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

EXAMINER HEARING

IN THE MATTER OF: Application of Gulf Oil Corporation for a dual completion and for an exception to the tubing requirements of Rule 107. Applicant, in the above-styled cause, seeks an order authorizing the dual completion of its Federal-Apache Well No. 8, located in Unit D, Section 8, Township 24 North, Range 5 West, Rio Arriba County, New Mexico, in such a manner as to permit the production of gas from the Otero-Gallup Oil Pool and the production of gas from the Dakota Producing Interval through the casing-tubing annulus and the tubing respectively. Applicant further seeks an exception to certain tubing requirements set forth in Rule 107 of the Commission's Rules and Regulations.	Case 1943

BEFORE:

Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. PAYNE: Application of Gulf Oil Corporation for a dual completion and for an exception to the tubing requirements of Rule 107.

MR. KASTLER: My name is Bill Kastler. I am the district attorney, district lawyer for Roswell's Gulf Production District, and associated with me in this case is Mr. Roger Allen from the Law Department of Gulf's Denver Production District. Mr. Allen is a member of the Oklahoma and Colorado Bars.

MR. UTZ: Are there other appearances in this case? If not, you may proceed.

MR. KASTLER: Mr. Examiner, our witness is John D. Mackay.

(Witness sworn.)

JOHN D. MACKAY

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

DIRECT EXAMINATION

BY MR. KASTLER:

Q Will you please state your name, and give the proper spelling of your name?

A John D. Mackay, M-a-c-k-a-y, one word.

Q Are you employed by Gulf Oil Corporation, Mr. Mackay?

A I am.

Q Where are you employed, and what is your position?

A Petroleum Engineer in the Denver Production Office.

Q As such you are familiar with Gulf's application in Case 1943?

A I am.

Q Have you previously appeared before the New Mexico Oil Conservation Commission?

A No.

Q Have you been qualified as an expert witness?

A No, I have not.

Q Would you please briefly state your educational background, where you attended school, and what degrees you were awarded?

A I graduated from Oklahoma A & M in 1951 with B.S. degrees in Mechanical Engineering and Petroleum Engineering.

Q Will you briefly outline your professional experience as a petroleum engineer since graduation?

A Went to work for Gulf in December, '52 and have since been employed by them as a production engineer and completion engineer.

Q In what areas of the United States were you so employed?

A Rocky Mountain area.

Q Were you employed at Farmington, New Mexico, for some time?

A Yes, I spent three years at Farmington; San Juan Basin.

Q And you are familiar with Gulf's leases and with their application in this case, what it is that Gulf is seeking?

A Yes, sir.

MR. KASTLER: Mr. Examiner, are the witnesses qualifications acceptable?

MR. UTZ: Yes, they are.

Q Mr. Mackay, will you please describe Gulf's lease involved in application to Case 1943?

A The whole lease is Section 8, 17 and 18, 24 North, 5

West, Rio Arriba County.

Q Have you prepared a plat for introduction in this case as Exhibit No. 1?

A Yes.

(Marked Gulf's Exhibit No. 1, for identification.)

Q Mr. Mackay, calling your attention to Exhibit No. 1, is Gulf's lease involved here a Federal lease?

A Yes, sir.

Q And what is the location of the well which is the subject of this application?

A 990 feet east of the West Line, Section 8, 24 North, 5 West, Rio Arriba.

Q There are other wells shown on Gulf's lease in this plat. Are those other wells, any of them, completed in either the Dakota or the Gallup formations?

A No, they are not.

Q Does this plat also show the names of all offset operators?

A Yes.

Q Have all offset operators been given a copy of this application and so informed of its pendency?

A Yes, they have.

Q At what time was this application mailed?

A March 23.

Q Have you heard any objections from any of those?

A No, we have not.

Q Would you please testify as to the history of Gulf's Federal-Apache Well No. 8?

A The well was spudded on March 31, 1959, and completed July 15, 1959.

Q At what depth or development was this well completed?

A Drilled to 7,045 and at this depth 5 1/2 casing was run and cemented.

Q What zone or zones have been found to be productive in this well?

A Gallup and Dakota.

Q And have you taken initial flow tests and pressures that you may testify to here?

A Yes, we took Bureau of Mines back-pressure tests on both zones. Do you want the results?

Q Yes.

A The open flow potential of the Gallup was 1,275,000 cubic feet per day, and the indicated open flow potential on the Dakota was 2,775,000.

Q And have you taken pressures?

A Oh, pardon me. Bottomhole pressure, 72 1/2 hour build-up, Gallup, 1138, and the build-up, 144 1/2 hour Dakota, 2344.

Q Have you prepared, or caused to be prepared an electric log for introduction here as Exhibit No. 2?

A Yes.

(Marked Gulf's Exhibit No. 2 for identification).

Q Referring now to Exhibit No. 2, will you identify the top and bottom of the Gallup formation?

A The Gallup top is 5,656 and the bottom of the base of the Gallup was at 5,905.

Q Now, while you are on this, will you please state where the well is perforated in the Gallup?

A Four shots per foot from 5,675 to 5,690; from 5,712 to 5,718; and from 5,734 to 5,744.

Q Now, will you proceed to identify the top and bottom of the Dakota formation?

A The top of the Dakota was at 6,782 and the base of the Dakota was at 6,980.

Q And what perforations have you made in the well in the casing?

A It was perforated, four shots per foot, 6,783 to 6,833; and 6,852 to 6,856.

MR. UTZ: In your opinion are each of these zones a separate common source of supply?

A Yes.

MR. UTZ: And that is amply illustrated on the electrical log?

A That they are separate sources of supply? Yes, sir.

Q (By Mr. Kastler) Is the Gallup zone primarily an oil or gas zone?

A In our tests it made gas and no liquids in this particular well.

MR. UTZ: How long was this test?

A It was a 4-point test; I couldn't testify as to the exact time.

MR. UTZ: Do you have a copy of that test with you?

A I do have a well copy, our file copy. I can have one made for you. I think one may have been sent.

(Handing document to Mr. Utz)

MR. UTZ: Possibly you are more familiar with this than I am. Can you tell me how long those points are so we can determine about how long the well flowed? It seems the first point was an hour and three quarters; I couldn't find anything else.

A It was four hours and thirty minutes. I believe that would be the total time, four hours and thirty minutes. It was flowed previous to clean up, previous to the test.

MR. UTZ: What was your rate of flows?

A I am sorry, I don't know. I would say approximately 800,000.

MR. UTZ: Does this test show the flowing well head pressures during the process of each point? That is the bottomhole pressure, I believe.

A Yes, it does.

MR. UTZ: What was the range of pressures from the beginning of the test until the end of the test?

A On the 1/16th orifice the tubing pressures stabilized at 725 and the casing at 960.

MR. UTZ: What did it start at?

A 859 on the tubing and 965 on the casing.

MR. UTZ: The rate on that was approximately?

A 62,000 cubic feet per day.

MR. UTZ: Your next point?

A The next point, it ranged from 710 and stabilized at 698 on the tubing; casing from 950, stabilized at 925. Rate was 133,000. Next point, tubing from 700 to 696; casing, 925 to 900. Flow rate, 251,000. Fourth point, tubing 710 to 640; casing 900 to 780 and the rate, 529,000.

MR. UTZ: All right, sir; you may proceed.

Q (By Mr. Kastler) Has there been prepared for introduction as Exhibit 3 in this case a schematic diagram, or a diagram which shows the proposed or the installed proposed approved installation of the dual completion?

A Yes, there has.

Q May this be labelled Exhibit No. 3 in case 1943?

(Marked Gulf's Exhibit No. 3, for identification).

Q Mr. Mackay, will you testify as to the size of casing set

in this well at all depths, whether or not shown in Exhibit 3?

A There is a string of 8 5/8, 24 pound surface casing set at 300 feet and cemented to the surface, and a string of 5 1/2 set at 7045 and cemented with 1,035 sacks of cement.

MR. UTZ: Let me get that cement as you go. I was fooling with these figures and I missed your first statement. Where is your surface casing?

A 8 5/8 set at 300 feet, cemented with 250 sacks of cement, and the cement circulated. The long string is 5 1/2, set at 7,045 feet and cemented with 1,035 sacks of cement plus 90 sacks through a stage collar at 2,504.

Q (By Mr. Kastler) Calling your attention to the completion in the Gallup formation. You previously testified as to where the well is perforated and the amount of production and pressures taken on tests. What was the gas-liquid ratio on that completion in the Gallup?

A There was no liquid on our Gallup completion. Do you want the Dakota?

Q Well, the Dakota, what was the gas-liquid ratio?

A Made 15 barrels, GOR 66,750 to 1, and the gravity of that liquid, 53.4.

Q What type of packer have you installed?

A Packer Model D, permanent type.

Q Will this packer insure complete separation of the two

zones?

A We feel that it will; yes.

Q If this application should be granted, would Gulf perform the necessary tests, file necessary information and conform with all rules and regulations of the Oil Conservation Commission of New Mexico?

A Yes.

Q Will the Gallup producing formation be produced through the tubing casing annulus?

A That is correct.

Q However, it was tested through the tubing; is that correct?

A That's right, in the tubing immediately above the packer there is a type of time clock, and the Gallup zone was cleaned up and tested through the tubing.

Q Where is your tubing located in relation to the production from the Dakota formation?

A The bottom of our tubing and core is 5,958, and our uppermost perforation is in the Dakota 6,783 so it is set 825 feet above our perforation.

Q Why is the tubing so located?

A During the completion of the well there was 914 feet of 2 1/16 anchor dropped through the packer. In order to be fished out again it would be necessary to drill out the Model D packer.

Q The well was originally drilled and completed so far as

a dual producing, or dually completed, well; is that correct?

A That's right.

Q And the location of the tubing in relation to the Dakota perforation makes it necessary for an exception to Rule 107?

A That's correct.

Q In your opinion will the Dakota be sufficiently produced with tubing so located without damage to the formation?

A Yes.

Q And what do you base that opinion on?

A Well, it is primarily a gas producing zone and the amount of fluid that does occur is most probably in a gaseous state.

MR. UTZ: You mean by that it is gas in the reservoir and there is a retrograde that goes to liquid on the way up, so the pressure decreases?

A That is correct.

Q (By Mr. Kastler) How could migration be detected?

A The pressure differential in the two sands would indicate at the surface.

Q And that pressure differential again is what?

A 1138 bottomhole on the Gallup versus 2344 bottomhole pressure on the Dakota.

Q Are there other dual completions in this general area?

A To my knowledge the closest is Skelly's Jicarilla, you have that application, Jicarilla B-20, which is located in Section

21, 25 North, 5 West.

Q In your opinion, will the completion in this manner as proposed prevent waste and protect correlative rights?

A Yes, it would.

Q Were Exhibits 1 and 2 prepared by you, or at your direction or under your supervision?

A Yes.

Q What is the manner of measurement of production from each zone?

A They will be separate. We plan to install separate metering.

Q And after separately being metered, the gas will then be sent to the same pipeline to the same purchaser; is that correct?

A I believe so, yes.

Q Was Exhibit No. 3 prepared by you?

A Yes.

Q Will the completion in this manner prevent waste and protect correlative rights?

A It will.

MR. KASTLER: Mr. Utz, that completes the questions I have on direct. At this time I would like to move for the introduction of Exhibits 1, 2 and 3.

MR. UTZ: Without objection Exhibits 1, 2 and 3 will be entered in the records of this case.

CROSS-EXAMINATION

BY MR. UTZ:

Q Mr. Mackay, how much pressure drop do you think there will be between the 2,344 bottomhole pressure and the point at which the gas enters the tubing at 5,958 when the well is producing?

A Depending on the rate; it should be negligible at 800-foot intervals.

Q Have you read any bottomhole samples on the Dakota?

A No, sir; there have been no bottomhole samples run yet.

Q You don't actually know if there is gas in the reservoir or not? You are just assuming?

A Yes.

Q Neither do you know, if there is gas in the reservoir, at what pressure the liquids actually drop out?

A That is correct.

Q If this well doesn't flow, under the circumstances you think it will flow, you will have some liquid problems, won't you, since it produces 15 barrels per million?

A That gas-oil ratio should preclude that, but it is possible.

Q You think you can produce this at high enough rate to lift the liquids through a 5 1/2 inch casing?

A The Dakota will be flowing through the tubing. You mean at the interval?

Q 825 foot interval.

A With 66,750 to 1 gas-oil ratio, I believe that it will.

Q If you do have liquid problems what are you going to be able to do about them?

A If we have liquid problems we will have to -- that wouldn't be my decision to make, but we would probably drill out the packer, which would necessitate killing the well.

Q If you do have liquid problems you are not going to be able to produce much gas out of the well, are you?

A No, sir, but we don't anticipate liquid problems.

Q Well, we have determined, apparently, that on a four hour, thirty minute test on 4-point that you do not produce any liquids out of the annulus of the Gallup?

A We were flowing the Gallup tests through the tubing. The side-door choke, you are probably familiar with it, and we ran a mandril blocking off the lower zone, and producing the Gallup through the tubing.

Q Did you run this gas through a separator?

A Yes, it was separated.

Q There wasn't any liquids?

A No, sir.

Q Is this a little unusual for the Gallup in this area?

A I couldn't say for sure, but Gallup is primarily -- well, I just couldn't say for sure.

Q Do you know of any Gallup oil wells in this area?

A Skelly's, the one I referred to.

Mr. Payne: That is within the horizontal limits of the Otero-Gallup pool?

A It was concluded.

Q (By Mr. Utz) This is, you contend, that it is a Gallup-bearing gas well. Do you think it is a possibility that it is a gas crop from the Gallup-Otero?

A I don't know. I haven't made a reservoir study.

Q It is that structure, isn't it?

A I believe it is.

Q Do you have the shut-in point when the well was shut-in? First, let me ask you: Was the well shut in before your 4-point test or after?

A Shut in before for pressure build-up.

Q Did you take various points during your 72 hour shut-in pressure or just beginning and end?

A It was constantly recorded.

Q Do you have that information?

A On the Gallup?

Q Yes.

A I believe the pressure build-up was included in this well test. Yes, here is the Gallup build-up.

Q It would appear that permeability is not red hot on this well.

A No, sir.

Q Would you say that the build-up curve there indicated liquids in the well?

A No, I would not.

Q Referring to your cement program, I believe you circulated -- not circulated, but you ran cement from your 5 1/2 shoe at 7,045 to the top of 3,106?

A That is correct.

Q Is that a calculated top?

A Yes, it is.

Q Do you know what the Pictured Cliff interval is in this area?

A I can find it for you. The top of Pictured Cliff was at 2,380 and assume the next (this is the geologists' summary report) the La Ventana is the next top he has at 3,210.

Q Is that immediately below the Pictured Cliff?

A I didn't prepare this. He doesn't give the base of the Pictured Cliff. I don't believe that the top of the La Ventana would be the base because that was the purpose of our stage collar which was run at 2,504.

Q 2,504? Then you did run a stage collar?

A Yes; 90 sacks cement. Top of that cement, by temperature survey was 2,100 feet.

Q I think I would agree with you that the interval of the Pictured Cliff is properly protected. Did you have any Mesaverde

section in this well?

A I am sure they did, but I don't know exactly. The Mesaverde, is that referred to by any other formation name?

Q The three sections are Cliff House, Menefee and Point Lookout.

A Yes, we had that.

Q Do you have the tops of that?

A Cliff House, 3,912; top of Point Lookout, 4,557.

Q I think that is enough. Your cement is at 3,106, so it is covered. Were there any producing formations or shows above your cement at 2,100?

A No.

Q Any fresh waters in this area?

A Not to my knowledge, sir.

Q Do you know where the fresh waters were; where the potable waters were, above 250 feet?

A That area is all in the Largo Wash, and you have surface waters there at the wash.

MR. UTZ: Mr. Kastler, I don't know for sure if you actually asked for an exception to 107-2 which is an exception to not putting tubing in and flowing the Gallup up through tubing. You mentioned 107-3, which is setting it too high.

MR. KASTLER: I intended to ask for all necessary exceptions to Rule 107.

MR. UTZ: Do you want to amend your application to ask for an exception to 107-3?

MR. KASTLER: Yes, if the Commission so please, I would like the application to be considered amended in that respect.

MR. UTZ: Are there any other questions of the witness?

MR. PAYNE: When you said that you didn't have any liquid in the Gallup, does that include water?

A That's correct; that includes water.

MR. PAYNE: So you have no liquids at all?

A That's correct.

REDIRECT EXAMINATION

BY MR. KASTLER:

A Mr. Mackay, during the drilling of this well or at any other time were any efforts made to complete in the Gallup formation or to develop the Gallup formation as an oil-producing zone?

A Yes, that was our primary purpose.

Q Would you describe the nature of your attempts to complete that as an oil-producing zone? Were there drill stamp tests taken?

A Yes.

Q Going through the Gallup?

A Yes.

Q Do you have the results of those tests?

A Here it is. Tested interval, 5,674 to 5,774, and we

got gas at the surface in fifty minutes. The maximum reading at the end of a three hour test was 7,238 cubic feet per day, and we recovered 660 feet of heavily gas-cut drilling mud, no oil.

MR. KASTLER: That is all.

RECROSS-EXAMINATION

BY MR. UTZ:

Q Did you run any other DST's lower in the section?

A From 6,862 to 5,979; tube open two hours, and it was a weak flow, no gas to the surface; recovered 105 feet of slightly gas-cut mud.

Q You didn't run any DST's from the interval of 5,734 to 5,744?

A No; that was drill stem tests No. 3 and 4 that I quoted.

MR. UTZ: Any other questions of the witness?

MR. PAYNE: Did you fracture either one of these two zones, or both?

A They are both fractured.

MR. PAYNE: Did you use oil to fracture with?

A That is correct.

MR. PAYNE: Did you recover it?

A I believe there is still a small amount that is not; there is some of it not completely recovered.

MR. PAYNE: In the event that the Gallup evenutally proves to be liquid productive, would you be willing to install

tubing?

A Yes, we certainly would.

MR. UTZ: Other questions? If not, the witness may be excused. Are there any statements in this case? If there are none, the case will be taken under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

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

June Paige
Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1943, heard by me on April 27, 1960.

Elvis A. Utz, Examiner
New Mexico Oil Conservation Commission