barrels per day, as is the case for February, to some lower figure. Those difficulties that you referred to, did they by chance refer to the changes that would be necessary in the mechanical operation of the unit?

A Yes, sir.

Q Did you intend to imply that those difficulties would be the type of difficulty that would cause underground waste, for instance?

A I don't think it would cause underground waste, no.

Q In other words, you are saying then that underground waste would not be caused by a, for instance a reduction in the production from the unit by reducing the production from the unit?

A That's right.

MR. ERREBO: That's all I have.

MR. UTZ: Are there other questions?

RECROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Rogers, do you have high gas-oil ratio wells in a

stripper pool that initially had a solution gas drive mechanism?

A If it's a stripper pool I don't think you would have high gas-oil ratios, no, sir.

Q So you really couldn't compare a pressure maintenance project with a water flood project in the terms that we define water flood project with secondary recovery project, at least insofar as gas-oil ratios are concerned?

A I think that's probably right, I might make one other comment, if I may, of course in this particular type reservoir we don't expect high gas-oil ratios in the West Bisti Field.

MR. PAYNE: Thank you.

MR. UTZ: Any other questions? The witness may be excused.

(Witness excused.)

MR. ERREBO: I have one further witness for brief testimony. I would like to call Mr. Taylor.

E. L. TAYLOR

called as a witness, having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. ERREBO:

Q State your name, please. A E. L. Taylor.

Q You are the same Mr. E. L. Taylor that testified in Case 1866?

A Yes, sir.

Q Mr. Taylor, I would like to ask you concerning what contact you have had with regard to the other operators, particularly those operators who have been most active in this project with regard to the proposals which have been made here today by the British-American Oil Producing Company.

A I have been in contact with the operators who have been most active in this operation and those are, besides ourselves, Skelly, Phillips, El Paso Natural Gas Products, Honolulu Oil Corporation and Benson-Montin-Greer Drilling Corporation. At an operators' meeting on December 1, 1959, the operators voted upon the initial plan of development and operation for the proposed West Bisti Unit and approved that plan which we have here but have not introduced into evidence because we understand it's going to be introduced as an administrative act following the hearing, but before the effective date of the unit. That plan was as it has been presented here in this case.

Q Have those other operators also been informed of the essential details of the rules which we have proposed here today?

A Yes. At the December 1 meeting in which the plan of development and operation was approved we had not yet developed the field rules section that we propose to incorporate in our application. But since that time we have developed these rules and have been in contact with the same operators. They were

apprized of the contents of these proposed field rules which have been placed in the record here and they approved those orally to me by telephone and advised me that they would substantiate that oral concurrence by communications to the Commission, which Mr. Payne, I believe, read some this morning in connection with the prior case here.

Q Will you please identify those operators that you contacted as to the rules?

A Skelly Oil Company, Phillips Petroleum Company, El Paso Natural Gas Products Company, Honolulu Oil Corporation, Benson, Montin, Greer Drilling Corporation.

MR. ERREBO: Mr. Examiner, the reservoirs which have been received I think may not be too clear as to which of these two hearings they refer to. I think the intent of all these operators that he has named has been to concur in both applications. I don't know whether they realized that there were separate applications, one for the Unit Agreement and the other as contained in this hearing, or not. I think there's one which spells out and names the prior hearing, and if counsel desires, we can leave that out, but I would like to move that the wires received be admitted in evidence and made a part of the record in this case.

MR. UTZ: They'll be admitted.

Q Did you have anything further?

A That's all.

MR. ERREBO: That's all.

MR. UTZ: You may be excused.

"Honolulu Oil Corporation supports the application of British-American Oil Producing Company in regard to their application for unitization agreement and pressure maintenance project for the proposed Bisti Unit, San Juan County, New Mexico. F. D. Edwards, Division Manager of Development and Production, Honolulu Oil Corporation, Midland, Texas."

"Regarding number Case 1867, British-American application for approval of pressure maintenance project in the Bisti-Lower Gallup formation and corporation of field rules Benston Montin Greer Drilling Corp. concurs in this application stop we believe establishment of allowables and transfer of allowables as herein requested are in accord with the principals and benefits to be derived from unitization stop we therefore urge the Commission to approve British-American application. Benson Montin Greer Drilling Corp., Albert R. Greer."

"Regarding Case No. 1866, British-American application for approval of unit agreement covering the Bisti-Lower Gallup formation Benson Montin Greer Drilling Corp. urges that the Commission approve this application. Benson Montin Greer Drilling Corp., Albert R. Greer."

"Attention Mr. A. L. Porter: El Paso Natural Gas

Products Co. is in agreement with the British-American Oil Company's application for the approval of West Bisti Unit Agreement. We also concur with their application for approval of their pressure maintenance project establishing field rules, and a project allowable. The El Paso Natural Gas Products Co., W. T. Hollis."

"The Commission has scheduled for hearing on January 27, the application of British-American for approval of the West Bisti-Lower Gallup sand unit. Phillips Petroleum Company is in full support of the applications of British-American and urges your approval of the formation of the unit and of the proposed program for pressure maintenance by water flood operations. We believe the unit and plan of operation is fair and equitable to all concerned and will result in substantially increasing the recovery of oil from this pool. Phillips also urges your approval of establishing a unit allowable which would be determined by multiplying the full basic allowable for an 80-acre proration unit by the total number of 80-acre proration units in the unit. L. E. Fitzjarrald, Phillips Petroleum Co."

MR. UTZ: Do you want to enter your exhibits?

MR. ERREBO: Yes, I move the admission of Exhibits 1 through 25.

MR. UTZ: Without objection they'll be admitted in the record.

Are there any statements to be made in this case?

MR. SELINGER: If the Commission please, for the record, Skelly Oil Company owns approximately 23% in this unit. We would like to have a few comments with respect to the Applicant's proposed Rule 2 and 3 regarding a project allowable.

If the Examiner please, the statute both in 65-3-13 and 65-3-14 does not prohibit the Commission from issuing a project allowable. We further wish to point out to the Examiner that the criteria used for primary production which rightly concerns the Staff is, of course, the capacity of the well to produce at that time. You can't have well use that same criteria for secondary recovery because, and this is in answer to a question which Mr. Payne made regarding the oil in the reservoir, when you start putting water under pressure you immediately displace in the reservoir the natural criterias of primary production and you begin to move oil and gas and reservoir energy from one end of the area to the other end, from one 80-acre unit to another 80-acre unit.

Hence, you can't use a productive capacity of a particular well at that time, because after a series of secondary recovery for a period of time, a well which may ordinarily be under primary capable of only producing five barrels may very well be capable of producing 75 barrels because you have already moved and caused displacement in the reservoir.

The best brains of the oil industry have indicated that the ideal objective of conservation is to have as early as possible secondary recovery in the development of a field. We have been handicapped in the past by the fact that regulatory bodies have insisted that the oil industry first define a field in which a unit is to be formed for the purpose of determining what is in the reservoir. Consequently, we have had to wait until fields have been actually depleted and placed in the stripper stage before we could even attempt to make secondary recovery moves.

Now, this Applicant is coming forth with a plan which is becoming quite common throughout the oil industry, particularly in other states, in that they attempt to initiate secondary recovery methods as quickly as possible, and in line with one question that you, Mr. Examiner, asked, I'll ask you here is a 40-acre tract which is a part of a standard unit, we all know that there is recoverable hydrocarbons under that tract because although there's a dry hole immediately west, there's a producing well to the northwest, and to the southwest of this 40-acres. It has 10 to 12 feet of reservoir there under that 40-acre tract. How is the industry going to benefit by the reserves, the recoverable reserves under that particular tract?

Likewise on the 80-acre are you going to require the oil industry to needlessly spend money to drill up the entire productive limits of a unit knowing beforehand that they're going to

recover, as in this case, 6,000,000 barrels from primary to a total of 13,000,000 plus for both primary and secondary? I think this Commission should encourage the earliest possible moment in the development of a field in secondary recovery because it means additional oil, and as an illustration of how the criteria of primary cannot work under the criteria of secondary recovery here, we are recovering additional 7,000,000 barrels of oil. That doesn't necessarily come from only the tracts which have a producing well on it, it comes from any tract.that has any portion of productiveness in that reservoir that contributes to a part of the 7,000,000 additional barrels.

Other states have been quick to utilize this method of encouraging the oil industry for early secondary recovery. In Oklahoma it's becoming quite fashionable, I might say, to permit early utilization of a field, and in that regard I might point out the largest unit in Oklahoma which results in additional 313,000,000 barrels of oil as a result of gas secondary recovery pressure maintenance, the common rule there is to take the total number of proration units, which happen to be ten acres there, and multiply it by the top allowable and commensurate with the amount of productive acreage, which is, after all, what the Applicant is asking for now.

He is asking for credit for the 1500 plus productive acreage that lies in the unit. He's not asking for a per well. He's

asking for all of that productive acreage in the unit as determined by these schedules and the exhibits to be given credit for secondary recovery on pressure maintenance, and we think that even Kansas, for example, on the water floods is beginning to turn to per acre rather than a per well or each unit having a producing well on it. We think that the Commission should firmly consider the encouragement of the oil business in the light that the Applicant here proposes.

MR. UTZ: Are there other statements?

MR. PAYNE: Mr. Selinger, do I understand a portion of your statement correctly, do you feel that any of the oil that will be produced from the participating area is being flushed from any areas outside the participating area?

MR. SELINGER: I think when you start and you look at the unitization agreement, all the interested parties have fixed the amount of recoverable reserves under each of their respective tracts. It is designated there as to the amount of recoverable reserves under each tract, and that is considering both the primary and secondary, so that the parties themselves, both royalty owners and working interest, have already designated what their participation is. I think the Commission can do no less than honor the agreement that all the parties, after complete study, has indicated what the recoverable reserves are under each of the respective tracts.

MR. PAYNE: You are not saying there's a hundred percent signed up in this unit, are you?

MR. SELINGER: No, but what I am saying is that everything within the productive limits of the unit contributes to the secondary recovery the additional 7,000,000 barrels of oil considering the fact there's a time element which is determined by your productive limits of your producing area as it may be enlarged from time to time. But everything in the unit outlined contributes to that additional 7,000,000 barrels of oil.

MR. PAYNE: If it is all contributing, why isn't it all participating?

MR. SELINGER: Because it is commensurate with the time element, the participating area is the factor which weighs equally to offset the time element. Incidently, I might add in that regard, whether a purely pressure maintenance project which we have, for example in this unit I have referred to in Oklahoma, 275 wells drilled and about 50 of them are high gas-oil ratio, the operator immediately shut in the high gas-oil ratio wells. There were 40 or 50 different wells and the unit of the 276 wells now produce on the basis of only 140 wells. They got a project allowable and they produce the entire project allowable from the 140 wells, which points out the fact that the difference between the 140 and 276 wells were unnecessary wells to recover the recoverable reserves there, but they had to do it because they had

to determine the outline, the perimeter of the producing unit, they had to do it under the best tools we had in the last ten or fifteen years. But we no longer have to be saddled with those things and I think the Commissions of the various states should go along in the additional development of the production of oil and gas. It's a progress movement. I think the states should join along with the industry.

MR. NUTTER: May I ask you one question?

MR. SELINGER: Yes, sir.

MR. NUTTER: If Skelly, after drilling the dry hole in the section, had gone into the Southeast of Southeast and drilled a producing well, would they have asked for and expected to have received a full allowable for that well that they would have drilled, the second well?

MR. SELINGER: Under primary development, no. Under secondary recovery development, if we have the sand there we feel pretty sure that the injection of water would have been, driven oil in that dry 40 acres from somewheres in the field.

MR. NUTTER: You wouldn't have asked for full allowable?

MR. SELINGER: Not under primary, we couldn't.

MR. UTZ: Maybe you ought to unplug the well.

MR. SELINGER: That isn't too farfetched. In these units where you have dry holes drilled in the injection program there are many instances where the operators have gone back

into the well bores and made producable wells out of it. Yes, sir, we have done that ourselves in Texas at the edge of units.

MR. PAYNE: That may be done with El Paso State No. 9?

MR. SELINGER: Yes, sir.

MR. UTZ: Any other statements? If no further statements the case will be taken under advisement.

STATE OF NEW MEXICO)
: SS
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 1st day of February, 1960.

Notary Public-Court Reporter

My commission expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1867, heard by me on January 27, 1960.

....., Examiner
New Mexico Oil Conservation Commission