



BEFORE THE OIL AND GAS CONSERVATION COMMISSION  
OF THE STATE OF COLORADO

----- X  
IN THE MATTER OF FIELD RULES :  
TO GOVERN THE LOCATION OF WELLS : Cause No. 16.  
IN THE FRENCHMAN CREEK AREA, :  
LOGAN COUNTY, COLORADO :  
----- X

Room 704, State Capitol Annex,  
Denver, Colorado,  
Tuesday, March 17, 1953.

Met, pursuant to notice, at 10 a. m.

BEFORE:

WARWICK M. DOWNING  
RUSSELL H. VOLK  
JOHN E. CRONIN  
CLARK F. BARB  
J. J. ZORICHAK,  
Commissioners.  
WILBUR ROCCHIO, Attorney.

APPEARANCES:

JOHN R. MORAN and THOMAS C. HIESTAND, appearing for F. Kirk  
Johnson, the applicant.

BURTON DUNN, appearing for Dunn and Boreing.

WALTER E. WILL, TOM T. FREEMAN, HAROLD E. CHRISTENSEN, and  
J. D. CHAMBERLAIN, appearing for The Texas Company.

ROBERT E. PARADISE and G. R. NANCE, appearing for The  
Russell Oil Company.

JOHN STANFORD and J. W. JACKSON, appearing for the Sinclair  
OIL and Gas Company.

## APPEARANCES (Continued):

GLENN SANDBERG, appearing for the Sunray Oil Company.

L. W. WINKLER, appearing L. W. Winkler and Son.

CARL HOUY and ROSS BOLTON, appearing for Deep Rock Oil Corporation.

J. R. HAMILTON and J. R. CHANDLER, appearing for La Gloria Corporation.

H. C. ARNOLD, appearing for himself.

HARRY ROYSTER, appearing for himself.

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I N D E X

<u>WITNESSES</u>	<u>DIRECT</u>	<u>CROSS</u>
Thomas C. Hiestand	11	33
Burton Dunn	52	
Harry Royster	55	61
J. D. Chamberlain	62	70
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E X H I B I T S

<u>NO.</u>	<u>DESCRIPTION</u>	<u>MARKED</u>	<u>RECEIVED</u>
A	Plat of Mineral and Working Interest Owners	14	32
B	Information taken from Schlumberger Logs.	14	32
C	"Contours on Top of the Sand Bar."	20	32
D	Gas Reservoir Isopachous Map	31	32
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P R O C E E D I N G S

MR. DOWNING: We will come to order. We have here a hearing on the Frenchman Creek case, Cause No. 16. Were notices properly given?

MR. ZORICHAK: Yes, notices have been published and sent to the parties in interest.

MR. DOWNING: And everything is done necessary for our jurisdiction?

MR. ZORICHAK: That is right. We have a telegram and a letter that I probably should read, that have been sent in by parties who will not be present.

MR. DOWNING: Let's see who is here first.

(Appearances stated as shown on pages 1 and 2.)

MR. DOWNING: Now, we are faced with a rather unfortunate situation here. Mr. Bretschneider is out of the city. Yesterday afternoon I got a call to go to Washington, I have got to leave at four o'clock. Mr. Volk had a telephone message last night, he has to meet someone at the airport; he will probably have to leave at quarter of eleven or very quickly thereafter, and he is leaving this afternoon at four o'clock. You know these things will happen. We are sorry. If we had known about it we could have postponed the hearing.

Apparently this is a controversial matter. You are going to take some testimony; how long do you expect to take?

MR. MORAN: As far as the applicant is concerned, it

shouldn't take more than an hour.

MR. DOWNING: Is there opposition?

MR. WILL: Yes, I am afraid there is.

MR. DOWNING: How long will the opposition take?

MR. WILL: I suppose the same length of time. It may take half a day.

MR. DOWNING: Half a day?

MR. WILL: Yes. All these gentlemen want to say something and they certainly ought to have the privilege.

MR. DOWNING: Well, now, gentlemen, you can have all the time you want but today we can't give it to you because we have got to have a quorum.

MR. VOLK: I'll tell you what we can do. I will stay here until 11, then if you can adjourn until 1:00, then reconvene at 1:00, we can finish the hearing then or as much as can be done. Would that be all right?

MR. WILL: That is agreeable.

MR. DOWNING: I will stay until 12. That will give us two hours. Mr. Volk will be back at 1:00 and stay until 2:00 or 3:00. That will probably give us time to finish. Unfortunately, we have to take all testimony with a quorum present.

Has everybody been notified that has any interest in this controversy?

MR. ZORICHAK: Yes.

MR. DOWNING: In addition to the published notice?

MR. ZORICHAK: That's right. We have sent notices to all parties.

MR. DOWNING: Let's assume the witnesses are all qualified unless objection is made. Let's make it just as brief as we can. Maybe we can get through today.

Tell us a little about it.

MR. MORAN: This is an application filed by F. Kirk Johnson for field rules in connection with the spacing of gas wells to be drilled in the Frenchman Creek Area in Township 8 North, Range 50 West, 6 P. M., Logan County, Colorado. One well has been drilled to completion in the Southeast-Southeast-Northeast of Section 31, known as the F. Kirk Johnson State No. 1. This well was drilled to a total depth of 4,780 feet and was completed as a gas well capable of producing 13 million cubic feet per day on open flow. The applicant has requested that a spacing pattern be established in the field of 320 acres, with the well for each 320 acres to be located at a comparable location in the southeast corner of each 320-acre unit, but in any event that no well be drilled closer than 2600 feet from any other well located within the area and completed as a gas well.

That, in substance, is the application before the Commission and I would like to call Mr. Hiestand, representing F. Kirk Johnson Company, the applicant.

Mr. Hiestand.

MR. DOWNING: Just a moment. Will the other side tell us

what their objections are? I think we can follow the testimony better. Make a short opening statement, if it is agreeable to you.

MR. WILL: Yes, there is no reason for us not to state our objections. In the first place, we believe that the hearing that you are holding is premature to fix these drilling units and the location of the well in each unit at this time. We say it is premature because all the information that we have got on this pool, as described by Mr. Moran, is a dry hole and one producing well. Mr. Royster has drilled an offset rather diagonally to the south; it is not completed at this time. And we did ask, or Mr. Royster asked that this hearing today be continued until that well was completed, which would be around the end of this week.

MR. DOWNING: The end of this week?

MR. WILL: I believe that's right. We think it is premature at this time. But, in any event, we feel that 320 acres in this field is too wide a spacing. There is no information that warrants a 320-acre spacing.

Third, the well locations, as set out in the application, require one well to 320 acres, but you should drill that well in the corner, the southeast corner, I believe it is, in the corner of the 320 acres. I don't know what kind of a drainage pattern they have in mind on that, and, of course, we'll have to hear their testimony. We think 320 acres out in the Jules-

burg Basin -- now, not in every field, we are only talking about this one -- we think it is a small structure; sand conditions out there vary, vary from one well to another.

I might also add that 2600 minimum footage from a producing well is absolutely, we think, ridiculous in the face of the very fact that you got a dry hole within half that distance of the producing well. I believe that is the well that was drilled by Sunray.

MR. DOWNING: Let's reserve the argument until we get through.

MR. WILL: Well, you wanted to know my position.

MR. DOWNING: Yes.

MR. WILL: Well, that's it.

MR. DOWNING: I would like to hear it but we are in a hurry. Do you want to say any more? I don't want to shut you off, I just want to suggest you hurry.

MR. WILL: That is just an opening argument.

MR. DOWNING: Will you call your witnesses and let's swear them all at once?

(Applicant's witnesses sworn.)

MR. DOWNING: Just a minute. We have here a wire from George W. Selinger, Skelly Oil Company:

"WE FAILED TO RECEIVE NOTICE OF HEARING ON APPLICATION OF F. KIRK JOHNSON BROOKS-SCANLON OIL COMPANY REGARDING FRENCHMAN'S CREEK LOGAN COUNTY SPACING. WE UNDERSTAND INDIRECTLY

IS SET FOR MARCH 17 UNTIL SUCH TIME AS ALL INTERESTED PARTIES ARE GIVEN NOTICE. HOWEVER IF COMMISSION DESIRES TO GO AHEAD WITH HEARING WE WISH TO OBJECT TO THE UNITS AS PROPOSED BY APPLICANT. WE BELIEVE THAT 320 ACRE UNITS SHOULD FOLLOW GOVERNMENTAL SUBDIVISIONS."

Why wasn't he notified?

MR. ZORICHAK: Notices were sent to the Skelly Oil Company at Sterling and also the Denver office. So the Skelly Oil Company was notified.

MR. ROCCHIO: What is the date of the telegram?

MR. ZORICHAK: The date of the telegram is March 16.

MR. DOWNING: You say you have another letter?

MR. ZORICHAK: Yes. Here is a letter from the Stanolind Oil and Gas Company, dated March 13, 1953:

"We have received a copy of your Notice of Hearing dated March 3, 1953, on Cause No. 16, in the matter of field rules to govern the location of wells in the Frenchman Creek Area, Logan County, Colorado. It is stated in the Notice of Hearing that it has been called at the request of F. Kirk Johnson and we have received a copy of Mr. Johnson's petition to the Commission for the hearing. That petition contains pertinent data on the gas discovery well, F. Kirk Johnson State No. 1, located in the SE 1/4 SE 1/4 NE 1/4 Section 31-T8N-R50W, with a request that the Commission establish drilling units in the Frenchman Creek Area on the basis of one well to not less than 320

acres conforming to the unit areas outlined on Exhibit "A", a map which is attached to the petition. In the area proposed for drilling units on the above-mentioned Exhibit "A", Stanolind Oil and Gas Company has a lease on only one 160-acre tract, this being the NE 1/4 of Section 1-T7N-R51W.

"This is to advise that Stanolind Oil and Gas Company has carefully reviewed all of the pertinent data on the F. Kirk Johnson State No. 1 and in view of the depth of the producing sand, approximately 4700', and the high permeability, we are of the opinion that one well will efficiently drain the gas from at least 320 acres and that 320 acre spacing is the proper spacing for gas wells in the "J" sand of the Dakota Series in the Frenchman Creek Area. Stanolind therefore recommends to the Commission that 320-acre spacing be established for the "J" sand in the Frenchman Creek Field.

"This is also to advise that Stanolind Oil and Gas Company has no particular preference for any one drilling pattern, that is, the location within a 320-acre drilling unit upon which the well should be drilled, and Stanolind will be agreeable to any drilling pattern that is considered proper by the Commission. Stanolind likewise has no particular preference regarding the formation of properly shaped 320-acre drilling units but recommends to the Commission that the operators in the Frenchman Creek Area be left free to form properly shaped 320-acre drilling units without prior designation of such units by the

Commission as has been requested in Mr. Johnson's petition.

"In view of Stanolind's relatively small holdings in the Frenchman Creek Area, Stanolind does not plan to have representatives present at the hearing in Denver on March 17, 1953, and we are taking this opportunity to advise the Commission of our opinions and recommendations regarding the proper location of wells in the Frenchman Creek Area.

"Yours very truly,  
R. G. Bechtel. "

MR. MORAN: If the Commission please, we have no objection to this hearing being continued if it is necessary to suit the convenience of the Commission and also to give everybody an opportunity to be heard.

MR. DOWNING: Well, the Commission hasn't considered as a whole but my viewpoint is, we have plenty of time. We don't want to make any decisions at any time without giving everybody a full opportunity to be heard. It is my suggestion we go on and take the evidence today, get as far as we can, because there are a lot of you here and it is an expense to come back, but we will reach no decision until we give Skelly a chance to be heard, also. Now, strictly speaking, I guess, they have had notice, but apparently the proper man didn't get notice and we would rather err on the side of giving people a full opportunity to be heard than to take any chance of shutting anybody off.

Is that agreeable to everybody, to go ahead as far as we

can today, but with the understanding that we will not close the hearing until we communicate with Skelly?

Go ahead.

THOMAS C. HIESTAND

was sworn and testified as follows:

DIRECT EXAMINATION

BY MR. MORAN:

Q Will you state your name, please?

A Thomas C. Hiestand.

Q What is your position with Mr. F. Kirk Johnson, Mr. Hiestand?

A I represent Mr. Johnson as Manager in Rocky Mountain operations.

Q Are you familiar with the area known as the Frenchman's Creek Area of Logan County, Colorado?

A I am.

Q I hand you a map or plat which, for identification, has been marked Exhibit A. Will you please state what that represents?

A This exhibit shows the lease ownership, to the best of my knowledge; also, by color, the red indicates the minerals owned by the State of Colorado and the blue represents the minerals owned by the fee owner, August Frank. The large numbers going through, from 1 through 7, represent the numbered areas for reference as the proposed gas units. The

purpose of this plat was to be on a larger scale than that which accompanied the petition.

Q This is a duplicate or a copy of the plat or map attached to the application filed by F. Kirk Johnson, is that correct?

A Yes.

Q Now, you have stated that the numbers appearing on that plat from 1 to 7, inclusive, represent the areas of 320 acres which you suggest or for which you have made application to have declared as units by the Commission for development for gas, with a location to be made for a gas well in the southeast corner of each of the units?

A Yes, sir.

Q Would you state what acreage comprises Unit No. 1?

A The acreage under No. 1 includes the northeast quarter of Section 31 and southeast quarter of Section 30, 8 North, 50 West.

Q Now, units numbered 2, 3 and 4 consist of 320 acres each running north and south and parallel to Unit No. 1, is that correct?

A That's right.

Q And Units No. 5, 6 and 7, each consisting of 320 acres, adjoin Units 4, 2 and 1, is that correct, to the south?

A That's right.

Q Mr. Hiestand, F. Kirk Johnson has drilled a well at a location in the southeast of the southeast of the northeast of

Section 31, which places the location of that well in the southeast corner of Unit No. 1, is that correct?

A That's right.

Q Can you give the history of that well?

A Very briefly, the No. 1 State well was commenced approximately the 1st of August -- July 30 -- and was completed in approximately 20 days, with casing set and perforations in the "J" sand. I have other exhibits which will show more details, but from a narrative standpoint this well was then shut in pending the availability of a gas market. And to continue with that story, approximately the end of December 1952 a gas line was constructed and laid to the well by the Kansas-Nebraska Natural Gas Company, which has the line coming down from the Big Springs Field in Nebraska to the No. 1 State well in the Frenchman Area, and let open a market which is being -- the well is now producing gas into that market.

Q What is the average daily production from that well at this time?

A The production has amounted to only a few hundred thousand feet per day to recent date on the runs. I can produce the exact figure if you want that stated.

Q I don't think we need that.

A It has been a few hundred thousand cubic feet of gas per day while the line is being tested.

Q Mr. Hiestand, from the information that you have obtained

from the drilling of the No. 1 F. Kirk Johnson, have you prepared a map or plat indicating your interpretation of the geological features there comprising the Frenchman's Creek Area?

A Yes, sir. I would like to show Exhibit B first.

Q All right.

MR. MORAN: Does the Commission want these exhibits marked?

MR. ZORICHAK: Yes, they should be marked.

MR. MORAN: We will offer Exhibit A at this time for the record.

(Documents were marked Exhibits A and B, for identification.)

Q (By Mr. Moran) Mr. Hiestand, I hand you a map or plat which has been marked Exhibit B, and ask you to state, if you know, what that represents?

A Exhibit B consists of three parts. Figure 1 at the top is the north-south sea-level cross-section. The information is taken from reproductions of Slumber Jay Electric Logs, and the one at this position on the left is the La Gloria No. 1 State well, the one in the middle here is the --

Q Will you give the location of the La Gloria No. 1?

A It is in Section 19. I will have another exhibit which will more specify the plan of this cross-section. This is the F. Kirk Johnson in 31, and this one is the Sunray No. 1 State, in Section 32.

The purpose of this figure is to illustrate the deposition

of an off-shore sand bar, what we call winnowed sand, where the action of water has laundered out the clay minerals to give permeability for the accumulation of liquids and sands. The north end illustrates the dying out of the sand colored there yellow, and the sand is only slightly diminished at the southern end, so that it extends off of the limits of the cross-section to the southeastward. The green is an envelope of shale and silt which envelops this sand bar and therefore causes a type of trap which we think of as depositional or stratigraphic rather than structural. I may say this is 200 feet below sea level on this line, 300 feet below sea level on that line (indicating). The lines reprinted within the green envelope show the correlations of details in the amplified normal curve of the electric log and show the details within intervals of two feet. There is some change in structural position relative to sea level in the reservoir that is so flat that it has to be made on a very large scale to show those changes. However, it is important and critical that the top of this sand, in this off-shore bar, on sea-level datum, is 22 feet lower in the Sunray No. 1 State than it is in the F. Kirk Johnson No. 1 State.

The red in the column here of each of these wells indicates the presence of gas, the blue indicates the presence of water. It does happen that the gas sand in the Johnson well has a vertical column of 22 feet, the structural difference to the

Sunray is 22 feet, and the history on the Sunray well has indicated that the water and gas are not sufficiently separated to be able to produce the gas without producing water, and as a consequence, the well has been temporarily suspended without any work on it and in that sense is more or less a dry hole.

The change in here (indicating) is in a structural difference and shows the classification of the reservoir, as to its fluids, is an active water-drive reservoir, with the water shown in the lower chart in more detail, which we will follow up.

Meanwhile I would like to take up Figure 2, which is another cross-section that starts down in 12-7N-51W, continues northward to 35-8N-51W, comes across Section 31-8N-50W, with this being the Johnson No. 1 State well repeated here.

The purpose of this figure is to show, likewise, the green envelope which envelops this off-shore sand bar such that the gas-producing sand in both Figure 1 and Figure 2 are shown in the Johnson well and are absent in the wells lying to the northward, the westward and the southwestward, so that the producing beds in the Johnson well do not exist in those holes which have been drilled in that vicinity in those directions.

The purpose of Figure No. 3 is to show some of the details on a larger scale in connection with the testing and the completing of the Johnson No. 1 State.

Figure 3-A on testing shows the electric log with the position of the gas sand, and in the column it shows Drill Stem Test No. 2, No. 3 and No. 4. In Drill Stem Test No. 2 and 3 gas was produced, with a very small amount of water recovered. In Drill Stem Test No. 4 slightly over 2600 feet of water fill-up was recovered in that drill stem test. The details of those tests are given on this chart at that position above the electric log.

Q Identify that well, will you, please, Mr. Hiestand?

A That well is labeled at the bottom. It is F. Kirk Johnson No. 1, 31-8N-50W. It shows the S. P., the normal, amplified normal, the long normal, and the micro-log of the gas-producing sand, with the sand area colored yellow on that chart.

Figure 3-B shows the radioactivity log of the same well with the area of the gas-producing sand colored in yellow. This shows the casing was run to a depth of 4770 feet, cemented with 50 sacks of cement; the casing was then perforated with four shots, 4686.5 to 4687.5. The well tested two million gas, zero oil and sprayed so much water it was immediately squeezed off, the retainer being left at the top of the squeezed-off section. Then the well was perforated at 4666.5 to 4672.5 with 36 shots, tested open flow 13 million cubic feet of gas, 1109 PSIA shut-in pressure at the sand level, the gas analysis by POD, low temperature fractionation 913 B. t. u.

at 14.7 PSIA, 60 degrees Fahrenheit. The specific gravity of that gas tested 0.626 by POD analysis. Also by POD analysis the gallons of liquid, of gasoline, per million represented 0.214. It is a very dry gas. We have more breakdown on that if anyone wishes to pursue that further. It is an extremely dry gas.

MR. ZORICHAK: The B. t. u. is what?

A 913 in that analysis.

Column 3-C is a coregraph which is reproduced here from the report; shows the foot by foot analysis of the core samples at one-foot sample intervals. The left-hand side of the chart shows the porosity, which stays almost exactly at 22 percent. The permeability in millidarcys runs off of the chart at two places and the average is about 400 millidarcys in that sand. I can give you the millidarcys off the chart if anyone wishes to refer to a particular position.

On the right-hand side of this chart the area colored blue represents the water, primarily the connate water, in that sand, which averages out at approximately 33-1/3 percent.

At the bottom of this coregraph also is shown a few feet of residual oil in the core sample, which was the reason why the casing was first perforated at that level, to see whether that residual oil saturation would be producible oil. In the reports in our files I think we have exhausted the

possibility of that oil being producible oil through our testing of the perforations, then later squeezing that off.

MR. ZORICHAK: What was the percent of that oil saturation, average?

THE WITNESS: In percent it will run up to -- well, the average will be eight percent.

MR. ZORICHAK: How many feet did you say that was saturated with oil?

THE WITNESS: We have used the figure of seven feet in our record. In other words, to summarize, there is a gas column of 22 feet below which is a water column and residual oil of 14 feet, making a sand thickness of 36 feet, with the upper part being a gas reservoir of 22 feet of effective thickness.

MR. ZORICHAK: You do have an oil-gas contact there?

THE WITNESS: Only in theory as to what is residual oil and water. Now, what is producible? By that I mean the non-producible water and oil, which both are present. But I think there is a vast difference between residual oil and water and producible oil and water in various wells. But I do want to get that in the record, that there are both the oil and water below this gas zone. Whether or not they will be producible -- the water is very highly producible and it is a very active water drive. So the fill-up of better than 2600 feet in Drill Stem Test No. 4 I think is very critical to the classification of that reservoir, so that the depletion of the

gas will be through active water drive in that reservoir.

I believe that constitutes the summary of that chart.

MR. DOWNING: Any cross-examination?

MR. MORAN: Just a minute, we are not through.

(A document was marked Exhibit C  
for identification.)

Q (By Mr. Moran) Mr. Hiestand, you have prepared a map or plat designated Exhibit C. I would ask you to explain to the Commission what that map or plat represents.

A I'd like to point out two or three features of this exhibit. First, this shows the plan, into "S", of the cross-section shown in the previous exhibit at the top. The other red line, SW-W-E, shows the plan of the cross-section figure 2 of Exhibit B. The purple lines outlining these gas unit areas numbered 1 through 7 are shown on this plat. The yellow represents the off-shore sand bar area, also shown in the previous exhibit and cross-section. The green shows the geographical position, on both sides, of the envelope of shale and silt, based on the position of the well shown in the previous exhibit to the west of the Frenchman Creek Area. Also, this is continued by virtue of a well in 11-7N-50W, to the south off of the plat a short ways, which failed to penetrate the sand-bar type of permeable sand.

The contours on this map are drawn in accordance with wells that are located as follows: Arnold-Deep Rock No. 1

State in Section 16, Deep Rock No. 1 State in Section 19, also La Gloria No. 1 State in Section 19, 8 North 51, the Johnson No. 1 State in 31, 8 North 50, Sunray No. 1 State in 31, 8 North 50, the Big Six Drilling No. 1 State in 35-8N-51, Tuley Carter No. 1 in 12-7N-51. The contours have an interval of ten feet. They are drawn on the top of the sand bar. That is something on which information can not be obtained from any source except details of the wells drilled in the area. To my knowledge, there is no other method of contouring the effective reservoir by sea-level contours except from the information derived from these particular stated wells.

The contours may be summarized as showing a few things; they feature at least a flattening in Section 19, a strong re-entry crossing section 35 at the northern extremity of outlined units in the Frenchman Creek Area, a contour closure consisting of slightly more than 20 feet, perhaps more than 22 feet, a vertical closure located at the center of Section 31, a slight reversal between the structural closure in the Frenchman Creek Area and the dry hole Tuley Carter No. 1 in 12, 7 North 51.

The evidence here which I consider is most critical is furnished by the Sunray No. 1 State, which shows this vertical closure at least 22 feet.

Q What is the location of the Sunray well?

A It is the center northwest-southwest 32, 8 North 50.

That becomes, then -- the -252 becomes the edge of the gas reservoir where the sand contains producible water and non-commercial producible gas, and I have interpreted that contact to extend at the -252 contour, which would be concentric with this contour -250 on this exhibit. I believe that summarizes that.

Q What relation, Mr. Hiestand, do your proposed units numbered from 1 to 7, inclusive, bear to the sand bar as outlined on your Exhibit C?

A The units are all on the sand bar and all cover some portion of the sand bar deposition and the structural closure. Not all the units 100 percent are within the closure contours.

Q It appears from Exhibit C that you have omitted any unit to the southeast of the sand bar area as outlined on your exhibit. Is there an explanation for that?

A It theoretically could contain something less than 40 acres within the contour closure. It is my expressed belief and interpretation that the gas produced from the Johnson No. 1 State is producing from the top six feet of that sand bar, and therefore if a well is located outside of that -230 contour it will not offset the No. 1 State producing sand, it will be drilled at some portion of the sand bar which will be thinner than it is in the No. 1 State and will not exactly offset the producing zone as perforated in the discovery well. I think that is an important consideration in the formation of any

rules with respect to locating those wells.

Q Is it your opinion, Mr. Hiestand, that the division of the sand bar area into seven units, each comprising 320 acres, as outlined on your Exhibit C, is a fair and equitable distribution of the effective sand body underlying the area represented on said plat?

A I think that the outline of each of those gas units is as fairly outlined as can be made, keeping in mind the position of the sand bar and the structural position of these contours. In other words, considering the Frenchman Creek Area, as shown on Exhibit AA, we showed the presence of the mineral ownership and these gas units show the proposed division of the working interests or lease owners; bearing in mind the entire presence of the gas in that reservoir, both minerals and working interests, it is as fair as we have been able to devise for spacing those units.

Q It is also outlined on the basis of legal subdivisions as nearly as practicable, is that correct?

A They have followed exactly quarter section subdivisions.

Q Mr. Hiestand, is it your opinion that one well drilled at a location upon each of those unit areas would effectively drain the gas from the formation underlying each of said areas?

A It is my belief that each well in a given unit would effectively drain the gas from that said unit.

Q Would development upon any greater rate per 320-acre

unit result in uneconomic operation or waste, in your opinion?

A In my opinion, the drilling of more than one gas producer per gas unit is both economically and physically wasteful, due to the extremely high permeability, the presence of both horizontal and vertical fracturing in that sand reservoir and the uncontrollability of water flooding that reservoir due to having the gas pressure reduced at a rapid rate.

Q Would you --

MR. VOLK : Would it be agreeable if we would take testimony here, say, until about 12 o'clock or a little after, then reconvene about quarter of two? I will be here from then on; I will stay as long as necessary.

MR. DOWNING: In other words, it is understood that when we adjourn at 12 o'clock, we will reconvene at quarter of two.

MR. WILL: I would rather that you all be here. Can we recess now before he goes any farther and come back at quarter to two?

MR. MORAN: That is agreeable with us.

MR. WILL: I think that is fairer, don't you, to have Mr. Volk here?

MR. MORAN: I think it is better to have all the Commissioners here.

MR. VOLK: If you want to recess now until 1 o'clock, I will be here at 1 o'clock.

MR. WILL: I would prefer that and I think Mr. Moran will

join me in it.

MR. MORAN: It will be perfectly agreeable with us.

MR. DOWNING: It will be understood we will recess until 1 o'clock.

MR. BARB: I would like to ask one question of Mr. Hiestand.

Mr. Hiestand, would you indicate on that map approximately the gas-water contact as you have it in mind?

THE WITNESS: Mr. Barb, may I defer your question until I have an exhibit expressly made for that answer?

MR. BARB: Okay.

(Whereupon, at 11 a. m., a recess was taken until 1 p. m. of the same day.)

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AFTERNOON SESSION

1 p. m.

MR. VOLK: The meeting will come to order. We will proceed with the testimony of Mr. Hiestand.

THOMAS C. HIESTAND

resumed the stand and testified further as follows:

DIRECT EXAMINATION (Continued)

BY MR. MORAN:

Q Mr. Hiestand, I will hand you a map or plat which has been marked Exhibit D, and ask you to state what that represents?

A This plat is an isopachous map starting with the edge of the gas reservoir and going up to the total thickness of the gas-filled sand at the center of the red area, the red representing the gas-filled area and the blue representing the producible water in the reservoir sand surrounding the gas. As I visualize this picture, it is much like the level on a transit or an alidade in which there is a gas bubble surrounded by liquid, and this gas accumulation here is surrounded with this liquid. The contours there are one foot of thickness of gas-filled sand, the outer one is zero and the inner one is 22.

Q AS outlined on the map, Mr. Hiestand, does that inner circle shown in red fairly represent your conception of the gas reservoir underlying the areas designated Units Nos. 1 to 7, inclusive?

A These contour lines were based on the presence of the Johnson No. 1 State well in 31 and the Sunray No. 1 State well in 32, which have the gas sand of this reservoir. The wells which have been drilled in that vicinity do not have this gas reservoir, in my opinion. Consequently, the gas units numbered 1 through 7, all or parts of those fall within the part of the plat colored red, showing the gas reservoir. Therefore, with the data we have at this date I think the Isopachous contours fairly represent the gas condition and the pattern of the gas units are fitted to the occurrence of that reservoir.

Q Mr. Hiestand, you stated in your testimony this morning that it was your opinion that one well drilled to each 320 acres in that area would adequately drain the reservoir underlying the land comprising the seven units as indicated on your original Exhibit A and also on Exhibit D. Could you state your reasons for that opinion?

A I'd like to set up the reasons as follows, to indicate support of my interpretation that one well on 320 acres would adequately drain that unit. The Number One point I would like to introduce, the gas producing sand net thickness in the Johnson No. 1 State well, that thickness is 22 feet; in the Sunray No. 1 State well that thickness is zero. The average, therefore, for the productive area falls on the median of 11 feet of net gas-producing sand for this reservoir

in this Frenchman Creek Area.

The Number Two point is the gas-producing sand porosity and its contents. Porosity in the Johnson No. 1 State is taken at 22 percent from the coregraph. The connate water content per acre foot is taken from the coregraph representing 8 percent content in the reservoir area. The gas content, producible gas per acre foot, is 14 percent.

The Number Three point would be the gas value at the well head. The well is connected to pipe line owned by the Kansas-Nebraska Natural Gas Company as purchaser. The sales price, at a base of 16.4 psia, is 14 cents per thousand cubic feet of gas.

Number Four point is the gas reservoir type of depletion. In the Johnson No. 1 State we have shown evidence that there is an active water drive. In the Sunray No. 1 State our information is that they are not producing that well because the well had a fill-up of water through perforations and the gas production was non-commercial, so therefore the gas reservoir type in that well is a water drive. According to my best knowledge, on a reservoir of this type of depletion, your final depletion pressure, which is taken as reasonable and logical before the Commissions of other States, including Texas and Louisiana, is 500 pounds per square inch of area. We measured the initial shut-in pressure at formation level in this gas reservoir, the sub-surface pressure at 1109

pounds per square inch of area. Therefore, our next point would be the ultimate gross yield per acre, remembering the plat of both the minerals and the working interests of this area under these numbered units. The gross yield per acre would be taken, the 2,479,000 cubic feet of gas at 500 pounds depletion pressure sold at 14 cents, with a base of 16.4 pounds per square inch, gives us a gross yield per acre of \$347.06.

The next point I would like to consider in this problem is the ultimate gross return per well. In accordance with precedents before Commissions in other States, including Texas and Louisiana, to my knowledge, the operator is allowed three times the cost of the completed well for his gross return, which in this case the figure submitted at \$120,000 as the gross return to be derived under a 20-year term contract for depleting that reservoir.

Now then, the number of acres necessary per gas well under that gross yield and under that gross return, divide \$120,000 by \$347.06, the answer is 345 acres per well.

The number of acres requested in our petition is 320 acres, which I feel is fair economically and to avoid physical waste in this type of reservoir, and under these circumstances that according to the isopachous map is non-economical and will result in physical waste if wells are drilled indiscriminately out over the thinning edges of that gas reservoir, by

properly spacing them according to the geological data available I feel that that answer is the best that we can give for the formula on spacing the number of acres per gas producing well in that area.

Q In other words, it is your opinion that in order for this field to be developed and operated on an economic basis without waste, that not more than one well to 320 acres should be drilled in the area, is that correct?

A That's right, that they not only should be -- the extra wells drilled will result in causing unnecessary lowering of gas pressure; the result will be the flood of this water which surrounds that gas bubble and result in the physical waste and uneconomical waste of natural resources.

Q Is there any other statement you would like to make in connection with this application, Mr. Hiestand?

A The thing that occurs to me at this moment is that since this work was started and the petition was filed before this Commission, there has been a well started and it is being drilled. The reports I have from the recorded lease owner are that this is the type well, and to date I have had no direct information; the location of this well known as the Royster-Russell No. 1, Frank, located in the southeast quarter of Section 31, 330 feet from the north and 660 feet from the east of that quarter section, is drilling as an offset to the F. Kirk Johnson No. 1 State. It is my information that this

Commission which we are appearing before has recognized the application of that operator for the drilling of that well at the location described, which is an exception to the pattern described in the applicant's petition to go on the numbered gas units. Inasmuch as that application was filed at a time before this hearing had been held and the Commission has approved that location, there is nothing in the way of any further rules, in my opinion, that could be stated except to say that it is an exception to the rule.

The second statement that I would like to make in here refers to the location that I understand an application to drill a well, filed by Deep Rock Oil Corporation, located in the Northwest Quarter of Section 31, 330 feet north and 330 feet west, in the southeast corner of that quarter, has been received by the Commission and it conforms to the pattern as mentioned in the petition in agreement with the location of the Johnson No. 1 State well. Inasmuch as the location, in my opinion, needs to be at the total sand thickness economically and preventing physical waste to deplete this reservoir, it is my opinion that that location is in harmony with the facts as now available to avoid economic and physical waste.

(Exhibit D marked for identification.)

MR. MORAN: I would like to offer at this time applicant's Exhibits A, B, C and D for the record.

MR. VOLK: Any objection to offering these exhibits for the record? If not, they will be made a part of the record.

(Exhibits A, B, C and D were received in evidence.)

MR. MORAN: That is all from this witness at this time.

BY MR. BARB:

Q Mr. Hiestand, have you figured the area in pink, the gas area there, actual acreage?

A I have not calculated by planimetric measure.

BY MR. VOLK:

Q Let me ask you this question, Mr. Hiestand. You are figuring on depleting over a period of 20 years. You have roughly estimated that those wells will produce about 800 million barrels during their total life, and that would be about 40 million a year in 20 years, or about a hundred thousand a day, approximately a hundred thousand per day. Is that about what you intend to take out of those wells?

A The way I intended my statement, I don't know whether I made it clear and perhaps I didn't say it correctly, I had reference to a 20-year term contract in connection with the gross return per well. Is that where you had mention?

Q No, you were figuring on a three for one pay-out there over a period of 20 years.

A What I had reference to was, under a 20-year term

contract that would constitute more than enough to get all of the gas that the operator could hope to have as his return for both the working interest and the mineral interest. I did not intend to say that the rate at which it would produce would come out at exactly 20 years to deplete it. I didn't intend to convey that idea.

MR. VOLK: Any other questions? Mr. Sandberg.

CROSS-EXAMINATION

BY MR. SANDBERG:

Q Mr. Hiestand, in your discussion on the production of gas you stated that thus far the well has produced an average in hundreds of thousands of cubic feet. I'd like to get that figure. What has been the average production, say, in the last seven or ten days when the line has been completely tested and the well has been under full production, do you have a figure available on that?

A I don't have that figure available.

Q Well, reports from the field indicate that production has varied from one and a half to three and a half million feet a day. Are you in position to verify that statement?

A No, I don't have that daily figure supplied to me. The figures so far have come out on monthly reports and the purser handles the metering of the gas in the field as his needs are required. There would be this, I can say, based on 13 million open flow, that if at any time there is more than 25 percent

of that open flow taken per day, that it would be contrary to the written understanding on the well, but within the limits of 25 percent of its capability of producing, I would not get those figures at any current date.

Q Well, based on your 20-year depletion of the pool and since you are the only operator producing at the present time, I think it should be a matter of record in the hearing that these figures of production within the last week or ten days should be included in the record so that the Commissioners can see your approximate rate of withdrawal and also get in the record so the rest of the operators would have that information. I think it is important that if the well is being drawn close to 25 percent of potential, that there is definitely an inequitable situation occurring where no other wells are producing in the area at the present time, and since the Kansas-Nebraska has more or less set up a withdrawal not in excess of one million cubic feet in their original estimates out there.

I had another question, or, rather, a statement to add. In your statement this morning you stated that the reservoir was highly fractureable both vertically and horizontally. I think for the matter of the record it should be entered that the reservoir generally is not. You may have a local situation of fracturing, because in our Sunray well we cored the section down to the water and found no horizontal fracture.

MR. VOLK: Just a minute. You can bring that all out in your testimony if you want to testify, but ask him a question.

MR. SANDBERG: I was not going to appear as a witness but merely to be entered in the testimony in conjunction with his testimony on fracturing in the reservoir.

MR. ROCCHIO: That is purely a matter of testimony. If you want to take the stand, you will be permitted to do so.

MR. SANDBERG: I have one more question.

Q (By Mr. Sandberg) Isn't it true on both your isopachous and your structural map, that you have drawn your contours very tight where you have the control between the Kirk Johnson and the Sunray well and expanded it greatly to the west and to the southwest where you have no control? Wouldn't you assume that since you have a rate of dip determined between your well and the Sunray well, that there should be some agreement over the area based on the control that is available in the immediate area?

A I would like to make a direct answer to that question. My answer to that question is that these contours are not structural contours entirely, and in part they are. Sometimes the top of the reservoir agrees with the structural position and sometimes with the depositional position. The contouring on the west from the Johnson No. 1 State is controlled largely by the depositional presence of this sand

bar. The change between the Johnson and the Sunray wells is essentially a dip condition, with a slight change in the thickness of the reservoir sand. So that the spacing of the contours would be determined on those two sets of conditions. In my opinion, the contouring has not been by matter of imagination but has been controlled by the data available, so that it represents my own interpretation of what data is available.

BY MR. HOUY:

Q Since I am a foreigner to Colorado, I would like to ask one question. On the unitization you didn't bring out in your petition or in your statements this morning that in the event any operator does not have 320 acres or fails to unitize, his allowable share will be curtailed according to acreage. Am I correct in assuming that is your recommendation to the Commission, that it be on 320 acres, if it is less, then we be curtailed accordingly, if we are the operators?

A I have no information on either the Interstate Commission's power in those takings of the gas or anything about the pure marketing of the gas, so that this was on the basis of the sub-surface and the prevention of economic and physical waste.

Q That was a nice dodge, but let's answer my question. You then say you are going on a straight acreage basis?

A I didn't follow your question.

Q I say, we are assuming that a full allowable, if there will be such a thing, will be allocated on a 320-acre unit, if we have only 160 we get half, is that correct?

MR. ROCCHIO: We have no authority to grant allowables, we have no control over it in this Commission.

MR. WILL: I was just going to object to the question because our statute doesn't cover it.

MR. SANDBERG: Being a foreigner, I wanted to know about that.

BY MR. ZORICHAK:

Q Mr. Hiestand, I have a question. The pattern of location recommended according to your plan has been the 10-acre unit in the southeast corner of the 320-acre tract, is that right?

A Yes.

Q It appears from your map that on Units 3 and 7 the pattern wells would be off structure, wouldn't they?

A The units were spread across the lands so long as any part of the reservoir was on one of those spaces. The question of the boundary of the Frenchman Creek Area will have to be decided through the evidence introduced and the matter of how the interpretation is finally, as to what unit should be included within that boundary and what excluded, but the map as used here, where there was enough of the reservoir extending into one of those spaces to keep the pattern on 320-

acre gas units, is the way the exhibit was prepared here.

Q Yes, but as a practical matter, if we were to use your map as a guide, the owner of Unit 3 or Unit 7, because of the distance provisions of 2600 feet or so, would be compelled to drill off the productive area, wouldn't he?

A Well, that comes up, as I understand it, in this district, and also I understand this is the first time we have had a public discussion of the stratigraphic trap or sand-bar type of reservoir. So that I don't pretend to have the answers to this thing. I am trying to describe a few facts, I have tried to gather all the facts I thought were pertinent and show them out here so we can hold a discussion as to what is fair and equitable to both the mineral interest owners and the working interest owners without prejudice to either, and therefore the problem in the way of having a symmetrical pattern within a unit and a symmetrical unit to this type of reservoir condition is a problem that I am very much interested to hear it discussed, but I don't want to be in the position of advertising my ability to get the answer to that problem that you state.

MR. SANDBERG: Mr. Zorichak, on that same point I think it should be pointed out that based on Mr. Hiestand's map here, the only other location, according to his spacing, that would be economical to drill would be the Deep Rock location in the southeast-southeast quarter of the northwest quarter

of Section 31. All of the other units would either be located in the blue or very marginal in the pink. In other words, the co-holders of the acreage in Units 1 and 2 would be the only ones that would be participating in the gas production in the pool and the rest of the operators would either have to stick their wells in almost definitely proven water areas or very marginal outside of his five-foot isopachous contour.

MR. ZORICHAK: I merely brought up this point because I am the guy who processes the notices of the intention to drill.

MR. MORAN: I would like to make this statement, Mr. Commissioner. In our application we have asked for this spacing pattern with an alternate spacing pattern, if a well is drilled upon any unit, that it be not drilled closer than 2600 feet to any other well, and if the Commission sees fit to grant this application, anyone who is affected can always file an application for an exception and if it appears to be justified and warranted based upon the information that is available here, a well can be drilled at any place on one of those units, provided it doesn't fall within 2600 feet of any other location and so long as they comply with the general spacing pattern that the Commission may see fit to adopt here. We haven't asked for a fixed rule.

MR. VOLK: Mr. Will?

BY MR. WILL:

Q Would you refer back to your Exhibit A, Mr. Hiestand?  
I believe all that showed was the property ownership?

A Yes, that's right.

Q Do you know who owns the land south and east of that colored in blue, do you know whether or not that is owned by the State?

A You are talking about the blue, and you mean from here (indicating) east or south?

Q No, I meant who owns the land immediately east of the blue, if you know?

A The State has the minerals here.

MR. VOLK: State of Colorado.

Q (By Mr. Will) Then so far as your map is concerned, the blue is owned in fee by August Frank, I believe you testified?

A All the record information I have is to that effect.

Q Then all the land surrounding the August Frank lease is owned by the State, is that correct?

A That is my information.

Q Now, I believe you testified that when you were working up this application -- by the way, you are familiar with this application, aren't you, that was filed by Kirk Johnson?

A Yes, sir.

Q You are familiar with it, the terms of it?

A Yes.

Q You testified that these units that you fixed on there were fair and equitable; am I quoting you correctly?

A I can go back to the transcript, but the way I remember the statement was that we presented all the geological facts and interpretation we could make, then we fitted these numbered gas units as nearly fair and equitable to the mineral owners and the working interest owners as we could see fit to suggest, this plan in our petition, that is correct in that way.

Q I see. Did you take into consideration that the only fee land in there was colored in blue?

A In what way, now? I didn't quite understand your question.

Q You filed an application here for spacing and you have recommended to the Commission that each one of the units consist of 320 acres and you further recommended that the well on those units be located in the southeast corner.

A Or the alternative -

Q And that there should be only one well on the 320 acres.

A That's all Alternative A now. You haven't read all the petition.

Q Yes, I have read all the petition.

A There is a "B" alternative which Mr. Moran just now recited, or if it isn't in the southeast corner it shall be 2600 feet from the nearest producing well adjacent to that

unit.

Q All right. We will go 2600 feet, that is approximately half a mile.

A Yes.

Q Now, then, when you made that location in the southeast corner of one of these units, did you take into consideration in protecting the mineral owner, as you just stated, that he only owned one of those sections in there, one of those units, did you take that into consideration at all in the location of your wells?

A We are presenting all the evidence. We have no way to protect anyone. The Commission can see what we have suggested with all the facts. But I don't understand your word "protected".

Q You didn't take that into consideration at all?

A We presented that evidence; I would say that is consideration fully.

Q I don't want to argue with you --

MR. VOLK: I think I can answer your question right off. There is no point in arguing where there is not any problem. There is already a well being drilled upon that fee title land, is that correct?

THE WITNESS: I recited that. That is a tight hole.

MR. VOLK: The well is already being drilled on the 320-acre tract. Is that your question?

MR. WILL: No, I am talking about the well in the southeast corner of Section 2. He alleges in his petition that well. I am not talking about the Royster well over in Unit No. 7.

THE WITNESS: He is talking about Unit 2 here.

MR. WILL: And he states in his application that that well is on pattern, the well in the southeast corner of 2; don't you state that in your petition?

THE WITNESS: Unit 2, yes.

Q (By Mr. Will) And you think that that would be fair and equitable location when it is just offsetting the area in blue which you describe as Unit No. 7?

A I certainly think that is fair and equitable on an acreage basis of the geographic location of the gas reservoir and the mineral interests and the working interests. In my opinion, that is a fair and equitable location.

Q How wide, then, Mr. Hiestand, is each one of those units?

A Those represent two quarter sections.

Q How many feet is that?

A Well, we'd have to get a surveyor to measure those. They are half mile, more or less.

Q How many feet in a half a mile?

A Well, I don't know what you are driving at there, but anyway you can look it up in the standard reference and it will be approximately --

Q I am asking you, Mr. Hiestand. You drew those units, didn't you?

A Well, if you will look up in a standard arithmetic in grade school it will tell you about 2640 feet. I am not an authority.

Q Is that how wide each one of those units are?

A I haven't measured them out there, I am sorry. I'll have to go out there and get a surveyor.

Q How wide are they on your plat?

A Well, that plat is approximately a thousand feet to the inch.

Q Answer the question.

MR. VOLK: The answer to your question is 2640 feet.

Q (By Mr. Will) Is that how wide each unit is?

A That is to the best of my knowledge.

Q Now, if you put the well in the southeast corner, as it has been drawn there and as you say it would be on pattern, what would be the drainage area of that well?

A Well, the way I would explain that is this. We have an exhibit here which has a red center surrounded by a blue outside and that is a gas bubble just like on a transit, if you have ever seen a transit there, and any hole that is punched down into that reservoir will cause one thing to happen: As the pressures reduce the water will move inward and the drainage area of any well in there will affect the entire

reservoir, if that is the answer to your question; that is my opinion.

Q I am asking you. You had to have some reason for arriving at 320 acres and you had to have some reason to locate the well in the southeast corner, and all I am trying to find out is what you estimated the drainage area of that well.

A My answer to that is that it will affect the entire reservoir within the limits of the pressure that is depleted out of the reservoir, and the water will move in at a higher pressure than the gas at all times and fill in that void, so that the size of that bubble will diminish with any well any place in that red area on that plat.

Q Well, then, why did you select the 320 acres?

A My selection here is based on eight points which I can repeat or hand you a printed sheet here.

Q Well, hand me the printed sheet.

A (Hands document to Mr. Will.)

MR. VOLK: I think Mr. Hiestand pretty well testified on the reason for selecting the 320 acres from an economical standpoint.

MR. WILL: But I don't think he ever touched on why they selected the location in the southeast corner. I failed to catch it if you did. Did you state why? Maybe I am mistaken about it.

THE WITNESS: I would like to repeat this part if I did



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not state it. I would very much like to restate this or repeat it. My reason for wanting the location where the discovery well is located, Johnson No. 1 State, and the location proposed by Deep Rock, both in the southeast corner of the respective gas units, that due to the deposition of this sand bar, where we have full 22 feet of vertical column of gas-filled sand, that those two locations conform exactly for the prevention of economic waste and physical waste; they are the ideal locations on that reservoir, in my opinion. Therefore, those are proposed in that petition in that manner.

MR. VOLK: Mr. Hiestand, didn't you make that location because the first well was drilled on that pattern, wouldn't that be the answer to it?

THE WITNESS: Well, we couldn't control the fact that we discovered gas because that was an outright discovery. Now, I want to make that clear, that that location -- it does occur to us that the other location is within those bounds, Mr. Volk, as I stated.

Q (By Mr. Will) I will put it another way. The location of the well in the southeast corner of Tract 2, did it take into consideration at all the ownership of the land in there, the mineral ownership?

A It certainly did. I mean no location can be made without consideration to the minerals and the working interests, that's right.

Q Now, you recommend, do you, firmly, that no well should be drilled closer than 2,600 feet of that well?

A In prevention of economic and physical waste, that's right. I didn't say that we would oppose an exception, but I did say that that's what we had to write our petition, that is the way.

Q Do you think that a well located in the southeast corner of 2 on a 10-acre location would drain any gas from the blue unit marked No. 7 on your Exhibit A?

A I would say that the drainage affects the entire reservoir and is not prejudicing any mineral owner or any lease owner insofar as that location goes in that reservoir.

MR., SANDBERG: I think we can partially answer Mr. Will's question if we go back to your isopachous map, where you had the blue and red outlines, and from the Deep Rock location in the southeast corner of Unit 2 measure off 2600 feet and see whether or not a location could be made in that unit that would be economically feasible to drill and yet conform to the whole pattern. I think that would answer the question.

THE WITNESS: I didn't understand, was he asking me a question?

MR. VOLK: He was trying to ask the question, where a well would fall 2600 feet from those two locations. That is what you are asking?

MR. SANDBERG: That's right.

MR. VOLK: Say, for instance, the Deep Rock well was in, then go 2600 feet from both of the two wells that are already in.

THE WITNESS: Which operator are we concerned with to offset that?

MR. SANDBERG: On the fee lease.

THE WITNESS: In my opinion, the one well on Unit 7 will be sufficient to protect both the working interest and the mineral interest with respect to that unit.

Q (By Mr. Will) And that is the well that is on there now, is that what you mean?

A Well, that hearing hasn't been concluded on that, but according to my petition that would now suffice since that well is in there and is drilling.

MR. PARADISE: Could I ask for a clarification? Does Mr. Hiestand's statement indicate that the application is amended to consider the Royster well as an exception?

MR. MORAN: I will answer that question. We do not consider the application amended for any purpose other than this hearing. If they want to make a supplemental application at this time, it will be perfectly agreeable with us. We'd like to have this application disposed of before an amendment is granted.

MR. VOLK: Any more questions now?

MR. PARADISE: The applicant does consider that well as

an exception, as I understood his testimony, is that correct?

MR. MORAN: It has been approved as a location by the Commission.

MR. VOLK: The Commission approved it. That is an accomplished fact.

THE WITNESS: Mr. Commissioner, I made a statement that perhaps I could restate in this sense, that it was not in accordance with the pattern suggested in our petition and was an exception to that pattern on the map but had nothing to do with the Commission.

MR. BARB: I am a little confused now. I want to get something straight in my own mind. It is my impression that after the Johnson well came into production there was an application for the offset to the southwest before there was an application for this spacing, is that correct? I just want to get the sequence of events.

MR. VOLK: That is correct.

MR. BARB: Then when was the application for the well to the west? Is that your location?

MR. PARADISE: That is correct.

MR. BARB: When did --

MR. VOLK: You mean the Deep Rock well?

MR. WILL: To the west would be Deep Rock.

MR. VOLK: The Deep Rock well is to the west, the Royster well is to the southwest.

MR. BARB: I can hardly see those figures, but Kirk Johnson was the discoverer, then very quickly there was application for the Sunray.

MR. PARADISE: Southeast.

THE WITNESS: I can point those out.

MR. VOLK: That is a dry hole.

THE WITNESS: This is the drilling well here now.

MR. BARB: That clears it. That is the one I was mixed up on, the dry hole. The one he is drilling now, though, the application came in before the application for the hearing?

MR. ZORICHAK: That's right.

MR. BARB: That is the one you called us about?

MR. ZORICHAK: That's right.

MR. WILL: I would like to ask a few more questions.

Q (By Mr. Will) I didn't quite get your testimony this morning on the producing horizon. It is "J" sand, isn't it?

A I would say that this producing sand which is colored yellow on this exhibit is a bed in the zone that most of us have referred to as "J" sand. That is a little bit controversial and isn't exactly part of this problem in direct --

Q I had no point on what it is called or anything like that. At what depth did you find that?

A It is in the petition there.

Q 4790?

A That is the total depth?

Q That is what I have, total depth.

MR. VOLK: I have a total depth of 4790.

A You are talking about the gas sand?

Q (By Mr. Will) I am talking about the sand that resulted in 13 million cubic feet per day.

A It is approximately 4662. I think you may find that in the petition.

Q That is the question. Now, you state that the perforations were squeezed and the casing was re-perforated between 4666 and 4672; that is an interval of six feet, isn't it?

A That is the producing interval now.

Q That is what I am getting at. Is that the producing interval?

A That's right.

Q Where did you reach your water contact?

A Measure 22 feet down from the top of the sand and the first indication of water was in the Drill Stem Test No. 3 there, and then it was filled up 2600 feet plus in the Drill Stem Test No. 4, so that in terms of approximate figures it will be 4684, is a theoretical contact of gas and water.

Q You made some reference this morning to six feet and I think it was in regard to the Sunray offset to the southeast. Did I understand you to say that top six feet of your production formation would not be affected by any other well?

A In case that the envelope of shale and silt occupied that

stratigraphic level, then there would be no way for a well which didn't have that particular part of that sand bar present to offset that well mechanically. Now, then, so far as affecting that reservoir, no matter where it would puncture into that gas bubble, it would lower the pressure and the water would come in, so it would affect the reservoir. But the point I was making was that you can not fully offset the Johnson well unless you have exactly the 22 feet of vertical column of gas-filled sand.

Q How much producing horizon above the gas-water contact would you estimate it would take for a commercial producing gas well out there?

A Well, the question is, of course, debatable. In my opinion, the drilling of a well at a point in the reservoir where the gas-filled sand was less than ten feet of thickness would be uneconomical and would probably result in physical waste in that reservoir.

MR. WILL: That's all.

MR. VOLK: Any other questions?

MR. PARADISE: May I inquire what Mr. Hiestand means by the phrase "physical waste"?

THE WITNESS: The interpretation I put on physical waste is where the abrupt depletion of pressure in the gas-filled sand permits water to unequally infiltrate into that portion of the reservoir, leaving other areas which can not be drained

properly by well-located gas-producing wells.

MR. VOLK: Any other questions?

The witness is dismissed.

(Witness excused.)

BURTON DUNN

was sworn and testified as follows:

DIRECT EXAMINATION

BY MR. MORAN:

Q Will you state your name, please, sir?

A Burton Dunn.

Q What is your occupation, Mr. Dunn?

A Consulting Geologist.

MR. MORAN: May I ask the Commission and the opposition whether or not they will accept Mr. Dunn's qualifications without further proof?

MR. VOLK: We have already done that. They have been sworn and they have accepted the qualifications of all these men.

Q (By Mr. Moran) Mr. Dunn, you have been present throughout this hearing and you have heard Mr. Hiestand's testimony with reference to the Frenchman Creek Area of Logan County, and may I ask you whether or not you agree substantially with the statements made by Mr. Hiestand with reference to the operations in the Frenchman Creek Field and the basic geologic problems and whether or not it is your opinion that one well

drilled to 320 acres in the area would result in economic development and operations in the field and whether or not it would result in the greatest ultimate recovery of production from that field? That may be a pretty long question; let me state it this way simply, then: You have heard Mr. Hiestand's testimony and I would ask you whether or not you agree substantially with the statements that he has made with reference to the Frenchman's Creek area of Logan County?

A I do agree.

Q Is it your opinion that if said area was developed on the basis of more than one well to 320 acres it would result in economic waste of gas or reservoir pressures?

A It is my opinion, yes.

MR. MORAN: That's all.

MR. VOLK: Any questions?

MR. ROCCHIO: Yes, I have a question.

BY MR. ROCCHIO:

Q Mr. Dunn, do you feel that there is sufficient information obtained in this field for this Commission to make a determination on the boundaries of that reservoir at this time?

A Well, that is a difficult question to answer. Mr. Hiestand has submitted all the information that we have. There is one other well drilling, we don't know anything about it. Of course, if you wait until a whole lot of wells are drilled you will have more definite, complete information. If

you wait too long there may not be any need for regulations.  
Does that answer your question?

MR. ROCCHIO: Yes. Thank you.

BY MR. VOLK:

Q May I ask this, if it is not confidential, do you have any seismic work there that substantiates this structure contouring the way you have it?

A We do not have any seismic work that I would say substantiated or did not substantiate this. As far as I know, the seismic interpretation, from what little information I have seen, was not on the horizon which we are discussing.

MR. BARB: I want to ask for information of anybody. Was there ever a figure on the cost of the well quoted in the hearing this morning or this afternoon?

THE WITNESS: Yes.

MR. BARB: I missed that.

MR. VOLK: That was given at \$40,000, I believe, forty thousand completed; that is, equipped, forty thousand completed and equipped for gas delivery. Is that correct, Mr. Hiestand?

MR. HIESTAND: That is correct. That is the figure I introduced.

MR. BARB: Thank you. I missed that.

MR. VOLK: Any other questions of this witness?

You are dismissed.

(witness excused.)

MR. MORAN: That is all the testimony the applicant has to submit at this time.

MR. VOLK: The party making the next appearance?

MR. WILL: We will go ahead.

MR. VOLK: All right, if you wish to go ahead now.

MR. WILL: Before we go ahead, Mr. Chairman, we want to be perfectly frank and honest about this location that is off-setting the Johnson well to the southwest known as the Royster-Frank No. 1, I believe. Is that well considered an exception to any plan that might come out? In the order you might make will there be an exception to that plan?

MR. VOLK: I see what you are trying to ask. Would you please leave the decision to the Commission?

MR. WILL: It would make a difference in our presentation.

MR. VOLK: The Commission approved the location. Does that answer your question?

MR. WILL: Yes.

MR. ZORICHAK: May I make a suggestion? It is possible that they both might have to be exceptions. That is possible.

MR. WILL: Mr. Royster.

HARRY ROYSTER

was sworn and testified as follows:

## DIRECT EXAMINATION

BY MR. WILL:

Q Will you state your name?

A Harry Royster.

Q And your business?

A I am a driller, drilling contractor and producer.

Q Did you drill a well or are you in the process of completing a well located 330 feet south and 660 feet west of the boundary lines of the southeast quarter of Section 31, Township 8 North, 50 West, Logan County, Colorado?

A Yes, sir, and drilling of said pipe line.

Q Now, in your own way will you tell the Commission where you encountered the various formations on the way down and any other pertinent information that you think they may want? You can just tell it to them in your own words.

A I ran a 7-inch at 4680. I hit the top of the "D" --

Q First of all, when did you commence the well?

A A week ago Thursday, wasn't it? I have got all that dope back there if you want me to get it.

Q You may refer to notes.

A About four days' drilling. We rigged up on March the 5th, set surface on the 6th, then 285 feet at 10-3/4 and cemented with 190 sacks.

Q You say the 5th of what?

A 5th of March. Took 3 cores, one drill stem test, used

five rock bits, run a Schlumberger, set 7-inch casing at 4680. We topped the "D" sand, we got a show of oil on the "D" sand at 4369. We got three foot of broken sandy shale at the top of the "D", we got a break of about six inches, then we got about six or eight inches of good oil sand and we got two or three of those little stringers of oil sand, very good-looking oil sand which might or might not produce. If you would like to see a piece of it, I brought it along. Not bad-looking sand.

MR. VOLK: I think the Commission will take your word for it. We will be more interested in the drill stem test.

A I cored from 4681 to 4688 and I ran a drill stem test on it. I used 6-1/8 diamond core head on that, blowed all the water out of the bucket in about a minute, and we had a Johnson Test Tube on there capable of four million, so it went up to capacity in very short order. I think that we are about eight foot lower than the Johnson well on the "J" and I have got the log here; I think we were about 11 or 12 feet low on the "D", lower than the Johnson. We are now in the process of drilling a plug, I am drilling a plug this afternoon.

I am going to drill all my wells out there with cable tools. I don't intend to get into any water. I have got another one drilling in 7-7-50, I am going to set 7-inch on that one. As I say, I am going to drill them all in and stay out of that water because I have been in on several dry holes

over there east of that river.

MR. VOLK: You are going in with cable tools, you set up on top of the sand, is that correct?

A Yes, sir.

Q (By Mr. Will) Mr. Royster, did any of the tests that you made or any information that you have from that hole that you are drilling out there indicate that it might be an oil producer, or did you find any oil of any kind?

A Yes, as I say, we had very good show up there in the "D", and with that well running lower than the Kirk Johnson-- I am not a geologist but I like to get away from the highs -- I think it has got a good chance of making oil. If I do get any oil down there, why, I don't intend to get any water in it. If I do, I am going to shut off the cable tools, I am not going in it too far. I have a very good possibility of making an oil well out of it in addition to a gas well.

BY MR. PARADISE:

Q Mr. Will inquired if you have a Slumber Jay that would show the exact correlation between this well and the Kirk Johnson well?

A I have mine, yes. You can have it if you want it.

MR. VOLK: Mr. Dunn, did you have a Slumber Jay in your well here?

MR. DUNN: Yes, I do.

MR. VOLK: Do you mind comparing the two Slumber Jays

there for the benefit of the Commission, based on their elevation?

MR. DUNN: Do you want me to compare them here?

MR. VOLK: Yes, compare them there and take into account the difference of elevation there.

MR. DUNN: That would line two oil wells up on top of the "D" sand, and they are approximately the same on the "J", though the penetration of the "J" sand, which is the gas-producing sand in Mr. Royster's well, is not sufficient to make very much of a comparison of the reservoir in the two wells.

MR. VOLK: Did you have any showing of oil in the sand in your well, Mr. Dunn?

MR. DUNN: No, I don't think so. We had a little staining and we tested it. It recovered 630 feet of water. We did have some stain, in other words, apparent saturation in the core.

MR. VOLK: The intervals look to be almost exact, isn't that correct, between your "D" and your "J"?

MR. DUNN: I would say the interval in Mr. Royster's well would be less than four feet thicker than it is in our well, the Johnson well, three to four feet.

MR. VOLK: Have you confirmed the fact that his well is probably 11 foot lower than your well?

MR. DUNN: No, I haven't.

MR. VOLK: 12 feet.

MR. DUNN: Do you want me to check it?

MR. VOLK: Yes, would you check it while you are there?

(Argument between Mr. Dunn and Mr. Royster off the record.)

MR. VOLK: I didn't intend to cause any argument. I just wanted approximately for the record the 12-foot difference.

Mr. Sandberg?

MR. SANDBERG: On the top of the main bench of sand, which is the producing, the testimony has been made that the top of the Kirk Johnson well was 62, and Mr. Royster states his top by coring was 81, and it figures out to be at that point 13 feet difference.

MR. VOLK: 13 feet. Okay. Any other questions?

MR. PARADISE: Yes. May I ask another question?

Q (By Mr. Paradise) For the record, Mr. Royster, will you identify the portion of the property shown on that map, which is Exhibit D, which comprises the lease on which you drilled the well?

A The southeast quarter of 31; I guess it would be here (indicating).

Q That is the same as the north one-half of that proposed Unit No. 7, is that correct?

A Is that over here, you mean? I am not familiar with

that.

Q The 160-acre section in the north half of that Unit No. 7?

A That's right.

Q Do I correctly understand that you have no interest in the south half of that Unit No. 7?

A I don't know what the south half is. Is that it? (Indicating).

Q Yes.

A No, I don't have.

Q From the showings of oil in the "D" and "J" sand in this electric log, do you have an opinion as to the probability of productive oil wells in the south half of that 160-acre parcel in which your oil is located?

A Yes, I think the possibility is good. I set surface platform on Section 7. I think the south end of it has possibility for oil.

Q For oil as distinguished from gas?

A That's right, and also the one we are drilling in now. However, I consider every well you drill there that is 330 feet from the well will offset any well that is drilled wildcat.

Q What is your reason for that opinion?

A The amount of dry holes I have drilled.

MR. PARADISE: No further questions.

MR. VOLK: Any further questions?

CROSS-EXAMINATION

BY MR. MORAN:

Q Mr. Royster, you drilled that well under a farm-out from The Texas Company, did you not?

A Yes, a lease from them, yes.

Q What were your bottom hole pressures on that drill stem test from 4621 to -88, do you have those?

A I have the breakdown on the back of something.

Hydrostatic pressure was 2940, the shut-in pressure was 1075 and the flowing pressure 770 to 940. We didn't leave that thing open very long.

Q How long was it open, do you know?

A I don't know, didn't pay any attention to it.

MR. MORAN: That's all.

MR. VOLK: Any other questions?

All right, Mr. Royster, you are excused.

(Witness excused.)

MR. VOLK: We will have a recess for 15 minutes.

(Recess had.)

MR. VOLK: The meeting will come to order.

Mr. Will, do you wish to call your witness?

MR. WILL: Yes.

J. D. CHAMBERLAIN

was sworn and testified as follows:

## DIRECT EXAMINATION

BY MR. WILL:

Q Will you state your name, please?

A J. D. Chamberlain.

Q By whom are you employed?

A The Texas Company.

Q In what capacity?

A Geologist.

Q Will you state for the Commission a brief background of your educational qualifications?

A I have a Master's Degree from the University of Rochester in Rochester, New York. I have worked for The Texas Company as a geologist for five years, presently in the Division Office at Denver.

Q Are you familiar with the pool that is the subject matter of this application called Frenchman's Creek?

A Yes, sir, I am. I was in on the original contribution to the Kirk Johnson well and to some extent on the farm-out to Mr. Royster and I have watched developments subsequently.

Q And are you familiar with the area surrounding this pool known as the Julesburg-Denver Basin?

A Yes, I am. That is one of my Division Office capacities, to watch all developments, wildcatting and sub-leasing operations of The Texas Company within that area constituted by the Denver-Cheyenne Basin of Colorado and Eastern Nebraska.

Q Have you been present at the hearing since it commenced this morning?

A Yes, sir, I was.

Q Did you listen to Mr. Hiestand's testimony?

A Yes, I did.

Q With particular regard to his Exhibit C and D?

A Yes, I did.

Q Do you care to comment on his interpretation of the geologic information that he used to draw those contours?

A Yes, I'd like to comment on Mr. Hiestand's presentation, and also present a few questions that arose in my mind as I listened to that interpretation that he presented.

First of all, it is not quite clear to me on what basis Mr. Hiestand can take three wells, which were presented on this cross section, I believe it was Exhibit B, one of which is outside of the immediate area under discussion as outlined by the seven units which have been set up by the applicant, and use those three wells for the basis of what he calls a stratigraphic type gas field. Now, I believe there are enough geologists present here to agree with me that a stratigraphic field, either oil or gas, certainly needs more control to be resolved than three wells rather closely spaced, especially two of them, one of which is a dry hole only a thousand feet away from one of which is a producer and the only producer which had been known to the applicant at the time he made his

presentation and drew his map.

Secondly, on that same basis Mr. Hiestand said that he believed that an active water drive was present and established by the evidence that he presented in this so-called off-shore bar. Well, that is not quite clear to me, either. As a geologist, I understand an off-shore bar as a non-interconnected sand body which is not a part of a so-called regional blanket sand whereby the water could enter that sand body from a distance of over, say, five miles, and thereon throughout any given area of the basin affected. In other words, I don't believe that there is an active water drive connected with this immediate area of Frenchman's Creek just by the very nature of the type trap which Mr. Hiestand is purported to have presented. There can't be. He has only shown on his Exhibit C, which I believe is this right here, the eastern and western flanks of that so-called structure, he doesn't limit it on the north or the south, but being a stratigraphic type trap and an off-shore bar it must have a shale and silt, what he calls envelope shale here on this map bounding that sand body to the north and the south. Therefore, how are you going to have an active water drive present? I don't see it. I base that question in so-called bewilderment on other parts of the Denver Basin, such as the Mt. Hope Field. Possibly a lot of you gentlemen will know that the Shell Oil Company shut in their wells on Mt. Hope for a period

of two weeks to see if their reservoir and bottom hole pressures would increase. In other words, they are trying to establish whether there was an active water drive connected with their gas or with their oil production in that particular field, which, incidentally, lies about three or four townships to the southwest of this particular Frenchman Creek area. After having shut in their Mt. Hope Field for two weeks the Shell Oil Company found that their bottom hole pressures are not measurably increased, certainly not to the extent it would establish a water drive. Therefore, if we can take that as a typical Denver Basin oil field, which would probably hold true for a gas field as well, we should assume that it is very unlikely that we are going to have a water drive in this particular area.

Now, getting back on the same subject, Mr. Hiestand said that the F. Kirk Johnson well had an average permeability of approximately 400 millidarcys. You all heard Mr. Royster's testimony that his well, drilled as an offset southwest diagonal 330, had an average of about 2000 vertical and horizontal. Right there, gentlemen, is evidence of the rather erratic nature of the sand conditions in this so-called Frenchman Creek Area.

Further, in pursuance of Mr. Hiestand's testimony, I do not believe that his interpretation is based on any definite sub-surface control. I believe Mr. Hiestand admits that.

He said his map was contoured on top of the sand, on the top of this off-shore sand bar. Taking into consideration two wells, one of which is a dry hole, the other of which is the only producer in the so-called gas field, which are only a thousand feet apart, the rest of his information is the sub-surface control lies a distance of over one mile to the west and to the north, but on the basis of that sparse control he interprets the structure, as you will recall on Exhibit C, that extends over practically the entire area that has been set up for 320-acre spacing and unitization.

Our own geological thinking, based on past experience in the Denver Basin -- and, incidentally, an established gas field to the southwest of this area known as the Padroni in 9 North, 52 West, indicates that these structures are by very nature very small and much less in areal extent than is here represented by Mr. Hiestand. I do not feel that this structure, as he has represented on Exhibit C, will cover an area as large as indicated. I believe from past experience in Padroni that almost every well that is going to be drilled hereafter subsequent to the wells which have previously been drilled is by very nature a wildcat and that even a 330-acre offset has very much danger of being a dry hole.

For example, Sunray moved down here a distance of a thousand feet. Even Mr. Hiestand's interpretation shows a very quick drop-off in that direction but he has nothing to

support evidence that he has a broad sweep to the southwest as he has so represented. How do we know that this structure isn't limited by the very small area shown here between the center of Section 31 and the east line of that section. How do we know that the next location, Deep Rock's, for example, which has been requested, is not going to fall off drastically and be a dry hole? We don't know. We don't have the control. Mr. Hiestand admitted that in his testimony.

One other thing that Mr. Hiestand presented that I don't agree with. He said that between the Kirk Johnson discovery well and the Sunray dry hole, a distance of one thousand feet, the prospective sand thickness of 22 feet diminished to zero. Now that, mind you, is a distance of one thousand feet. How are we going to go over here in Unit 5, for example, a distance of approximately one mile from the discovery well, and not find out that we have passed that zero line of prospective sand horizon within half of that distance before we got to that area? In other words, what I would like to show by very reason of Mr. Hiestand's own presentation is that he has taken an area and set it up on a unitization and spacing pattern that is very favorably inclined to not only Kirk Johnson but Deep Rock to the detriment of all the other operators that are involved in this particular area in which the applicant is set up.

For example, if Deep Rock drilled their well in this

area, I believe the chances are better than three to one that it will be a dry hole, just by the size of the structure, as I feel it may be. But assuming that it is a marginal well, where does the operator that has Unit 6, for example, where is he going to drill his well? He is going to drill it on 2600-foot spacing, granted. It doesn't have to be in a southeast corner pattern, according to Mr. Moran, if special application is asked. However, where can he put it in there and be 2600 feet away without getting into the danger of a dry hole? The same can be said for Unit 7, if we leave out Mr. Royster's well. Supposing that well hadn't been drilled, where would The Texas Company and Sinclair drill their next hole? They'd drill it down here in the corner in dry-hole country.

Then you can go over here to so-called Unit 4 and Unit 5. The chances are they wouldn't even get a show of gas. There is nothing to establish the fact that they would unless it so happens that there is another structure over there which we know nothing about. No one has shot this area. We have run seismic lines up to the south line of 8-50, so we know something of the structural condition south of that township but we don't know what the score is up in here, other than subsurface information, and that is all Mr. Hiestand knows. We can dream a structure that will be a third again as small as this and yet fit all the facts of the evidence that has been

represented, the sub-surface data, by the previous wells that have been drilled. Therefore, in conclusion, I believe that Mr. Hiestand has presented plenty of information but he has made his own liberal interpretation. I believe that his interpretation is favorable to Deep Rock and Kirk Johnson but to the detriment of the other operators involved and will not act, as he says, as a conservation of gas in this particular area because of the fact that it has not been established that we have a gas field that does extend over the size of the unit that he has set forth in his application. In other words, how are we going to conserve the gas if we don't know whether we have a gas field there to begin with? We can't set up a gas field on one thousand feet spacing on two wells that have been drilled one thousand feet apart, in my opinion. I hope the Board will agree and see the reasoning behind what I have tried to present and why I disagree with what Mr. Hiestand has said.

That is generally my argument with what Mr. Hiestand put forth, Mr. Will.

MR. WILL: That's all.

MR. VOLK: Any questions?

#### CROSS-EXAMINATION

BY MR. MORAN:

Q Mr. Chamberlain, there is always considerable difference of opinion between geologists on almost every area in this part of the country, isn't there?

A Yes, sir, I am sure there is.

Q Mr. Hiestand's presentation of the facts in his testimony is not an impossible interpretation, is it?

A I believe it is impossible -- or I wouldn't say it is impossible; strictly speaking, nothing in geology is impossible. This particular interpretation of Mr. Hiestand's, in my opinion, is improbable in the Denver-Julesburg Basin, that is, its magnitude and areal extent is improbable.

Q Have you prepared a geological map of the Frenchman's Creek Area?

A Yes, sir, we have.

Q Do you have a copy of it with you?

A Yes, we have a map showing our own interpretation but it is not with us. We can furnish it, if necessary.

Q In what respects does your map disagree with the map that has been presented here by Mr. Hiestand?

A Well, for example, as I mentioned previously, our shooting control does come up to the south line of Section 8 North, 50 West, wherever that is -- right here, I believe. In other words, we have shooting control over this whole area (indicating).

Q To the south?

A That's right. So we know what kind of structures we are looking at up to here. Now, taking that in conjunction with the sub-surface data that we have, we have contoured

an area that will be higher or as high in here (indicating) as the Kirk Johnson gas area roughly around the center of Section 31. In other words, this Big Six well at a minus-271 is flanking a synclinal sag that comes up roughly in a northeastward direction and extends right up there in Units 4 and 2 and through into the center of Section 30 until it almost approximates this sag in synclinal pull-up as herein represented. As we go eastward from the Kirk Johnson well we are practically in agreement with Mr. Hiestand's interpretation in that the structure falls off to the east and southeast. However, we show the falling off in a more rapid direction, especially since we had the advantage of Mr. Royster's well and the tops; it may have been a tight hole to the other operators but it wasn't to us. We know that Mr. Royster's well is 11 feet lower on the "D" and approximately 13 feet lower on the "J" than the Kirk Johnson well, which shows that this structure as herein interpreted by Mr. Hiestand is not even as large as he showed it. It falls off a heck of a lot faster; somewhere inbetween here and the Kirk Johnson well there is ten feet of dip. Therefore, we show a sag that is fairly pronounced here; as you come down here there is a sag between this falling off over here, which will separate the Kirk Johnson small high here, and another high that may make its appearance down here outside the area proposed for unitization. However, we only have geophysical information and

sub-surface well control is more necessary in this particular instance in order to verify the correctness of the shooting picture.

Q Did I understand you to say that your seismograph map reflects that Kirk Johnson high as it is mapped on Exhibit D?

A No, it doesn't. It doesn't extend that far north, but the regional trends of the structure that we interpreted south of the township line of 8 North, 50 West, do indicate that there is a trend in this direction and the small closure that we have contoured in this area would be expected to be on trend with another small closure of the same magnitude in the area of the Kirk Johnson well.

Q Your only control, then, is to the south of the Kirk Johnson well, is it not?

A In addition to the sub-surface control that Mr. Hiestand has, in addition to Mr. Royster's well which he did not have; we have Mr. Royster's well and our shooting picture, which Mr. Hiestand does not have.

Q You didn't have Mr. Royster's well until the last day or so, did you?

A We had it Monday.

Q Did that change your overall geological picture of that area?

A No, sir, it didn't, because we started out on the premise that it was a small structure. Mr. Johnson's well

substantiated that, in our opinion. It fell off 11 feet in a distance -- that is, on the "D" sand -- 13 feet on the "J" sand -- in a distance of 660 feet.

Q You made the location for Mr. Royster, did you not?

A Mr. Royster picked his own location, as I recall. We sub-leased the acreage. It was up to him.

Q There was no restriction on where he could drill?

A Not as far as we were concerned.

Q This dry hole on the west side of Exhibit C here, you state is not a sufficient basis for projecting the sand bar area that far to the west, is that correct?

A No, sir, I didn't state that. I said it is not sufficient basis for projecting the structure as shown that far west. I have no argument with the fact that the sandbody of the "J" does extend that far west. It may extend even further west. I notice he has very conveniently stopped it there, but in my opinion it could go on for another couple of miles. But it may not be a productive sand. It may be shaled out to the extent that it is not prospective. It may be lower structurally. In other words, we have to consider a combination of structure and stratigraphy here. The fact that the gas field is small, in my opinion, is a combination of structure and stratigraphy. It is a small structural entity and you have very erratic and variable sand conditions which are going to limit it in any direction.

Q Well, would you recommend that from an economical standpoint and also from the standpoint of underground waste, that more than one well be drilled to 320 acres in that area?

A I would not recommend that if I thought that the gas field extended over the area that Mr. Hiestand maintains that it does. However, inasmuch as it doesn't, in my opinion, I believe that more than one well is justified in order to determine just what the extent of this gas-producing or oil-producing area is, in order to not only cheat the other operators involved but to prevent unnecessary dry holes from being drilled because of a previously set forth spacing arrangement. We are not only going to miss the possibility of getting a producing gas well, but we may miss the possibility of discovering an oil field if we agree with the spacing pattern as applied for, and the unitization pattern, for that matter, also.

Q Well, based on your information regarding the area, what kind of a spacing pattern would you recommend to the Commission?

A I think I stated in my testimony that I believe that even a 330-foot location was a wildcat in this area, but in view of the fact that we do have a gas field of some extent, not strictly determined as to exact areal boundaries as yet, inasmuch as we do have some sort of a gas field, I would say that a maximum of 160-acre spacing would be my recommendation.

I wouldn't step out any further than that without somebody getting, shall we say gypped, and without endangering any conservation practices.

Q Haven't you previously expressed the opinion that one well to 640 acres would be adequate to drain that gas field?

A Well, one well to 330 acres might be adequate to drain this gas field, but I didn't say that one well per 640 acres could drain this gas field. I don't recall saying that. I didn't say that today. If I said it sometime previously I'd sure like to know when, but I don't recall it. I don't think the whole gas field is 640 acres.

Q Your company didn't think sufficiently of that south location there to spend its own money for the drilling of that well, did it?

A Which south location are you referring to?

Q The Royster well.

MR. WILL: I object to that question. This witness wouldn't know anything about that. It doesn't have anything to do with direct at all.

MR. VOLK: Objection sustained.

MR. MORAN: That's all.

MR. VOLK: Any questions?

I would like to ask one question of the witness.

Q (By Mr. Volk) You stated there the pattern of your fields, your seismic information there to the south, would

indicate that that would be a very small structure, is that correct?

A Yes, sir, it is.

Q Now, your company and several other companies have shot the area of Mt. Hope, and is that true of that district there, in other words, have the seismic structures reflected the size of those fields?

A Generally speaking, our shooting more or less delimits the size of the fields. However, we found that there are certain stratigraphic considerations involved sometimes that aren't picked up by our shooting and they may be even smaller or slightly larger than we do find out by shooting. We find out there isn't even the closure that we have shot out that is present, in some cases, not all, of course. In other words, it is a very erratic depositional basin, as I am sure you know, Mr. Volk, and that would be my only answer to that.

Q Well, the point of it is that the size of the seismic structures on the surface did not reflect the size of those fields, I believe that is correct, isn't it?

A I'd say that would be essentially correct, yes. But we have to use some kind of a pattern in advance of any previous -- any other information.

MR. VOLK: Any other questions?

(Witness excused.)

MR. VOLK: Any other witnesses?

MR. WILL: Mr. Jackson.

J. W. JACKSON

was sworn and testified as follows:

DIRECT EXAMINATION

BY MR. WILL:

Q Will you give your name to the reporter, please?

A J. W. Jackson.

Q By whom are you employed?

A Sinclair Oil and Gas Company.

Q In what capacity?

A District Geologist for Colorado and Nebraska.

Q And, briefly, will you give your educational qualifications, or your training for that job?

A I have a degree in geological engineering from Colorado School of Mines.

Q And since you obtained your degree will you give us briefly your experience?

A I worked four years for Sinclair Oil and Gas Company, two years as a seismologist, two years as district geologist.

Q In your present capacity do you have under your supervision the area of Logan County, Colorado?

A Yes, sir.

Q Are you familiar with the Frenchman Creek pool, the subject matter of this application?

A Yes, sir.

Q Have you been here through all the testimony?

A Yes, sir.

Q Do you care to comment upon that part of the application that requests 320-acre spacing, as to whether that is large enough or small enough?

A Well, I would like to make a short statement on that. I do not believe that one well--and we had one well at the time of the application--will outline a producing area. As Mr. Hiestand pointed out, he thought this was a sand-bar type gas field or stratigraphic associated with structure, and I believe a sand bar by definition is an irregular body with a rather limited lateral extent and that any conjecture on Mr. Hiestand's part as to the lateral extent of that sand body is purely conjecture, and by the same premise we have three wells in the area now and any structure or isopachous map such as Mr. Hiestand has shown on Exhibits C and D are also mostly conjecture and you can project the given data and contour here almost any way you desire. We feel one well is not sufficient information to outline a producing area and establish seven drilling units.

Q From the information from those three wells and your general knowledge of the Julesburg-Denver Basin, of which this is a part, do you believe that 2,600 foot location is too large, too long?

A I think a 2600-foot location would be a definite wildcat

in any area I have seen in the Colorado portion of the Denver-Julesburg Basin. There are no fields in the Colorado portion that cover as much area as Mr. Hiestand has outlined on his structure.

Q Do you have any other comments to make, whether I have asked them or not?

A No, sir.

MR. VOLK: Any questions?

Q (By Mr. Paradise) What, in your opinion, would be the closest distance which would not be a wildcat?

A Well, I wouldn't drill a well in there until I had seen a seismic picture on it.

Q Do you agree with the 330-foot distance suggested?

A Well, we have one well that is a thousand feet away which is a dry hole, another well which is approximately 700 feet away, which is dropped 11 feet or 13 feet structurally, and as Mr. Hiestand pointed out in his testimony he thought it would be necessary to have approximately 11 feet, wasn't it, to be a commercial well. It may be, using that definition, Mr. Royster will not have a commercial well, being 700 feet away.

MR. VOLK: Any questions?

Q (By Mr. Barb) This is going back but perhaps you can answer it. When Mr. Royster was talking, evidently he said something regarding the permeability of his cores. I missed

that, was that 2,000 millidarcys?

A He had one foot out of six, I believe, that analyzed better than 2,000 millidarcys, both horizontal and vertical.

MR. BARB: Thank you.

MR. VOLK: Any other questions?

Q (By Mr. Bolton) What spacing, in your opinion, would be economical? You say 2600 feet would be a wildcat and the chances are it wouldn't be a producer.

A What size is the structure?

Q I didn't ask you that. Assume the structure is there for the moment; what spacing?

A What do you define as an economic well?

Q Well, I assume one that would pay out?

A One that will make three times your investment? Mr. Hiestand pointed out you would need 320-acre spacing to get a run of \$120,000 over a 20-year period.

Q That is his opinion, is that yours?

A I haven't checked Mr. Hiestand's figures. I don't know whether they are right or wrong.

MR. VOLK: Any other questions? Witness dismissed.

(Witness excused.)

MR. VOLK: Before we proceed with a witness, the Director would like to read another letter.

MR. ZORICHAK: This letter is from L. W. Winkler, Jr.

(Reading) "In the matter of the promulgation of field rules

to govern the location of wells in the Frenchmen's Creek Area, Logan County, Colorado, I have received copy of petition of F. Kirk Johnson filed with the Director of the Commission.

"L. W. Winkler and Son is a joint owner of a working interest in the lands of which F. Kirk Johnson No. 1 State SE/4 SE/4 NE/4 Section 31-8N-50W was drilled and completed as a gas producer. The undersigned as such owner joins in said application and requests favorable action by the Commission.

"Respectfully, L. W. Winkler and Son.  
(Signed) L. W. Winkler, Jr. "

We also had a similar letter -- rather, a letter from Dunn and Boreing, but Mr. Dunn has already testified as to his agreement with the application, so I won't read the letter.

MR. MORAN: Mr. Zorichak, didn't you have another letter from Deep Rock?

MR. HOUY: No, the letter was missent. I have a copy that was mailed on March 9, wherein we agree or acquiesce to the proposed unitization and go along with the 320-acre unitization, and we haven't changed our mind due to the testimony we have heard today.

MR. ROCCHIO: Do you also go along with the petition as to where the well would be located in the 320 acres?

MR. HOUY: We will leave that up to the discretion of the Commission.

MR. WILL: Before we close, Mr. Hiestand handed me as an answer to one of my questions this paper marked Exhibit E. I think that should be made a part of the record.

MR. MORAN: We have no objection. We will offer Exhibit E into the record, please.

MR. VOLK: All right.

(The document referred to was marked and received as Exhibit E.)

MR. VOLK: Any other witnesses? If not, the meeting --

MR. SANDBERG: I would like to make a statement in behalf of Sunray Oil Corporation who holds acreage in the area. We want to go on record --

MR. VOLK: Just a minute, Mr. Sandberg. You haven't been sworn, have you?

MR. SANDBERG: No, sir.

GLENN SANDBERG

was sworn and testified as follows:

DIRECT EXAMINATION

THE WITNESS: As a representative of Sunray Oil Corporation who holds leases in this immediate vicinity, I wish to go on record as objecting to the application that F. Kirk Johnson has presented here today. I believe as servants of the State and representatives of the people, that the Commission owes as much right to consider the equity of an area, of an application, as it does to the conservation. In this

particular case I feel that the promulgation of these rules would definitely be detrimental to the interests of the Sunray Oil Corporation and inequitable in that case.

I would like to state my reasons. In addition to our dry hole in the northwest-southwest of Section 32, we have 160 acres in the southwest quarter of 31, which would be a part of Unit No. 6. If Deep Rock's well is approved and drilled in a position where it has been located, it would be necessary for us to step out on this unit 2600 feet, or if the Commission approves the southeast corner designation, a full mile to the south of the Deep Rock location.

Now, assuming that based on the new information this is changed, it is very possible that maybe the northern 80 acres of our lease is gas productive; therefore, we would be in a position where we would have to drill a well which would stand a very good chance of being dry and at the same time our lease being drained by the Deep Rock well. I therefore feel that based on the information available a unitization of 320 acres is not feasible and I certainly object very strongly to enforcement of moving a mile or as much as a half mile away from a producing well when the chances for getting a dry hole have already been proven, where we moved only one thousand feet and got a very definite dry hole, based on both structure and stratigraphy. As far as Sunray is concerned, I wish to go on record as objecting to the application of F.

Kirk Johnson.

MR. VOLK: Any questions?

Q (By Mr. Zorichak) What would be your recommendation as to spacing gas wells?

A I believe our recommendation would tie in with our original spotting, what we had hoped and had all fond beliefs would be a confirmation well in this area, and that no well from henceforth should be approved in the area at a lesser distance than 660 feet from any other operator's lease line. The location within a particular lease is up to the particular operator's discretion, but I would feel that 660 feet would be as close as would be feasible in a gas area like this of such limited and I think nearly proven limited extent.

Q In other words, that would be 10-acre spacing for gas wells?

A No, sir, 40-acre spacing, but --

Q You say 660 feet from the line?

A 660 feet from each lease line, which would be a normal 40-acre spacing, but I don't believe any operator with any kind of sense in there would go in and drill on 40-acre spacing on his own leases, but I feel, to protect his rights and protect the possibility of being drained, that that would be as low as would be feasible in this area of limited extent. If you got any farther than that, say 990 or even stretching it as far as 2600 feet, he would have a very, very

good chance of having a dry hole.

Q You don't think 990 would be feasible?

A No, sir. It is my belief and it would be my recommendation that the spacing would be limited to 660 feet from any other operator's lease line.

Q What would be the recommendation as to the size of a drilling unit?

A I feel the size of the drilling unit is going to depend entirely on the amount of acreage that an operator holds in the area. If an operator holds 160 acres, he is not going to drill four wells on 160 acres, but I believe to protect his rights he should be allowed to at least make an equitable location for the drilling of his confirmation test.

Q You think that 320 acres is too large an area for a gas well in this field?

A Well, I think the testimony has already been presented that one well would drain 320 acres, and I believe if it was drawn far enough, if the field could be proven it was covering 640 acres, I believe any engineers present would agree with permeabilities up to 2000 millidarcys, and with the proof that has been presented at least between the Sunray and Kirk Johnson wells, when we have a contiguous blanket sand, I think we could extend ourselves to the point that 640 acres could probably be drained by one well. But my point in here is that we don't know how large the field is

and I think it is very inequitable to place rules on a field, with as little information as we have, that are going to be detrimental to the developmental operations of any other operator in the area.

MR. ZORICHAK: Thank you.

MR. VOLK: Any other questions?

(Witness excused.)

MR. VOLK: We will adjourn the meeting and the Commission will take this evidence --

MR. WILL: Before you adjourn, Mr. Chairman, we'd like to present a little brief, but we would like to do that after we get a transcript of the record.

MR. VOLK: Then we will continue the hearing, is what you wish?

MR. WILL: I understand you were going to do that for Skelly anyway.

MR. VOLK: We will continue the hearing, and we will send out notices later.

(Whereupon, at 3:30 p. m., March 17, 1953, the hearing was adjourned.)

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