

BEFORE THE
OIL CONSERVATION COMMISSION
DECEMBER 10, 1958

IN THE MATTER OF:

APPLICATION OF SUNRAY MID-CONTINENT OIL COMPANY, Case 1559

TRANSCRIPT OF HEARING

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Application of Sunray Mid-Continent Oil Company for an order authorizing a secondary recovery project in San Juan County, New Mexico, and for the promulgation of special rules and regulations in connection with said project. Applicant, in the above-styled cause, seeks an order authorizing it to institute a secondary recovery project in the Bisti-Lower Gallup Oil Pool for the injection of dry gas into the Gallup formation through its Federal "C" Well No. 18, located in the SW/4 NE/4 of Section 7, Township 25 North, Range 12 West, San Juan County, New Mexico. Applicant further proposes that special rules and regulations be promulgated to govern the operation of the above-referenced project, which rules would provide among other things for the conversion of additional injection wells without notice and hearing, the transfer of allowables from injection wells to producing wells, transfer of allowables from wells which have been shut-in for observation or to increase the efficiency of the project, exemption of all leases connected with the project from gas-oil ratio limitation provided gas produced therefrom is reinjected, and such other rules and regulations the Commission may deem appropriate.

Case 1559

BEFORE:

Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. NUTTER: We will take the next case, case 1559.

MR. PAYNE: Case 1559, Application of Sunray Mid-Continent Oil Company for an order authorizing a secondary recovery project in San Juan County, New Mexico, and for the promulgation of special rules and regulations in connection with said project.

MR. WHITE: May the record show the same appearances as in the last case?

MR. NUTTER: The record will so show, yes, sir. Are there other appearances to be made in Case 1559?

MR. KELLAHIN: Jason Kellahin, of Kellahin & Fox, appearing on behalf of Phillips Petroleum Company.

MR. NUTTER: Will you proceed, Mr. White.

MR. WHITE: We have two witnesses, Mr. Finfrock and Mr. Hall.

(Witnesses sworn.)

LAWRENCE J. FINFROCK

the witness, having first been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q State your full name and the name of your employer and the capacity in which you are employed?

A Lawrence J. Finfrock, employed by Sunray Mid-Continent Oil Company as research geologist in Tulsa, Oklahoma.

Q Have you previously testified before this Commission?

A Yes, I have.

Q Have you made a detailed study of the geology of the Bisti-Lower Gallup Oil Pool?

A I have.

MR. WHITE: Are the witness' qualifications acceptable?

MR. NUTTER: They are, proceed.

Q (By Mr. White) Will you refer, Mr. Finfrock, to Exhibit 1, which we would like to have marked Exhibit One, and state what it is and explain it.

(Marked Sunray Midcontinent Exhibit One for identification.)

A Exhibit One is an area map of the Bisti-Lower Gallup Oil Pool. This area map consists of portions of Townships 9 and 10, 11, 12 and 13 North, Townships 24 -- I mean 24, 25 and 26 North, Ranges 9, 10, 11, 12, 13 and 14 West in San Juan County, New Mexico. We have shown here on this exhibit indicated in yellow the project area. This project area is described as follows: The south half of Section 31, Township 26 North, Range 12 West, excepting the southwest southwest quarter, all of Section 6, 25 North, Range 12 West, excepting the northwest quarter of the northwest quarter, the north half of Section 7 in the southeast quarter of section 7 in Township 25 North, Range 12 West. We have indicated this location in the southwest quarter of the northeast quarter of Seven by a red circle. The proposed injection well for this project is a Federal "C" 18 Sunray Mid-Continent. Shown in green are the common corners of Townships 25 and 26 North, Ranges 12 and 13 West of the pilot test area of the LPG stage program which was approved by this Commission last year. Outlined by the red border are the field limits of the Bisti-Lower Gallup Oil Pool reflected in the Commission's records.

I'd like to call your attention to the northeast quarter of

Section 3 of Township 25 North, Range 12 West, shown by a dashed line. This represents this quarter section has been advertised but has not been approved in the Bisti-Lower Gallup boundary. The oil wells have been shown and located. The dark circles indicate the productive oil. The gas cap areas are shown by their different features.

(Marked Sunray Mid-Continent Exhibits
2, 3, 4 and 5 for identification.)

Q Mr. Finfrock, will you refer to Exhibit 2, identify and explain it, please?

A Exhibit 2 is a copy of the portion of the electrical log of the Sunray Mid-Continent Federal "C" 18, which is the proposed injection well for the project area. This well is located in the southwest of the northeast of Section 7, 25 north, range 12 west. We have indicated on this exhibit a portion of, lower portion of the Slumberjay Log as indicated in the pink. That log lies within the Lower Gallup formation. In the Lower Gallup formation, we picked a depth of 4836 feet in this well. At the total depth of 4990 feet, that well was still in the Lower Gallup formation.

As can be seen from the study of the electrical log, the sands in the Lower Gallup formation are indicated by the SP curve.

Q Will you similarly explain what is marked as Exhibit 3?

A Exhibit 3 is a copy of a portion of the electrical log of Sunray Mid-Continent Federal 1 "C", located in the southwest of the

southwest of Section -- pardon me, it's located in the northwest of the northwest of Section 6, Township 25 North, Range 12 West. We have indicated the lower portion of the electrical log, have indicated in pink; the Lower Gallup Section in this log is in -- the presence of the top of the Lower Gallup formation in Exhibit 3 is picked at 4829 feet, and at the total depth of 5100 feet, this well was still in the Lower Gallup section.

As in the previous exhibit, one can see the presence of sand in the Lower Gallup section reflected by the SP curve.

Q Take your seat and refer to Exhibit 4 and explain it, please?

A Exhibit Number 4 is a northwest-southeast digrammatic cross-section extending from Section 1 in Township 25 North through to Section 17 in 25 North, Range 12 and 13 West. We have shown hereon tracings of portions of the electrical logs of the following described wells, proceeding from left to right on the cross-section: First, the British-American Marye Number 3, located on Section 21, 25 North 13 West; the British-American Marye Number 6, located in Section 1, 25 North, 13 West; the British-American Marye Number 5, also located in Section 1, 25 North, 13 West; and in Section 6 of 25 North, Range 12 West the Sunray Mid-Continent Federal "C" 5; Section 7, 25 North, Range 12 West Sunray Federal "C" 11; Section 5, 25 North, Range 12 West, Sunray Mid-Continent Federal "C" 18, which is the proposed injection well for this project.

Also in Section 7 of 25 North, Range 12 West Sunray Federal "C" 19; the last well is the Sunray Mid-Continent Federal "B" 4, located in Section 14, 25 North, Range 12 west. This cross-section is hung from a datum of plus 1500 feet, and the top of the Lower Gallup formation has been picked in each well and connected by a solid line. at the top of the section, which is colored in pink, tying into Exhibits 2 and 3, which have previously been described.

As can be seen from this exhibit, the dip of the beds on this section from right to left are in a northerly direction. It can be seen from this exhibit, the presence of the SP curve, the sands in the Lower Gallup section can be identified.

Q Will you likewise identify what has been marked as Exhibit 5?

A Exhibit Number 5 is a north-south cross-section of Section 31, 26 North, 12 West through Sections 6 and 7 in 25 North, 12 West across the project area. This section, reading from left to right, is made up of the following wells: Section 31, 26, 12, Sunray Federal "C" 7; Section 6, 25 North, 12 West, Federal "C" 4; also in Section 6, 25 North, Range 12 West, Sunray Federal "C" 10. In Section 7, 25 North, Range 12 West, Sunray Federal "C" 18, which is the injection well in this proposed program.

As in the previous exhibit, this cross-section is hung from a datum of plus 1500 feet. The top of the Lower Gallup formation

has been correlated with the solid line at the top of the section which we have indicated in pink. As in the previous exhibit, one can see from the study characteristics of the electrical log to the Lower Gallup sands are present in these four wells also.

Q Mr. Finfrock, will you state the purpose of these two exhibits, namely four and five?

A The purpose of these diagrammatic cross-sections is two-fold. One, to show the altitude for the dip of the bed in the area of the project and also to show that the Lower Gallup sands are present and continuous throughout the area.

Q Is it your opinion that the Lower Gallup formation is present throughout the project area, is continuous and connected?

A Yes, that's my opinion.

Q Were these exhibits prepared under your direction and supervision?

A Yes, they were.

MR. WHITE: We move the exhibits be admitted in evidence.

MR. NUTTER: Any objection to the admission of Sunray's Exhibits 1 through 5? If not, they will be admitted.

MR. WHITE: That's all the direct we have of this witness.

MR. NUTTER: Any questions of Mr. Finfrock?

CROSS-EXAMINATION

BY MR. PAYNE:

Q Mr. Finfrock, in the event this application is granted,

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do you see any possibility of channeling?

A I feel --

Q In other words, is it a hazard in this project?

A I feel that would be a question that would be applied to the engineering witness from the study of the reservoir.

MR. PAYNE: Thank you.

EXAMINATION BY MR. NUTTER:

Q Mr. Finfrock, do you likewise feel that any questions regarding paragraph 10 of the application, that is, the promulgation of certain rules and regulations for the operation of this project should be applied to the engineering witness?

MR. WHITE: We have Mr. Hall; he will go into detail on that.

Q (By Mr. Nutter) Mr. Finfrock, at the perforated interval that is shown, is the perforated interval on the wells for which you have the logs there the same as the pink zone?

A Yes, in this Federal "C" 18, which is the proposed injection well. I believe the perforations are from 4840.

Q I had in mind particularly Exhibits 2 and 3.

A Exhibit 2 is this Federal "C" 18, and the perforated section from the top of the sand is 4840 to 4930 in this exhibit. As I understand their program, they will use those same perforations to inject gas into the Lower Gallup formation.

Q Do you think that at the present time with the injection of gas in one well in the southwest quarter of the northeast

quarter of Section 7 and injection of gas in one well up there in the cross, at the crossroads of the townships, do you know that the complete area in between those wells can be called a project area?

A Well, I don't feel I'm qualified to answer that question. I don't know the full program of the engineering project.

MR. WHITE: Again, Mr. Nutter, I think that can be covered by Mr. Hall.

Q (By Mr. Nutter) Do you have any personal opinion, Mr. Finfrock, as to the necessity of transfer of allowable in the operation of this project on a net gas-oil ratio basis?

A No personal opinion. I'm tired of putting everything to Mr. Hall, but I feel that's his category.

MR. NUTTER: Any further questions of Mr. Finfrock? If not, he may be excused.

(Witness excused.)

MR. WHITE: Mr. Hall, you may take the stand.

DONALD E. HALL

the witness, having first been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Mr. Hall, state your full name for the record, please?

A Donald E. Hall.

Q By whom are you employed?

A I'm employed by Sunray Mid-Continent Oil Company.

Q In what capacity?

A I'm a petroleum engineer located in Midland, Texas, in the district office for the northwest Texas-New Mexico district.

Q Have you previously testified before the Commission?

A Yes, sir, I have.

Q Have you made a study of the Bisti-Lower Gallup Oil Pool?

A Yes, I have spent considerable time studying the Bisti-Lower Gallup Oil Pool and worked with it since Sunray commenced operations there in the early part of 1956.

MR. WHITE: Are the witness' qualifications acceptable?

MR. NUTTER: Yes, sir, they **are**.

Q (By Mr. White) Mr. Hall, explain in general what the proposed program will be in the event the application is granted.

A If I might refer to Exhibit One, we propose to take gas from our Federal "C" Lease, which includes the project area shaded in yellow; it was previously described in Mr. Finfrock's testimony, also, it includes the northwest quarter of Section 5, Township 25 North, 12 West and the north half of Section 8 in the same township and range, and project it into the Bisti-Lower Gallup Oil Pool underlying the project area, the area shaded in yellow.

Our injection well will be Federal "C" 18, 1980 feet out from the north and east lines of Section 7.

Q In that connection, will you refer to Exhibit 6 and explain it, please?

A Exhibit 6 is a schematic drawing of the proposed gas injection well, Sunray Mid-Continent Oil Company Federal "C" Number 18. It shows that 8 and 5/8 inch O.D. casing set at 352 feet. The 8 and 5/8 inch casing was cemented with 225 sacks of cement, cement circulated to surface. The well was drilled to a total depth of 4,990. 5½ inch O.D. casing was set at 4,989 feet and cemented with 200 sacks of cement. The cement, the top of the cement behind the 5½ inch O.D. casing was measured at 3650 feet by a temperature survey. The cement was drilled out inside the 5½ inch casing to 4963. The well is perforated from 4842 to 4858 and 4890 to 4896, from 4910 to 4916 and 4952 to 4930. The top of the Lower Gallup sand is at 4836. We didn't penetrate the bottom of the Lower Gallup sand.

We propose to set a Baker Packer at 4830, run tubing set through the Baker Packer. Gas will be injected from the compressors down the tubing and into the perforations.

Q Is the entire project area located on a Federal Lease?

A Yes, sir.

Q And have you obtained the approval from the USGS for this project?

A Yes, sir.

Q Is that demonstrated by Exhibit 7?

A Yes, sir. Exhibit 7 is a photostatic copy of our application to the USGS, which has been approved. This application calls for injecting gas into the previously described perforations

in Federal "C" 18.

Q Now, will you refer to Exhibit 8 and explain it, please?

(Marked Sunray Mid-Continent Exhibit
8 for identification.)

A Exhibit 8 is a summary of production data from Sunray Mid-Continent Oil Company's Federal "C" Lease. It shows in columnar form, it shows the year and month, the number of wells produced each month, the oil production in barrels per month, accumulative oil production, gas production in thousand cubic feet per month, accumulative gas production, average daily oil production in barrels per day, average daily gas production in thousand cubic feet per day, and average gas-oil ratio in cubic feet per barrel.

I might point out that the last month of October, 1958, shows that the "C" Lease produced 22,006 barrels per day average, and 1,517,000 cubic feet of gas per day, and had an average gas-oil ratio of 756 cubic feet per barrel.

Q Mr. Hall, under your proposed project, what is the minimum and maximum amount of gas injection you contemplate?

A The minimum amount of gas would be calibrated from using the figure of a million and a half cubic feet per day. Of that million and a half cubic feet per day, we are injecting 650,000 cubic feet into our pilot project, that is, gas taken from Federal "C" 1 and "C" 2, and being injected into Bisti "GI" 1. We would use approximately 100,000 cubic feet per day for heater treater

gas and for compressor engines.

This could leave approximately 750,000 cubic feet of gas to be injected in "C" 18; therefore, 750,000 cubic feet per day would be the minimum amount of gas. We estimate the maximum amount to be injected in Federal "C" 18 to be approximately 2 million cubic feet.

Q And what would your minimum and maximum pressures be?

A Pressures should range from a minimum of 1500 pounds to a maximum to 22,000 pounds.

Q What is the volume of gas that will be available from your lease for injection?

A Presently it would be approximately 750,000 cubic feet per day.

Q In answer to one of the questions I asked Mr. Finrock, in your opinion, will this project bring about any channeling?

A No, sir, we have had very little channeling in our pilot project with considerable production and the injection well being in close proximity to our producing wells.

Q Do you have any gathering system on the gas?

A Yes, we have a gathering system, a gas gathering system, of which we will take gas from -- we will have one tank battery in the north half of Section 6, another battery in the south half of Section 6, another battery in the north half of Section 7, and we will also have a gathering line coming in the tank battery of the north half of Section 8. They meet at our compressor station in

the immediate proximity of our injection well.

Q Do you anticipate that your Federal Lease gas production will increase?

A Yes, yes, sir, I do.

Q Have you designed your system to accommodate these increases?

A Our gathering system was designed to handle from 5 to 6 million cubic feet of gas. Initially, we will have compressing facilities to handle, to compress gas from 20 pounds per square inch to 2,000 pounds per square inch. That will be about a million and a half cubic feet per day for the initial compressing facilities. Other compressing facilities can be added. The gathering system, I should mention, was designed with less than five pounds of pressure drop in it.

Q Mr. Hall, were Exhibits one through six and Exhibit eight prepared under your direction and supervision?

A Exhibits 6, 7 and 8 were. Six, seven and eight were prepared under my direction. Seven was -- I had the original copy of your USGS approval copy photostated.

MR. WHITE: At this time we move the admission of Exhibits 6 through 8.

MR. NUTTER: Any objection to Sunray's Exhibits 6 through 8 as exhibits in this case? If not, they will be admitted.

Q (By Mr. White) Directing your attention in regard to perforation intervals in relation to logs on the exhibits, are you

in a position to make a statement in answer to that question?

A The perforated intervals, I should mark them on the logs, they are within the Gallup sand that Mr. Finfrock pointed out on "C" 18. He shows the top of the Gallup sand at 4836, and we didn't penetrate the bottom. The upper most perforation is at 4842; the lower most is 4930, well within the limits of the Gallup sand.

Q That's also shown on Exhibit 6, is it not?

A Yes, those perforations are shown on Exhibit 6.

Q Mr. Hall, do you have any recommendations for proposed pool regulations in regard to this project?

A Yes, sir. It is recommended that rules and regulations be adopted in the previously described project area to provide for (1) the conversion of producing wells to injection wells within the project area, upon approval of the Secretary-Director of the Oil Conservation Commission. (2) The transfer of allowable from wells which have been shut in for observation or to increase efficiency of the project to producing wells within the project area. (3) The transfer of allowable from injection wells to producing wells within the project area.

Q May I interject right there in regard to the conversion of the wells and the transfer of the allowables, what notice, if any, do you suggest be given to the offset operators to allow them an opportunity to protest?

A I would suggest that at the time the application was made

to the Conservation Commission a copy of the application was sent to all the offset operators and a ten day waiting period be made before approving the application so that the operators could object if they so desired.

Q The Commission could set the matter down for hearing upon objection?

A Yes, sir.

Q Continue with your suggestions.

A Recommend that the operation of the wells be on a net gas-oil ratio basis giving allowance for gas injection.

Q Amplify on that and explain what you mean by net gas-oil ratio?

A Net gas-oil ratio would be defined as a ratio calibrated from the net gas which would be the produced gas less the gas injected. An example would be a well producing 100 barrels per day and having a gas-oil ratio of 3,000 cubic feet per barrel would produce 300,000 cubic feet per day. If 200,000 cubic feet of this per day of this gas would be injected or returned to the reservoir, it would leave 100,000 cubic feet per day net gas taken from and not returned to the reservoir, and the net gas-oil ratio would be 100,000 divided by the oil rate of 100; therefore, it would be a net gas-oil ratio of 1,000 to 1.

Q What, in your opinion, will these proposed rules accomplish?

A These rules would prevent waste of natural gas and main-

tain the reservoir pressure.

Q In your opinion, will this project be in the interest of conservation and be a measure toward the prevention of waste?

A Yes, it would.

MR. WHITE: If the Examiner please, that's all the direct we have.

MR. NUTTER: Any questions of Mr. Hall?

CROSS-EXAMINATION

BY MR. PAYNE:

Q Mr. Hall, what do you advocate as a test to be used by the Secretary and Director of the Commission in determining whether administrative approval should be granted on conversion of a producing well to an injection well?

A I don't believe that it would -- to convert a producing well to an injection well?

Q Yes, sir. In your paragraph one, sub-paragraph one paragraph 10.

A Are you referring to a test to show how much allowable should be transferred from that well?

Q No. You propose the Secretary-Director approve the conversion of a producing well to an injection well. Now, I take it you have to have a reasonable standard to use in determining whether such approval should be granted. I'm wondering what you advocate as a test or standard, if any?

A I don't advocate any. We wouldn't want to inject into

any well that would damage the reservoir; but I see no instance where that would take place as long as it is within our project area.

Q I take it from your answer this is just a rubber stamp thing, so why even have administrative approval; I mean if it doesn't have to meet some kind of test?

A The only thing I could foresee would be the possibility of having several injection wells close to someone else's property and injecting too much gas into that; but that -- the other operators should be given opportunity to protest.

Q In other words, the only reason for denying such an application would be if it wouldn't protect correlative rights?

A Yes.

MR. PAYNE: Thank you.

MR. NUTTER: Any further questions?

MR; KELLAHIN: Jason Kellahin, representing Phillips Petroleum Company.

MR. NUTTER: Mr. Kellahin.

EXAMINATION BY MR. KELLAHIN:

Q As I understand your testimony, Mr. Hall, you propose application for transfer of allowables or conversion of wells to be handled by administrative approval with notice in the usual form to offset operators?

A Yes, sir, that is within the project area.

Q What would you consider as an offset operator in connection

with such notice?

A All the offset operators to the project.

Q As a whole?

A Yes.

MR. KELLAHIN: That's all I have. Thank you.

MR. NUTTER: Any further questions from Mr. Hall? Mr. Stamats.

EXAMINATION BY MR. STAMATS:

Q Do you have an estimate of percent recovery in the well originally placed in the pilot area?

A I could give you an accumulative figure of that. Actually, I've worked with that, but I'm not sure I can give you a very good figure on the percent recovery. The accumulative recovery from the four producing wells in the pilot project as of November the first was 222,996 barrels of oil.

Q What percent completely would you say is flooded out the pilot area at this time?

A We don't know. We are -- that is one of the purposes of the pilot, to determine that. Actually, our gas-oil ratios are still in a fairly low range, ranging from 1,647 to 5,084 cubic feet per barrel. One purpose of the pilot is to determine how much oil we are going to get, and we are hoping to determine that.

MR. STAMATS: That's all the questions I have.

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

MR. WHITE: That's all we have.

EXAMINATION BY MR. NUTTER:

Q Mr. Hall, did I understand you to say correctly you would gather all the gas from your Federal "C" Lease, even that portion of the northwest quarter of Section 5, which is outside the project area, and **gather** that gas in these section wells?

A Yes, sir.

Q All the gas from the Federal "C" Lease would be utilized?

A Yes.

Q What is the purpose of this injection program, Mr. Hall?

A Well, the purpose is to maintain our reservoir pressure and to keep from flaring gas.

Q What is the reservoir pressure at this present time in this area?

A An average reservoir pressure in 12 West, just a line drawn through Township 12 West was 1,050 pounds per square inch absolute. The original reservoir pressure in that area was 1440 pounds per square inch.

Q There has been a decline of approximately 400 pounds in the area then?

A Yes.

Q What is the bubble point on the oil in this area?

A I have that right here if I might refer to it. It was slightly over 1200 pounds, about 1215, I believe.

Q Do you think that the injection of gas from -- at a pressure of 1500 to 22,000, I believe you said, will build up the

reservoir pressures to above the bubble point again?

A No, sir, not with the oil being withdrawn too.

Q You are withdrawing it at a rapid enough rate you wouldn't have any rapid build up in your pressure?

A Yes, sir, the pressure would still decline some with the amount of gas we plan to put in, at least initially, although not as rapidly.

Q Do you think you will enhance the recovery of oil from the area by the injection of gas?

A Yes, sir, I do.

Q In what way?

A By our maintaining higher reservoir pressure than by not injecting gas, allowing gas, oil to move through the reservoir with increased pressure differential.

Q How far away from this proposed injection well that you have here today, this "C" 18, do you expect the effect of this gas injection will be felt?

A I think that it would take considerable time for it to be felt even within the range of the closest wells.

Q Is there a well to the southwest of the "C" 18?

A No, sir, there is not a well in this area here (indicating.)

Q Is there one directly west of the well?

A Yes, sir, that well would be half a mile, I believe.

Q And there is a well to the northwest?

A There is one to the northwest, one to the northeast and one to the southeast.

Q Is there one to the south of the well?

A No, sir, not directly south.

Q Do you believe that the injection of gas in the "C" 18 would ever be felt in a well more than one location removed from the "C" 18?

A I wouldn't say it would never be felt, no, sir.

Q Is it likely that the injection of gas in the "C" 18 would have effect on a well more than one location away?

A No, sir, other than it would increase the reservoir pressure, but I don't believe we would have chaneling, if that is what you meant.

Q What is your ultimate gas injection pattern that you have for this project, Mr. Hall? You propose to inject gas in more than one well ultimately, don't you?

A Possibly so. We have no pattern at this time; for the present "C" 18 is the only injection well we have planned or proposed.

Q Well, you've requested administrative approval for converting other wells to gas injection wells, though?

A To be able to, yes, sir, after notifying the offset operators.

Q Mr. Hall, do you feel that the pilot LPG project up there in the crossroads of the townships has been a success?

A Yes, sir, I definitely feel it has been a success.

Q By what percent has it increased the recovery over the normal primary recovery you would anticipate in this pool?

A I don't have the actual figures at my command. I know that is over -- we have recovered over 50%.

Q Of the original oil in place?

A Of the original oil in place. Now, I don't -- we have technical personnel that have gone into close calculations on that. I certainly haven't.

Q How much of the success of the pilot project would you say is due to the injection of the LPG and how much is due to the injection of dry gas?

A We believe that the LPG greatly assists the recovery of the, in the Bisti-Lower Gallup field.

Q Why don't you put LPG in this well, the "C" 18, then?

A At this time I understand that Sunray Mid-Continent is not economically, does not consider it economically feasible to inject gas into our own leases until such time as possibly we could have a unitized operation.

MR. LOAR: Could I interrupt and make a statement?

MR. NUTTER: Yes, sir.

MR. LOAR: Sunray Mid-Continent and the other operators west of Carson Unit or west of the Shell acreage offsetting the Carson Unit are actively negotiating a unit to be formed between that line and the township line between Ranges 12 West and 13 West.

The operators have reached agreement on the participation formula to be used in this unit and contracts are being prepared, and, at that time, it is anticipated that the operators will come to the Commission with a request to inject LPG and dry gas into such a unit.

Our purpose in requesting this application is to prevent the flaring of gas and to do what we can toward maintaining pressure in this portion of the field pending unitization in this area.

We have requested additional wells in case the gas production from this area becomes more than would be engineeringly feasible to put into "C" 18. We believe that if the Commission approves this request, it will be approving the principle of gas injection for such a purpose, and we safeguard the offset operators objecting, having a chance to object. No detriment will be occasioned to the reservoir or the offset operators.

Q (By Mr. Nutter) Mr. Hall, do you believe that the ultimate project for this field, being the injection of LPG and dry gas, as Mr. Loar stated, is the desired aim of the operators; do you think this ultimate project will be harmed in any way by the injection of gas in the "C" 18 at this time?

A No, sir, I don't. I know that the "C" 18 is not one of the wells which Sunray Mid-Continent proposes to present in their plans of unitized operations to present to the other operators. We don't believe it would be a good well to inject LPG into.

Q Mr. Hall, go through those figures again on the amount of gas you have available and how much is used for the various purposes.

A Yes, sir. In October, the average daily gas production was one, was approximately one and one half million cubic feet of gas; approximately 650,000 cubic feet of gas is being produced by "C" 1 and "C" 2, which is being reinjected into the pilot project into Bisti "GI" Number One. We estimate it will take approximately a million, I mean 100,000 cubic feet of gas to operate our pumping equipment, our heater treaters and our compressor station. That would leave, I believe, 650 -- 750 MCF to inject in the "C" 18 at the present time.

Q The one and a half million feet per day produced in October was from the entire "C" 18 Lease, is that correct?

A Yes, sir, which included our pilot project.

Q Mr. Hall, I believe you stated that you felt there would be no chaneling of gas by the injection of gas into this well. Have all the wells in the four well project reacted the same?

A No, sir.

Q Has there been a variation in the GOR of those wells?

A Yes, sir.

Q Would that indicate any chaneling up in that area?

A It would indicate some degree, yes, sir. There has been no drastic chaneling. I think I stated the range of gas-oil ratios

was from 1,647 to 5,084 cubic feet per barrel.

Actually, gas in itself is not the best means to sweep the floor space from the reservoir. That is one reason we used LPG in the pilot project, and we will have breakthroughs. One "C" pilot is fairly well depleted.. There has been considerable oil produced from the pilot.

Q Excepting the "C" 1 and "C" 2, which are the two wells on this lease in the pilot area, what is the range of GOR on the Federal "C" Lease?

A They are low. I don't believe I have the last gas-oil ratio survey. I have some tests on the lease. There is one for 467. I would say 1500 would be the approximately upper most range.

Q GOR range from 400 to 1500 on the rest of the lease?

A Yes, sir.

Q Mr. Hall, How much allowable would you transfer from a well if the well were shut in for observation or to increase the efficiency of the project or to convert it to an injection well?

A We feel like we should transfer the top allowable if the well was so capable of making that top allowable.

Q Supposing the well were not capable of making top allowable?

A We feel like the capacity of the well should be transferred.

Q On the basis of a test or on the basis of previous 90 days' production?

A On the basis of the test.

Q What length of test would you propose?

A We believe that the wells should be tested in accordance with the instructions on the Gas-Oil Ratio Form C-116. I believe they provide for a well to be produced normally over a 24-hour period before the well is tested, and tested for a 24-hour period. We believe that also the other operators should be notified as to the date of that test.

Q What is the necessity, Mr. Hall, for the net GOR rule you propose?

A We do not believe an operator can afford to convert wells to injection wells or to shut in wells unless the allowable of those wells is transferred to other wells.

Q That's your explanation for transfer of allowable, but what is your explanation for net GOR?

A Net GOR would conserve gas and being allowed to shut wells in that had high GORs you would conserve gas. Also, in being able to have a net GOR you can inject that gas and maintain a fair share of oil rates and replace the gas going into the reservoir when a well would have a high gas-oil ratio.

Q You gave a hypothetical 3,000 to one on a well that produced 300,000 cubic feet per day?

A Yes, sir.

Q You said if 200,000 of this gas is reinjected, how much would you now, how much of that gas in an individual well was

being injected?

A We would have to proportion that to the wells on the lease. Actually, we intend to inject all the gas capable of injection, except what is used on the lease for lease use or compressor fuel.

Q What is your "GI" Number One presently taking in MCF per day?

A Approximately a million six hundred thousand, I believe. Well, during the month of October, 43,931,000 cubic feet of gas were injected into it; a million and a half, I believe.

Q Do you think this "C" 18 will be capable of taking as much gas as the "GI" One?

A No, sir, I do not at the pressure that is going on "GI" One. It does not have as good permeability, although our "GI" Number One was not fracked and "C" 18 was fracked. We still do not believe it is as capable as "GI" One.

Q Is the rate of gas production in this area increasing at the present time, Mr. Hall?

A Yes, sir, it is increasing. Not -- it is very gradual. We expect it to be a gradual increase.

MR. NUTTER: Any other questions of Mr. Hall?

MR. CHRISTY: S. B. Christy, of Hervey, Dow & Hinkle, representing Humble Oil Company.

MR. NUTTER: Mr. Christy.

EXAMINATION BY MR. CHRISTY:

Q Does the project encompass the entire lease?

A No, it does not.

Q When you spoke of the net GOR formula, do you propose that for each of the wells in the project or for the entire lease?

A Only the project area.

Q Do you have such a rule you have prepared written out, the type of rule you propose on this net GOR?

A No, sir.

Q It doesn't seem to be encompassed hereon in the application in any particular language. Do you happen to have that?

A No.

Q You have no particular language?

A No.

Q One other question on your transfer of allowables. Do you propose any limit to that? For example, no one well to receive more than three allowables, or is it unlimited?

A Well, we hadn't planned to do that, no, sir; but the way we have stated it is there will be no limit, although the offset operators would be able to object to that.

Q Now, sir, again, can you visage any situation there in which you would be transferring say more than three allowable to any one well?

A No, sir.

Q You can't?

A I don't believe that we would transfer a full allowable

from -- the top allowable -- from one well to just one other well.

MR. CHRISTY: Thank you.

MR. NUTTER: Mr. White.

REDIRECT EXAMINATION

BY MR. WHITE:

Q Mr. Hall, you said that you found some chaneling in your pilot area. Is the degree of this chaneling greater than what you anticipated?

A No, sir, I would rather say rather than chaneling it's more of a depletion rather than chaneling.

MR. WHITE: That's all.

MR. NUTTER: Any questions from Mr. Hall? If not, he may be excused.

(witness excused.)

MR. NUTTER: Does anyone else have anything further they wish to offer in case 1559?

MR. KELLAHIN: Jason Kellahin representing Phillips Petroleum Company. Phillips Petroleum Company is the operator of properties in this pool, including properties which directly offset the proposed project area as is shown by Applicant's Exhibit Three. Phillips is in general support of the application and particularly with the provisions which have been suggested as to administrative approval after notice and opportunity to protest has been given to offset operators in regard to the transfer of allowables, conversion of wells from producing wells

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to injection wells and the procedure for testing wells prior to the transfer of the allowable from that well. With that provision, Phillips is in support of the application.

MR. NUTTER: Did you wish the Phillips telegram to be read in the record?

MR. KELLAHIN: I believe it is covered in my statement. However, I'll present the telegram to the Commission.

MR. NUTTER: Anything further in Case 1559? If not, we will take the case under advisement.

STATE OF NEW MEXICO)
) ss
 COUNTY OF BERNALILLO)

I, John Calvin Bevell, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me in stenotype and reduced to typewritten transcript by me; that the same is a true and correct record, to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this 15th day of December, 1958, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

John Calvin Bevell

My Commission Expires:

January 24, 1962

I do hereby certify that the foregoing is
 a complete record of the proceedings in
 the Examiner hearing of Case No. 1559
 heard by me on 12-10, 1958.

[Signature], Examiner
 New Mexico Oil Conservation Commission