



DEARNLEY, MEIER, WILKINS and CROWNOVER

General Court Reporting Service

Suite 1120 Simms Building Albuquerque, New Mexico Phone 243-6691

BEFORE THE  
NEW MEXICO OIL CONSERVATION COMMISSION  
Santa Fe, New Mexico  
February 5, 1964

EXAMINER HEARING

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IN THE MATTER OF: )  
)

Application of Union Oil Company )  
of California for a waterflood )  
expansion, Chaves County, New )  
Mexico. )  
)  
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CASE NO. 2978

BEFORE: DANIEL S. NUTTER, EXAMINER

TRANSCRIPT OF HEARING

MR. NUTTER: Next case is 2978.

MR. DURRETT: Application of Union Oil Company of  
California for a waterflood expansion, Chaves County, New Mexico.

MR. RUSSELL: John F. Russell of Roswell, New Mexico, for  
the applicant. I have two witnesses.

(Witness sworn)

RICHARD H. BUTLER,

called as a witness herein, having been first duly sworn on oath,  
was examined and testified as follows:



## DIRECT EXAMINATION

BY MR. RUSSELL:

Q Will you please state your name, residence, and by whom you are employed, and in what capacity?

A Richard H. Butler, and my residence is Lovington, New Mexico, and I am employed by Union Oil Company of California.

Q In what capacity?

A I am the Unit Engineer for the South Caprock Queen Unit.

Q How long have you been employed in that capacity?

A Since 1960.

Q Have you previously qualified to give expert testimony before this Commission?

A No, sir, I have not.

Q Will you give a brief resume of your educational background leading to your specialty?

A I have a Bachelor's degree in engineering, granted in 1954 at the University of Southern California, and a Master's degree in Petroleum Engineering, same school, 1958.

Q And what work have you been doing since your graduation or obtaining your Master's degree?

A I have been employed by Union Oil since 1955, mainly in the capacity of a reservoir engineer.

Q All right.

MR. RUSSELL: Are the witness' qualifications acceptable?

MR. NUTTER: Yes, sir.



Q (By Mr. Russell) Are you familiar with the application which has been filed on behalf of Union Oil Company of California?

A Yes, sir.

Q Case No. 2978?

A Yes, sir.

Q Now, will you explain to the Examiner what Exhibit One portrays or shows?

A Exhibit One shows the South Caprock Queen Unit area, and I will describe the symbols in the legion. First of all, the printed legion, the heavy dashed outline indicates the present unit boundary of the South Caprock Queen Unit. The large circled numbers are the tract numbers, the heavily circled, blue circled wells are water injection wells presently in service. The open circled wells, that is, uncolored circles, are proposed injection wells. The circle with an "S" indicates stimulated wells, and I might explain here that this exhibit is used and revised each time we apply for administrative approval for expansion, and the wells indicated as stimulated wells have bearing to a proposed expansion under the provision of Rule 701 that is currently under consideration by the Commission. The dotted background area is the present project area. The horizontal dashed background area is the proposed expansion of the project area under this Rule 701 expansion. This has no bearing on the case today, and the final- - finally the diagonal crossed hachured areas are the areas that are non-qualified in the unit at the present time.



Q Now, this unit was approved by the Commission by Order R-1729, entered in Case 2032, was it not?

A That's correct.

Q And has the expansion of the project area been accomplished administratively under the Rule of 701?

A Yes, sir.

Q By this application, you are seeking exception to that rule and to add additional wells as injection wells at this time?

A That's correct.

Q Now, referring you to the area which is outlined in orange, will you explain what that area shows, what it is?

A This area surrounds three proposed injection wells situated along the gas-oil contact.

Q And the proposed injection wells are likewise circled in orange?

A That's correct.

Q The area outlined in green is another area which contains one proposed injection well which is circled in green?

A Correct.

Q And then, to the right of the diagram are areas outlined in purple and immediately adjacent thereto are also wells circled with purple, those are also proposed injection wells, are they not?

A Yes, sir.

Q All right. Now, referring first to the area which has been outlined in orange, will you identify the wells which you



seek to have added as injection wells at this time?

A Yes, sir. The first well is Tract 7-B, Well No. 2-29. The second well is Tract 55-B, Well No. 10-29. The third well is Tract 55-A, Well 16-29.

Q Now, why is it your opinion that it is necessary to add these three injection wells at this time?

A These wells are necessary in order to prevent waste by the creation of a barrier between the gas cap and the oil zone. This barrier will prevent the migration and loss of recoverable secondary oil to the gas cap.

Q Now, a later witness will testify as to the location of the gas cap in relation to these wells; is that correct?

A That's correct.

Q Is there any other reason, other than the prevention of waste, which would require them to be put on at this time?

A Yes, sir. In the case of Tract 7-B, Well No. 2-29, also correlative rights will be protected in that well. As a diagonal offset to a proposed injection on the Baird-Bennett-Zimmerman lease and the well is Well No. 2 on that lease. It is our understanding that this well has been approved previously by the Commission for injection purposes.

Q Now, that, as you understood it, has been approved for a waterflood project, but as yet not any of the three wells have been placed on injection; is that correct?

A That is correct.



Q Now, going back for a minute to these three wells in the orange outlined area, in your opinion, how long will it take to build up an effective water barrier to prevent the loss of oil into the gas cap?

A In my opinion, it would take between one and a half and two years.

Q And what is your opinion based upon?

A It is based on two factors. First of all, it is based on the performance of the ten original gas-oil contact injection wells in the south end of the field, and secondly, it is based on a volumetric calculation made in this area of interest.

Q All right. Now, going into the area which is outlined in green, would you identify your proposed injection well?

A The proposed injection well is Tract No. 4, Well No. 4-28.

Q Why do you feel that it is necessary to have that well placed upon injection at this time?

A It is necessary to protect correlative rights across the common boundary between the Baird-Bennett-Zimmerman and Zimmerman "A" leases.

Q Do you have any lease line agreement between Mr. Bennett and your company?

A No, sir, we do not.

Q Now, there is an area immediately north of the Bennett flood project, and to the east, what project is that?

A That is the West Cap Queen Unit operated by Phillips



Petroleum Company.

Q Is that waterflood project in progress at this time?

A Yes, sir, it is. Injection has been in operation since approximately April of 1963.

Q Do you know what wells are on injection in that flood?

A Yes, sir. I believe there are 17 wells on injection. There are six of the wells closest to the area of interest shown on the map, and they are circled in blue.

Q Have you discussed with any of the Phillips personnel your proposed application here on having these injection wells approved?

A Yes, sir.

Q Have they given you any opinion, letter or otherwise, in connection with it?

A It was my understanding that they have. I have not seen the letter.

Q Were you advised it was sent or would be sent to the Commission?

A We were advised it would be sent to the Commission.

MR. DURRETT: Which one are you speaking of now?

MR. RUSSELL: Phillips. I was just checking it.

MR. DURRETT: We do have a telegram from Phillips.

Q (By Mr. Russell) Have they discussed with you the advisability from the point of protecting their correlative rights of your adding these injection wells to protect your own and Phillips'



correlative rights?

A Yes, sir, they have.

Q What was their opinion in that connection, if you know?

A As far as I know, their opinion was that it would be of benefit to them in the protection of their correlative rights, as well as ours, and Mr. Bennett's, if this well was put on at this time.

Q Was there any expression of opinion as to whether the approval of the injection wells of yours might incline Mr. Bennett to put his on?

A Yes, that was the thought.

Q And in your opinion, if you were given approval for these injection wells, then, if Bennett did put it on, it would be necessary to protect the correlative rights of Union, of Bennett and of Phillips in their West Cap Queen Unit; is that correct?

A Yes, sir.

Q All right. Now, referring to the areas and the wells marked in purple and identify the proposed injection wells there?

A Tract 54, Well 9-28, Tract 7-A, Well 1-33, Tract 7-A, Well 9-33, Tract 27, Well 1-4, Tract 3-A, Well 3-3.

Q Will you explain to the Examiner why, in your opinion, approval should be granted for the addition of these five injection wells?

A The reason being to protect correlative rights across the common boundary between Continental Oil Company operated East



Cap Queen Unit and the South Caprock Queen Unit.

Q Has the Continental East Cap Unit been approved?

A Yes, sir, it has.

Q All of the wells outlined have been approved to be put on at one time as injection wells?

A That is correct.

Q Do you have any lease line agreement at this time with Continental?

A A lease line agreement is in the preparation stage at the present time.

Q And as to the present stage of that agreement, does it provide for the timing of injection wells being put on injection as between the two units?

A Yes, sir, it will.

Q Do you know what the figure is at this time?

A No, sir, I do not.

Q But, there is in the agreement that if you put yours on at this time, their's will be put on within a certain period there after?

A That's correct.

Q Is it also covering an agreement between the two of you as to the rate of injection in these wells?

A The rate of injection will be as mutually agreeable.

Q But, that agreement has not been concluded as yet?

A No, sir.



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Q Referring to what has been identified as Exhibit Two, will you explain to the Examiner what that portrays?

A Exhibit Two is a map showing all leases and wells within a two mile distance of the proposed injection wells.

Q Is there anything in particular on that exhibit which you care to point out to the Commission or Examiner?

A No, sir, I believe not. I believe it is self explanatory.

Q Well, let's have Number Three. Referring to what has been marked or identified as Exhibit Number Three, will you explain what that exhibit consists of and what it portrays?

A Exhibits Three consists of nine pages, each page is a diagrammatic sketch of the proposed injection well as they will look at the time of the injection.

Q And there is one sheet for each of the proposed nine injection wells covered by the application?

A Yes, sir.

Q Is the casing program for each of the nine wells the same and if not, explain the general casing program and where any one of them may vary from the general?

A There is one exception from the general rule, but generally the wells are completed with approximately two to three hundred feet of surface casing, either 8 5/8ths inch or 9 5/8ths inch diameter. This casing in all cases has been cemented to the surface so that the cement circulated. The production casing is either four and a half inch or five and a half inch diameter, and



set through the Queen sand and cemented between 150 and 300 sacks of cement. The calculated top of cement behind that casing is indicated on each diagram. There is one exception to this rule, that is on Page 8 of Exhibit Three, Tract 27, Well 1-4. In this well, the production casing is set just at the top of the Queen sand and the well is completed as an open hole completion in the Queen sand, and this particular well is cemented with 300 sacks at that point. Then, for all nine wells, they will be completed with two inch plastic lined tubing with a tension packer on bottom, and this packer will be set just slightly above the perforation or open hole section in the Queen. Then, the annulus between the casing and the tubing will be filled with an inhibited water for protection against corrosion.

Q What is the source of your water supply for this project?

A There are two sources. First of all, the Ogalala fresh water sand and the second source is produced Queen sand water or brine.

Q Is it the same source as was testified to at the original hearing?

A Yes, sir. Yes, sir.

Q In your opinion, will the granting of this application prevent waste and protect correlative rights?

A Yes, sir, it will.

Q I have no further questions of this witness.

\* \* \* \* \*



MR. NUTTER: Are there any questions of this witness?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Butler, what did you say you anticipated would be the time to fill up the gas cap, one and a half to two years?

A Yes, sir.

Q Now, you mentioned that you have a line agreement with Continental regarding the border between your unit there and their East Cap?

A Yes.

Q Do you have any line agreement with Bennett?

A No, sir. The line agreement between East Cap and our unit hasn't been agreed to.

Q But, you expect to make an agreement with Continental along that line?

A Yes, sir.

Q Bennett has never been - - Well, back in May, the 17th, 1961, he filed an application to institute a waterflood project.

A Yes, sir, that is correct.

Q Now, Mr. Butler, I notice that on the surface pipe here on these various wells there is quite a variation in the setting depths of that surface pipe, being all the way from 119 feet down to 339 feet. Do you know if this surface pipe was set in accordance with the rules for this area regarding surface pipe?



A To my knowledge it was. I might point out that four of these proposed wells are located below the caprock.

Q There is a difference in the casing program that is required there?

A Yes, sir. Well, the Red Beds are encountered at a shallower depth due to the difference in surface elevation.

Q Could you tell us which one of the wells are below the cap?

A Yes, sir. Tract 7-B, 2-29. Tract 55-B, 10-29. Tract 55-A, Well 16-29, and Tract 4, Well 4-28.

Q All the rest are on top?

A That's correct.

Q Mr. Butler, you stated that you believe Exhibit Two is self explanatory. What does it explain?

A This exhibit was merely entered to show the present lease status of all the leases within two miles of the proposed injection wells.

Q What do you actually mean by "Buffer" zone there?

A Let's see, well, that means just the two mile area that is requested in the- - for the application.

Q You just depicted a two mile area around your application, in other words?

A That's right. This is two miles from our proposed wells.

MR. NUTTER: Are there any other questions?



## CROSS EXAMINATION

BY MR. DURRETT:

Q Mr. Butler, what is the approximate amount of water that you are injecting in this flood; do you have those figures?

A Yes, sir. At the present time, we are injecting approximately 33,000 barrels a day into 58 wells.

Q Into 58 wells?

A Yes, sir.

Q What do you anticipate after you get these nine wells, assuming that they were approved?

A I have indicated the individual injectivity on Exhibit Three, however, I have not added those up.

Q Well, you could give me a pretty rough idea, couldn't you?

A About 2800 barrels per day for the nine wells.

Q That would be additional now?

A That would be additional.

Q Those are broken down per well on Exhibit Three?

A Yes, sir, they are.

MR. DURRETT: Thank you.

\* \* \* \*

MR. NUTTER: Are there other questions of Mr. Butler?

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## REDIRECT EXAMINATION

BY MR. RUSSELL:

Q Were these Exhibits prepared by you or under your direction?

A They were. Exhibit One was prepared by me generally speaking, and Exhibit Two was not prepared by me, it was prepared under my direction. I did not enter the term "Buffer Zone".

MR. RUSSELL: I have no further questions.

MR. NUTTER: If there are no further questions of the witness, he may be excused.

\* \* \* \* \*

MARVIN ZOLLER,

called as a witness herein, having been first duly sworn on oath, was examined and testified as follows:

## DIRECT EXAMINATION

BY MR. RUSSELL:

Q Will you please state your name, residence, by whom you are employed and in what capacity?

A Marvin Zoller, employed by Union Oil Company of California as a geologist.

Q How long have you been employed in that capacity?

A 13 years.

Q Have you previously qualified to give expert testimony



before the Examiner?

A No, sir, I have not.

Q Will you give a brief resume of your educational background, leading up to your degree?

A I have a Bachelor of Science degree in Petroleum Geology from Texas Technological College.

Q When did you receive that degree?

A In 1949.

Q And what work have you been doing in that area since that time?

A Well, the entire 13 years with Union has been spent either in the Permian Basin generally, and two years was actually in the Roswell office during the development of this field, and another three years or so, even though out of Midland, dealing somewhat with New Mexico geology.

Q The witness' qualifications acceptable?

MR. NUTTER: Yes, sir.

Q (By Mr. Russell) Thank you. Mr. Zoller, you have prepared some exhibits for this hearing, have you not?

A Yes, sir, I have.

Q Will you hand me the first one? Referring to what has been marked as Exhibit Four, will you please explain what that portrays?

A That is the net productive sand isopach map of the Caprock Queen Unit that was presented at the original hearing when the unit



was approved, and another exhibit will be submitted here today that will be exactly the same exhibit, except updated by drilling that has taken place between that time and this.

Q Would it be better or a little more clearer if you discussed all three at once?

A Well, it is almost impossible to use an isopach map without a structural map and vice versa.

Exhibit Five is the updated net productive sand isopach. Exhibit Six is the structural map on top of the Queen sand.

Q Now, referring to Exhibits Four, Five and Six, explaining which one you are referring to in each instance, will you explain to the Examiner what these exhibits portray in connection with the waterflood project and this hearing?

A Exhibit Number Four portrays the net productive sand, that is, strictly the oil productive portion of that sand, and on the Western most side of the field, there are a number of wells which show two figures by several of the wells. The top figure is a gas sand count, the bottom figure is an oil sand count. Once you pass the red and green line, denoting the oil and gas contact, all of the wells have just the one figure.

Exhibit Number Five denotes exactly the same thing, has been very minutely changed by - - just within the last year we have either re-entered or drilled 20 new wells here, and it has required practically no change in the map.

Exhibit Number Six is nothing except a structural map on



top of the Queen sand showing a general eastward dip. The oil-gas contact as used here on the isopach map is nothing more than a tracing of the plus 1355 contour from the structure map. And this is believed to be correct, within four feet, plus or minus. I know of no control that indicates that four feet above or below 1355 won't fall within that contact.

Q Exhibit Five was extended from the original to show the location of the gas cap in connection with these proposed injection wells in the original area; is that correct?

A Yes, sir. On Exhibit Four, the oil-gas contact, the dashed line was stopped approximately at the middle of Section 29. On Exhibit Five, I have extended that on up to the north line of Section 29, which is the north line of our unit. This is not due to any more control, but due to the fact that some way we have got to get to the north end of this unit. The one well we have there near where I extended it was a tight well, had only two and a half feet of sand and was not productive of either oil or gas.

Q Is there anything else on either exhibits, Exhibit Four Five or Six, that you would want to call to the attention of the Examiner at this time?

A I don't believe I know of anything else.

Q All right. Do you have well logs on all of the proposed injection wells?

A I have well logs on eight of the nine proposed injection wells. There was one well, the Tract 27, No. 1-4, that was not



logged.

These logs are correlated from the top to the bottom, as far as the Red Beds, the casing shown on each log, the perforations shown on each log, and each log is correlated.

Q Mr. Zoller, is there any general statement which you would like to make in connection with all or anyone of these well logs?

A Only that in each and every case, I have tried to put the same information as to tops, perforations, casing, amount of cement used, that sort of thing.

Q And the well logs, as marked, are in the same sequence as the schematic drawings of the casing program; is that correct?

A Yes, sir.

Q With the exception, of course, of one well?

A That one we don't have a log on.

Q I believe you stated from your additional drilling of wells, that there was no material change in the location of the gas cap along the east portion of this project; is that correct?

A That's right, sir.

Q Now, in your opinion, Mr. Zoller, would the placing of the three proposed injection wells in the original area prevent waste caused by loss of oil into the gas sand?

A Yes, sir, it would.

Q Were these exhibits prepared by you or under your direction?

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A The contour maps that have been updated were originally prepared by the South Caprock Queen Geological Committee, and they have been updated by me and like I say, in the last year, we have drilled or re-entered 20 wells from one end of the unit to the other, so I have taken a pretty good look at the whole unit.

MR. RUSSELL: At this time, I would like to introduce in evidence Numbers One through 14 inclusive.

MR. NUTTER: Union's Exhibits One through 14 will be admitted in evidence.

MR. RUSSELL: I have no further questions of this witness.

\* \* \* \*

MR. NUTTER: Are there questions of Mr. Zoller?

#### CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Zoller, how do you spell your name, please?

A Z-o-l-l-e-r.

Q Throughout the development of this waterflood project in this area, Mr. Zoller, the Union Oil Company has been following this policy of injecting water into the gas cap area, have they not?

A Yes, sir.

Q Has this proven to be an effective means of controlling this flood?



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A Well, Mr. Butler is much more qualified than I am to- - He lives with this thing every day, and I think he can better qualify for how effective it has been, but I don't think there is any doubt but what sealing or building a bank in this gas cap did save an awful lot of oil.

Q There has been no evidence as yet of any oil having migrated out in the gas cap?

A I know of none.

MR. NUTTER: Are there any other questions of Mr. Zoller? He may be excused.

MR. RUSSELL: I have no further witnesses.

MR. NUTTER: Does anyone have anything further they wish to offer in this case?

MR. MORRIS: Pure Oil is owner of approximately five percent in the working interest in the South Caprock Queen Unit, and urges approval of the subject application.

MR. NUTTER: Thank you, Mr. Morris.

MR. DURRETT: If the Examiner please, the Commission has received a communication in the form of a telegram from the Phillips Petroleum Company stating that they concur with the applicant. We have also received a telegram from Continental Oil Company stating that they concur with the applicant.

MR. NUTTER: Thank you. Is there anything further in Case 2978? Take the case under advisement.

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STATE OF NEW MEXICO §

COUNTY OF BERNALILLO §

I, ROY D. WILKINS, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill, and ability.

WITNESS my Hand and Seal of Office, this 17th day of February, 1964.

*[Signature]*  
NOTARY PUBLIC

My Commission Expires:  
September 6, 1967.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2978 heard by me on 2/5, 1964.  
*[Signature]* Examiner  
New Mexico Oil Conservation Commission

