

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 27, 1960

EXAMINER HEARING

IN THE MATTER OF:)

Application of Continental Oil Company for)
an order authorizing the triple completion)
of its Jicarilla Apache Well No. 27-2,)
located in the NW/4 NW/4 of Section 27,)
Township 25 North, Range 4 West, Rio Arriba)
County, New Mexico, in such a manner as to)
permit the production of oil from the)
Gallup formation, the production of oil)
from the Greenhorn formation and the pro-)
duction of oil from the Dakota formation)
through parallel strings of 4½ inch, 2 7/8)
inch, and 4½ inch casing cemented in a)
common well bore. Applicant proposes to)
install tubing to the Gallup and the Dakota)
formations.)

Case 2018

BEFORE: Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. PAYNE: Application of Continental Oil Company for
an order authorizing the triple completion of its Jicarilla Apache
Well No. 27-2, located in the NW/4 NW/4 of Section 27, Township 25
North, Range 4 West, Rio Arriba County, New Mexico, in such a
manner as to permit the production of oil from the Gallup formation,
the production of oil from the Greenhorn formation and the pro-
duction of oil from the Dakota formation through parallel strings
of 4½ inch, 2 7/8 inch, and 4½ inch casing cemented in a common

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well bore.

MR. KELLAHIN: If the Commission please, Jason Kellahin, Kellahin and Fox, representing the applicant. I have associated with me Mr. William Griffith, a member of the Colorado Bar, who will present this and the next following case.

MR. GRIFFITH: We have one witness for this case, Mr. M. A. MacLennan. I would like to have him sworn.

(Witness sworn.)

MR. NUTTER: How do you spell your name?

MR. MacLENNAN: M-a-c L-e-n-n-a-n.

MR. NUTTER: Thank you.

MR. GRIFFITH: Will the reporter mark this Exhibit 1?

(Whereupon, Continental's Exhibit No. 1 was marked for identification.)

MR. GRIFFITH: I would like to state at the outset that Continental has changed the official name from Jicarilla Apache 27-2 to 28-27 No. 2. We wish the records of the Commission would reflect that change.

MR. NUTTER: Rather than call it 27-2 it will be 28-27 No. 2?

MR. GRIFFITH: Right.

MR. NUTTER: It still will be the Jicarilla Apache lease?

MR. GRIFFITH: Just Jicarilla.

MR. NUTTER: Jicarilla.

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MR. GRIFFITH: Continental would like to enter into the stipulation with counsel for the Commission that if Ken Kirkland were present and able to testify, he would testify substantially in conformity with Exhibit 2.

Please mark this Exhibit 2.

(Whereupon, Continental's Exhibit No. 2 was marked for identification.)

MR. GRIFFITH: I would like to read Exhibit 2. "My name is Ken Kirkland. I am an employee of Continental Oil Company as Continental's Land Superintendent of the Durango Division. I am familiar with Exhibit 1, prepared for Continental's application in Case No. 2018, scheduled for hearing on July 27, 1960. This exhibit was prepared under my supervision. The shaded area shows our acreage in the West Lindrith Block No. 208 in Rio Arriba County, New Mexico. The proposed triple completion will be located in the center of the Northwest Quarter of the Northwest Quarter, Section 27, Township 25 North, Range 4 West. Exhibit 1 correctly shows the ownership of acreage surrounding Continental's lease."

Is that stipulation agreed to?

MR. PAYNE: Yes, sir. You want this identified as Exhibit 2, this affidavit?

MR. GRIFFITH: Yes, sir.

M. A. MacLENNAN

called as a witness, having been first duly sworn, testified as

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follows:

DIRECT EXAMINATION

BY MR. GRIFFITH:

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

A M. A. MacLennan. I am employed by Continental Oil Company.

Q What is your position with Continental Oil Company?

A Acting District Engineer for the Durango District, Durango, Colorado.

Q Have you ever testified as a petroleum engineer before the New Mexico Oil Conservation Commission before?

A No, I have not.

Q Would you briefly state your qualifications as a petroleum engineer?

A I am a graduate of University of Wyoming with B.S. degree in general petroleum engineering, and worked as a petroleum engineer with Continental Oil Company the past four years, three and a half years as a production engineer, and since March of this year as district engineer.

MR. GRIFFITH: Are these qualifications acceptable to the Commission?

MR. NUTTER: Yes, sir.

MR. GRIFFITH: Will the reporter mark these as

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Exhibits 3 and 4.

(Whereupon, Continental's Exhibits Nos. 3 & 4 were marked for identification.)

MR. GRIFFITH: Exhibits 3 & 4 have been furnished to the Commission as a part of our original application.

Q I wish you would examine Exhibit 3 and identify it.

A Exhibit 3 is a schematic diagram showing the proposed casing and cementing program for triple casing for Jicarilla 26-27 No. 2.

Q Was the exhibit prepared by you or under your supervision?

A Yes, it was.

Q Would you state what Exhibit 3 shows?

A Exhibit 3 shows the diameter of hole size to be drilled, the size of casing strings to be run, estimated tops and bases of the formation encountered, and approximate lengths of the casing strings to be run.

Q Does it also show the location of the various stage collars?

A Yes, it shows the approximate position of stage collars to be used for cementing.

Q You have heard the stipulation entered into between myself and the attorney for the Oil Conservation Commission wherein the proposed location of this well was stated. Is this your understanding of the correct location of the well?

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A Yes, it is.

Q In what formation is this well to be completed?

A We propose to complete this well in the Gallup formation as an oil producer in the Greenhorn as an oil formation and in the Dakota formation as an oil producer.

Q What is the estimated top and base of each of these formations?

A The estimated tops, as shown on Exhibit 3, are, the estimated top of the Gallup is at 6445, estimated base as 7005; estimated top of the Greenhorn, 7332, estimated base at 7392; estimated top of the Dakota at 7412 and estimated base at 7700.

Q Would you briefly describe each of these proposed producing formations?

A The Gallup is a fine grain sand interbedded in a matrix of fractured green shales and silt stones, and the green shales are considered the source beds and this formation is bounded above and below by impermeable shales.

The Greenhorn is an interbedded fractured marine limestone and limy shales. This formation is considered as having a common source of supply separate from that of the Dakota, and is also bounded above and below by impermeable shales.

The Dakota is a fine grain fractured sandstone interbedded with black, green shales, and Dakota is considered a common source of supply separate from that of the Greenhorn and is bounded



above and below by impermeable shales.

Q What is the basis of your information on these proposed producing formations and their estimated depths?

A The estimated tops and bases and description of the formations were obtained from geologic studies available, core analysis and logs of wells previously drilled in the immediate area.

Q Would you describe the manner of the proposed drilling and completion of this well?

A We proposed to drill a 16 inch hole to the depth of 200 feet and run and cement to surface 200 feet of 13-3/8 O.D. surface pipe. We plan to drill a 12 inch hole from beneath the surface pipe to the base of the Gallup formation and then plan to drill a 9 inch hole from the base of the Gallup to the base of the Dakota or T.D.

Q May I interrupt just a minute. I would like to call the attention of the Commission to a typographical error in our application. In additional data for triple completion, Item No. 4, and indicated drill a 7 inch hole and it should be drill a 9 inch hole as the witness has just testified.

Would you please continue?

A Upon reaching total depth we plan to run E.S. conduction logs by sonic log and run a section gauge. The section gauge will be used to calculate the amount of cement required to adequately



cover each of the producing formations. Following the running of the logs and the gauge, we plan to run a string of 4- $\frac{1}{2}$ inch O.D. casing to the Gallup formation, a string of 2- $\frac{7}{8}$ inch O.D. tubing to the Greenhorn formation, and a string of 4- $\frac{1}{2}$ inch O. D. casing to the Gallup formation.

MR. GRIFFIN: Would the reporter read that?

REPORTER: Reading: "4- $\frac{1}{2}$ inch O.D. casing to the Gallup formation, a string of 2- $\frac{7}{8}$ inch O.D. tubing to the Greenhorn formation, and a string of 4- $\frac{1}{2}$ inch O.D. casing to the Gallup formation."

A Our first string will be a 4- $\frac{1}{2}$ inch O.D. string to the Dakota.

Q Okay, go ahead.

A Then we propose to cement the Dakota and Greenhorn through the 4- $\frac{1}{2}$ inch Dakota string. We plan to cement the Mesaverde next through a stage collar, or, excuse me, first we plan to cement the Dakota and Greenhorn through the 4- $\frac{1}{2}$ inch Dakota string. Then we will cement the Gallup formation through the 4- $\frac{1}{2}$ inch Gallup string. Following that we will cement the Mesaverde formation through a stage collar in the Dakota string and cement the Pictured Cliffs formation through a stage collar in the Gallup string.

Q How do you propose to perforate these multiple strings?

A We plan to perforate the Dakota formation using a



conventional bullet perforating gun, and we plan to perforate the Gallup and Greenhorn formations using the Lane-Wells nuclear oriented directional perforating tool. This tool has been used successfully in two other multiple completions in the San Juan Basin to date.

Q Do you know what these other multiple completions are where they use this particular tool?

A The two wells in which this tool has been used, the Johnson Shear No. 1 Well-4, located in the Northwest, Northwest of Section 4, Township 24 North, Range 5 West, Rio Arriba County. Second well was the Aztec Oil and Gas Company Hanks Well 12-D, located in the Southeast of the Northeast Section 7, Township 27 North, Range 9 West, San Juan County, New Mexico.

Q What additional action will be taken to complete this well?

A We plan to selectively sand-oil treat the Gallup and Dakota formations and acidize the Greenhorn formation.

Q What type of well head will be used?

A We propose to use a triple casing well head assembly, which is designed to prevent commingling of the hydrocarbons produced from each of the formations.

Q Would you examine Exhibit 4 over there, a copy of which has been furnished to the Commission, as a part of the application, and I ask you if this exhibit was prepared by you or under your

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supervision?

A Yes, it was.

Q What does this exhibit show?

A This is a schematic diagram for a triple casing well head assembly, showing the separate strings of casing and the separate tubing heads and control valves.

MR. GRIFFITH: Would you mark this Exhibit 5, please?

(Whereupon, Continental's Exhibit No. 5 was marked for identification.)

Q I show you Exhibit 5 and ask you, by whom was this exhibit prepared?

A This exhibit was prepared for Continental Oil Company by the Rector Well Equipment Company, Inc.

Q Would you please explain Exhibit 5?

A Exhibit 5 is a cross sectional drawing of the specific well head assembly we propose to use; the various components of the head are numbered and identified on the drawing, specifically it shows the manner in which the casing will be landed and also the control valves and separate tubing heads.

Upon running the last joint of $4\frac{1}{2}$ inch casing we will screw a special casing hanger, identified as No. 3 and shaded in pencil, to be screwed on the last joint and used for landing the casing in a special hanger bow identified as No. 2 and shaded in red. This hanger bow is a 12 inch mandril which will be bored for two



strings of 4- $\frac{1}{2}$ inch casing and one string of 2- $\frac{7}{8}$'s casing.

There's a top view of this landing manual shown at the top of the diagram. The 2- $\frac{7}{8}$ tubing will be landed in conventional slips.

Q What are the advantages in this type of head?

A The main advantage of this type of head is the ease in which the majority of workovers can be conducted on the well by having a separate tubing head and control valves; it will be possible to work on any one of the three zones independently of the other two. It will not be necessary to interrupt the producing operations of the other two zones.

Q Will this completion provide for separation of production at the well and on the surface?

A Yes, it will.

Q Or in the well and at the surface?

A Yes.

Q Will this manner of completion allow for separate reservoir pressure testing?

A Yes, it will be possible to obtain bottom hole pressure with conventional pressure bomb.

Q Is there any way of testing whether there's possible communication between the completed zones?

A Yes, it will be possible to test for communications in a manner similar to those obtained for packer leakage tests on a dual. It will be possible with surface pressure measurements to



shut in one of the strings, allowing the other to produce and obtaining our pressure measurements.

Q Will you be able to determine the gas-oil ratio for each zone?

A Yes, separate test facilities will be provided for obtaining GOR's.

Q Why does Continental Oil Company desire to triple complete this well in this manner?

A Continental Oil desires to use this type of completion primarily for economic reasons. We have estimated this type of completion will result in approximately \$40,000 savings over a dual, utilizing 7 inch pipe and two strings of tubing. Also it will be possible with this type of completion to complete in the Mesaverde formation, which we feel otherwise does not have sufficient reserves to support an individual well.

As stated before, we feel we'll gain a substantial reduction in costs of workovers due to not having to interrupt the production from all three zones.

MR. NUTTER: You said to complete in the Mesaverde formation. How you going to complete in the Mesaverde?

A Excuse me, I mean the Greenhorn formation.

MR. NUTTER: I see.

Q Will the correlative rights of the landowners be protected in this case?



A Yes, they will.

MR. GRIFFITH: That's all the questions that I have.

MR. NUTTER: Are there any questions of Mr. MacLennan?

MR. PAYNE: Yes, sir.

MR. NUTTER: Mr. Payne.

CROSS EXAMINATION

BY MR. PAYNE:

Q Do you have the anticipated gravities of the oil in each of these zones?

A Yes, sir, they will be similar to our production from the 28-1 well, and it's running from 40 to 41 degrees.

Q Each of the zones?

A A.P.I. We are not producing from the Greenhorn. That's from the Dakota and from the Gallup.

Q I was just wondering if your difference in gravities might aid you in determining, have you had communication between the various formations so that you didn't have to rely solely on pressures?

A I believe they are close enough in the Gallup and Dakota, it wouldn't be possible on that basis, no.

Q Do you intend to use casing centralizers in producing the well?

A Yes, we plan to run conventional centralizers on the long string of the 4- $\frac{1}{2}$ to the Dakota and then using, it's a rubber



turbulizer for slim hole completions on our 2-7/8, and we are presently working with an, oh, two service companies on a proper centralizer on the second string of 4-1/2.

Q These centralizers will be used only through the Pennsylvanian zone?

A Yes, sir.

Q As I understand your proposed completion, you are going to rely on cement to separate the common source of supply?

A Yes, sir.

Q Do you feel that's as effective, or possibly more so, than packers?

A Yes, sir, I believe so, over an extended period of time.

Q Mr. MacLennan, I notice on your application you list this well as being in the West Lindrith field.

A Excuse me, I believe it's the West Lindrith block, is the designation of the acreage tract.

Q Actually, it's a wildcat well, isn't it?

A No, sir. It's a step out, an offset to our 28-1, which is a dual completion in the Gallup and Dakota.

Q Has a pool been designated by the Commission for that well?

A No, it's undesignated.

MR. PAYNE: Thank you.

BY MR. NUTTER:

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Q I notice here on your Exhibit No. 3 that you show the calculated top of the cement to the Pictured Cliff but you don't give what that top will be. What will be the top of the cement there?

A We plan to calculate the amount of cement required from our section gauge and run our top to two to three hundred feet above the top of the Pictured Cliff.

Q I also notice that you show a top for the cement in the Mesaverde zone. What will be your calculated top there?

A That will be similar for all the zones.

Q Two to three hundred feet above the Mesaverde?

A Yes.

Q What would be the calculated top of the cement to the Gallup formation, two to three hundred feet above the top of the Gallup there?

A In the Gallup, yes, sir, it will be our producing interval is at the top of the Gallup.

Q When you run your cement down this 4- $\frac{1}{2}$ inch string to the Dakota, you'll bring the cement back up into the Greenhorn or above the Greenhorn?

A Above the Greenhorn.

Q How far above the Greenhorn?

A Two to three hundred feet.

Q So you'll have a cement sheath from two to three hundred



feet above the top of the Greenhorn all the way down through the Greenhorn and through the Dakota?

A Yes, it will be solid cement from the T. D. to the top of the Greenhorn.

Q Now, you are going to have centralizers on this long string of 4- $\frac{1}{2}$. How far up will those centralizers come?

A On the long string?

Q Yes, sir.

A The Dakota string, we plan to put the conventional centralizers up through the Dakota and then we'll run the turbulizers on the 2-7/8 through the Greenhorn.

Q So we might say we would have centralizers from 7412 down to T. D. and turbulizers from 7392?

A Yes, sir.

Q On up how far?

A Up through the top of the Greenhorn, 7332.

Q That would be a matter of just a couple of those turbulizers then?

A Yes.

Q I notice there's only 20 feet separated in the base of the Greenhorn and the top of the Dakota. Is this an impermeable shale in there?

A Yes, it's on the log as the Graneros shale.

Q This will be a 12 inch hole to the base of the Dakota

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and then 9 inch hole from there, correct?

A Yes, sir.

Q Now, your 28-1 is completed in the Gallup and in the Dakota, correct?

A Yes.

Q That's an oil well in both zones?

A Yes, sir.

Q What is the bottom hole pressure in the Dakota on that well?

A It's approximately 1850 pounds.

Q How about the Gallup?

A I'm not positive of the figures. It was approximately 1900.

Q The Gallup has more pressure than the Dakota?

A Let's see, we just finished. No, it's approximately 1850 on the Gallup and 1900 on the Dakota. There was a slight difference, the Dakota being higher of the two.

Q Would you check the figures and write us a letter and tell us the actual pressure?

A Yes.

Q How about the GOR on those two zones?

A The gas-oil ratio, the last gas-oil ratio in the Gallup, I'll also have to check these figures for you.

Q Okay. You stated that the gravities were very close to

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each other, around 41?

A Yes, sir, 41, 42.

Q You don't know anything about the oil in the Greenhorn yet?

A No, sir.

Q How will you determine, Mr. MacLennan, whether you have effective separation of the various zones from each other in the well bore?

A We were planning to test, similar to the procedure on a packer leakage test for a dual where we'll shut in all three producing formations, allowing them to stabilize, and then record the pressures on the three zones and open one up and produce it for a period of twenty-four hours or so. Then, allowing them to stabilize again, and producing the second and so on through the three zones.

Q I see.

A Also, I might state we plan to run a temperature survey or Semoton log to determine our actual cement top.

Q To find out how effective your actual cement job was?

A Yes, sir.

MR. NUTTER: Any further questions of Mr. MacLennan?
He may be excused.

(Witness excused.)

MR. GRIFFITH: Continental would like to offer

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