BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 29, 1962

EXAMINER HEARING

IN THE MATTER OF:

Application of Shell Oil Company for approval of a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its Middleton Federal "A" Well No. 1, located in Unit H of Section 18, Township 19 South, Range 32 East, Lea County, New Mexico, as a dual completion (tubingless) in such a manner as to produce oil from the Lusk-Strawn Pool and gas from the Morrow formation through parallel strings of 2 7/8-inch casing, cemented in a common well bore. Applicant proposes to run a third string of 2 7/8-inch casing to total depth as a spare casing string. CASE 2621

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

MR. NUTTER: We'll call Case 2621.

MR. DURRETT: Application of Shell Oil Company for approval of a dual completion, Lea County, New Mexico.

MR. MORRIS: I am Richard S. Morris of Seth, Montgomery, Federici and Andrews of Santa Fe, representing Shell Oil Company. We will have two witnesses, Mr. Dick Vassar and Mr. Ed Bingman, and I request that both of them be sworn at this time, please.

(Witnesses sworn.)

(Whereupon, Applicant's Exhibits Nos. 1, 2, and 3 marked for identification.)

R. D. VASSAR

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Vassar, will you state your name and occupation for the record, please?

A I am R. D. Vassar. I am Unit Engineer with Shell Oil Company in Roswell, New Mexico.

MR. NUTTER: How do you spell your name?

A Vassar, V-a-s-s-a-r.

Q (By Mr. Morris) Would you outline for the Examiner your education and experience in the oil and gas business, Mr. Vassar?

A I was graduated from West Virginia University in 1960 with a B. S. E. M. in Petroleum Engineering. Since that time I have worked with Shell Oil Company for one year on a training program, and after that time was assigned as a Unit Engineer in Roswell; and for the last year and a third, I have been operating as a Mechanical Engineer concerned primarily with drilling, completion, and production matters.

Q And are you familiar with the application of Shell Oil Company in this case?

A Yes, I am.

MR. MORRIS: Mr. Examiner, we ask that Mr. Vassar's qualifications be accepted and that he be allowed to testify as an expert witness.

MR. NUTTER: Mr. Vassar's qualifications are accepted, Mr. Morris. Please proceed.

Q (By Mr. Nutter) Referring to what has been marked as Exhibit No. 1, would you explain what that shows, please?

A Yes. Exhibit No. 1 is a plat of the general Lusk-Strawn area, showing Shell's Middleton Federal No. "A" 1 in Unit H, Section 18, Township 19 South, Range 32 East, Lea County, New Mexico.

Q Does the plat also show the other wells in the area that are completed in the Lusk-Strawn and other formations?

A Yes, it does. It shows Pan American's Greenwood 7, which was initially completed in the Bone Springs, Wolfcamp and Pennsylvanian, which is the same as our Strawn.

Q That well is located up in the northwest corner of the plat, which is some mile distant to the northwest from the proposed well?

A That is correct. It also shows the Pan Am's Greenwood 8, which is in the same general direction and is designated to the same formations. It is presently drilling. Also shown is El Paso's Lusk No. 2, which is dually completed conventionally in 5 1/2-inch casing in the Des Moines and Atoka, which corresponds to our Lusk-

Strawn and Morrow.

Q That El Paso well is in the Southwest of the Southeast of Section 18?

A That's correct.

Q Now there are other wells in the area not shown on this plat because they would lie off of it to the south, particularly, in the Lusk-Strawn Pool?

A That is true. El Paso has three other wells that are completed in the Strawn. Two of these wells are dually completed in the Strawn and Atoka, and the third well is completed in the Strawn and Bone Springs with the Bone Springs being temporarily shut in.

Q But the El Paso Well No. 2 here in Section 18 is completed in the same formations as the proposed dual completion was?

A That is true.

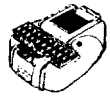
Q Dual completion that we are talking about today. Why is it, then, Mr. Vassar, that we have to come to hearing on this matter today? Is it that the El Paso was a conventional completion with packers?

A That is true.

Q Whereas our completion is a tubingless completion?

A That is true.

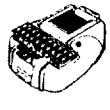
Q Referring now to what has been marked for identification as Exhibit No. 2 and designated as a Schematic Diagram of the well, would you explain to the Examiner what that exhibit shows?



A Yes, I will. This is, as designated, a schematic of the Middleton Federal "A" 1. Starting from the top, we drilled a large diameter hole to set 13 3/8 casing at 895 feet, and circulated cement to the surface, thereby protecting the fresh water zones in that area. The intermediate string was set through the salt at 4714, 9 5/8-inch casing, that is, and was cemented from T.D. back to 1100 feet. That depth is from temperature survey. This was not up to our standards, so we ran 1-inch tubing in the casing annulus and circulated cement from 250 feet to the surface, giving us two plugs at the top and bottom of the casing.

An 8 3/4-inch hole was drilled initially to 11,500 feet. At such time logs were run and indicated the Bone Springs and Wolfcamp to be non-productive. It was then decided to deepen this well to the Morrow, approximately 12,500 feet. An 8 3/4-inch hole was continued to total depth of 12,515 feet, and logs and drillstem tests indicated the Morrow to be productive.

Three strings of 2 7/8-inch 6.5 pound per foot N-80 external upset tubing was cemented at 12,514 feet with 1500 sacks of Class C + gel and 800 sacks of Class C Neat cement. This was arrived at from a caliper log, with 15 percent excess to allow for void and cracks not shown. The calculated cement top is 6500 feet. As can be seen from the schematic, there are several or quite a few accessories in the string. There are three Otis S nipples and flow couplings located in each string for the sole purpose of providing downhole control of these zones. Two of these



strings have the S nipples at approximately the same location so they can be interchanged or used for either zone. The middle string in this case has the S nipples located for the Morrow zone alone.

As is shown on the schematic here, the string on the right is to be the Strawn and will be perforated approximately as shown, and the middle string will be the Morrow with perforations as shown. Radioactive rings were run at the indicated depths to better correlate our logs with the productive zones. Turbulizers were run on each string to conform with the Commission requirements of one turbulizer or centralizer on each joint opposite the pay, and for three joints above the pay. These turbulizers were spread out between T.D. and approximately 11,000 feet. The Neat Cement was calculated to come up to approximately the Wolfcamp formation, that is around 10,500 feet.

Q Mr. Vassar, as is shown on the schematic, you have no cement between 4714 feet down to 6500 feet. Are there any productive zones in that interval?

A No, sir, there are not, not close to our well.

Q And the perforations that you have indicated here in the Strawn and Morrow are tentative perforations?

A They are.

Q You have not as yet perforated this well?

A No, sir, we have not.

MR. MORRIS: For the Examiner's information, Mr. Bingman

will testify with respect to the third and spare string of casing in this well.

MR. NUTTER: Mr. Morris, which will testify to the manner in which the well will be perforated and the orientation of the perforating gun?

A I will.

MR. NUTTER: Would you go into that, please?

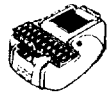
Q (By Mr. Morris) Go into that now, if you like.

A Yes. It is planned to perforate each zone individually in one string while maintaining pressure on the other two strings, to insure that perforating is not through the other casing and is into the formation. This will be done with an oriented perforating gun.

Q Referring now, Mr. Vassar, to what has been marked as Shell's Exhibit No. 3 in this case, which is the log of the well, would you point out matters of particular interest on that log to the Examiner?

A As can be seen on this log, the S.P. development doesn't match up at approximately 11,350 feet. This is a result of two different logs being run over these intervals. As I mentioned before, we ran logs to 11,500, approximately, and then ran a different log from 11,500 to T.D. These logs are spliced, as you can see, with the tops marked on them as have been interpreted. Well, the intended productive zones are indicated on the logs.

Q You might point out to the Examiner, Mr. Vassar, that the



scale as shown on the log here is somewhat confusing, inasmuch as there should be a "1" in front of each figure on the scale to show the actual development at which it's being logged here. For instance, the Strawn pay zone, rather than being slightly above 1100 feet, is slightly above 11,000 feet?

A Yes, sir, that is true. On the log tool, once they pass 10,000, they just start over again.

Q At the present time, with respect to the perforations in the Morrow zone where you have three tentative zones, it's impossible to say right at this point which of those zones will actually be perforated?

A That is true. On the drillstem test, the entire interval was covered so we will know which is productive.

Q That determination just has not as yet been made?

A It has not.

Q Also on this log, Mr. Vassar, the Examiner will be able to see that there is adequate separation of zones between the Strawn and the Morrow?

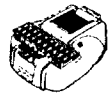
A Some 900 feet.

Q 900 feet between zones?

A That is true. This interval will be covered with Neat Cement.

Q What gas-oil ratio do you expect to find in the Strawn zone?

A Based on information from El Paso's wells, which is all



we have to date, the Strawn is expected to produce with a GOR of approximately 3,000 and have a flowing tubing pressure in excess of 2,000 pounds at a rate of around 300 barrels a day. This is with the expected bottomhole pressure of approximately 5600 pounds shut-in. It is fully expected that the Strawn will flow to depletion with extremely high GOR's at depletion, and will therefore never have to be pumped. It is anticipated that the life of the Strawn will be four to six years.

Q Now in the Morrow zone, what type of gas do you expect to find there?

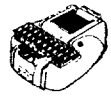
A By the same token, information received from El Paso's wells indicates the Morrow gas to be extremely dry and devoid of any hydrogen sulphide or any water. Therefore, we expect corrosion to be no problem whatsoever. This is true also of the Strawn; it is not a dry gas in reference to the hydrocarbons, it is dry in reference to water vapor, and it is void of hydrogen sulphide.

Q Do you expect to have to use extensive stimulation treatments on either one of these two zones?

A No, sir, we don't. We expect to perforate and lightly acidize the Strawn on completion, and the Morrow will be perforated, cleaned out with a flush acid and possibly fracture treated.

Q Mr. Vassar, what savings does Shell anticipate in this well over the cost of a conventional dual, even considering the running of the third and spare string in this well?

A The savings will be approximately $30,000. That is



versus a 7-inch dual completion with packers and special tubing.

Q From a conservation as well as a monetary standpoint, in your opinion what is the desirability of a tubingless completion, using 2 7/8-inch or other small diameter casing?

A In this particular instance, I think that we were able to get a much better cement job with three strings of 2 7/8th than would be possible with 7-inch casing. I also believe that we can obtain higher flow rates from either zone through this large tubing than we could through a conventional completion. I also believe that in the possibility, which is remote, that the Strawn should have to be pumped, that this third string will allow us to set a pump in the spare and to use the perforated string as a vent string. This will give us much better pump efficiency than could possibly be attained in 7-inch casing, due to the larger diameter of tubing and the better venting of the gas.

Q This well is located on Federal land, Mr. Vassar?

A Yes, it is.

Q And has this method of completion been submitted to the U. S. G. S.?

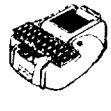
A Yes, it has.

Q What indication have you gotten from them?

A It was verbally approved by Mr. Knauff with the U.S.G.S. in Artesia on last Friday.

Q Were Exhibits 1 and 2 prepared under your direction?

A They were.



Q Have you examined Exhibit No. 3, and does it accurately show the information that's depicted thereon?

A It does.

MR. MORRIS: At this time, Mr. Examiner, we offer Shell's Exhibits 1, 2, and 3 in this case, and that concludes the direct examination of Mr. Vassar. As stated before, Mr. Bingman will testify with respect to the third string.

MR. NUTTER: Shell's Exhibits 1 through 3 will be admitted in evidence.

(Whereupon, Applicant's Exhibits Nos. 1, 2, and 3 entered in evidence.)

MR. NUTTER: Anyone have any questions of Mr. Vassar?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Vassar, here on Exhibit No. 1 --

A Yes.

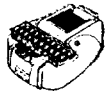
Q -- we have three wells producing from the Pennsylvanian and each one of them is depicted by a different symbol.

A Yes.

Q However, you stated that the zones were similar?

A They are. This is company policy. El Paso calls their Strawn well a Des Moines;and Pan Am calls theirs Pennsylvanian; and we and the State, I believe, call this the Lusk-Strawn.

Q But tne El Paso well is completed in the two same zones that you are talking about here today?



A Yes, it is.

Q The Lusk No. 2?

A That is true.

Q Where is the Lusk-Strawn Pool which was defined by the Commission some while back? Is it immediately south of this area?

A It encompasses our well and those wells to the south, yes, sir.

Q Is your well actually within the horizontal limits of that Lusk-Strawn Pool?

A Yes, it is, to the best of my knowledge.

Q Has the Commission created a Morrow gas pool for this area?

A No, sir, they have not. As far as I know, this zone has no allowable and no acreage spacing.

Q Now the Pan American Greenwood Unit No. 7 to the northwest is depicted here as a Pennsylvanian well. Which of the two zones is it completed in?

A It's in the Strawn also.

Q It's the upper one of the Strawn?

A Yes.

MR. NUTTER: Are there any further questions of Mr. Vassar?

REDIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Vassar, you stated, or do you know, to the best of your knowledge, is the Pan American Well No. 7 up here governed by

the allowable provisions of the Lusk-Strawn Pool as far as its allowable is concerned, in what you have designated the Pennsylvanian formation?

A I believe that it is, yes.

Q It appears to be within one mile of the horizontal limits of the Lusk-Strawn Pool on your Exhibit No. 1?

A Yes.

MR. MORRIS: That's all I have, Mr. Examiner, of this witness.

MR. NUTTER: Mr. Vassar may be excused.

(Witness excused.)

W. E. BINGMAN

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

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Bingman, will you state your name and position for the record?

A I am W. E. Bingman, Division Mechanical Engineer in Roswell.

Q Would you outline your educational and other experience in the oil and gas business for the Examiner, please?

A I graduated from the University of Illinois in 1951 with a B.S. degree in Mechanical Engineering with an option in petroleum production. I worked with Shell since that time. I was assigned

a training program for approximately one year, after which I was assigned in Odessa as a Unit Engineer concerned with artificial lift, well completion, drilling, and other such mechanical engineering matters; and in 1957 I was assigned in Midland area as a Drilling Engineer concerned primarily with drilling equipment, techniques, and related matters of completion and cementing, and worked in Midland area office until August 1st this year at which time I was assigned to Roswell as Division Mechanical Engineer.

Q Are you familiar with Shell's application in this case and the completion techniques that are proposed?

A Yes, sir, I sure am.

MR. MORRIS: Mr. Examiner, we ask that Mr. Bingman's qualifications as an expert witness be accepted.

MR. NUTTER: Mr. Bingman is qualified.

Q (By Mr. Morris) Mr. Bingman, you've heard the testimony of Mr. Vassar here today and you have stated that you are familiar with the completion techniques of the subject well. Why does Shell propose to run spare string in this well?

A We don't consider an extra string justified in all 2 7/8-inch completions. For this particularly deep well, the following factors provide sufficient justification, we believe. In this case, mainly due to the well depth, savings were sufficient to permit an insurance policy, if you will, of this extra string. It provides unusual flexibility, in that for almost any eventuality throughout the life of this particular well, with the possibility

of using Morrow gas for future repressuring of the Strawn, the extra string would provide for increased deliverability from the Morrow, if we choose to use two strings for the Morrow gas section. On the other hand, if this well proved to be an injection well, in such a repressuring system we could use two strings to increase injectivity into the Strawn, which would provide considerably more, higher injection rate at a lower pressure than would any other tubing configuration.

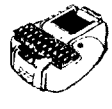
In addition to that, if, as Mr. Vassar mentioned, if we ultimately proved to be wrong in regard to possible artificial lift requirements for the Strawn, if this is a radically different type of Strawn section than we expect, it would be possible to use one string of tubing to vent the gas and improve artificial lift efficiency, pump efficiency from venting the gas to one string and lifting with rod string in the other.

In addition to those three things, an extra string would also provide for correcting any difficulty that might arise in completion or in further production operations throughout the life of the well. We do not expect any difficulties, but on a well of this depth the extra string seems well justified.

Q Then with respect to this well, Mr. Bingman, would it be your opinion that the running of the extra string would be a definite conservation measure?

A I certainly do.

MR. MORRIS: That's all we have of this witness.



CROSS EXAMINATION

BY MR. NUTTER:

Q Just approximately, what does 12,500 feet of N-80 2 7/8-inch tubing cost?

A Approximately $12,000. It's very close to a dollar a foot.

Q Possibly the perforation costs of the well will be increased, too?

A That's quite true. However, we would have to orient, if we ran two strings of 2 7/8ths much as we will if we run three strings. It will only be if we need the third string that there will be that additional completion cost.

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

(Witness excused.)

MR. NUTTER: Do you have anything further, Mr. Morris?

MR. MORRIS: No, sir, I do not.

MR. NUTTER: Does anyone else have anything to offer in Case 2621? We will take the case under advisement and take a recess.

(Whereupon, a short recess was taken.)

* * * * *

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public within and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached transcript of proceedings was reported by me in stenotype and reduced to typewritten transcript under my personal supervision; that the same contains a true and correct record of said proceedings, to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this 9th day of October, 1962, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2621, heard by me on Aug 29, 1962.

....., Examiner
New Mexico Oil Conservation Commission