CASE NO. 46.

BEFORE THE OIL CONSERVATION COMMISSION OF THE

STATE OF NEW MEXICO.

IN THE MATTER OF: THE APPLICATION OF THE GULF OIL CORPORATION TO CONNECT TO PIPE LINE AND RUN CONDENSATE FROM ITS WEST GRIMES NO. 4 LOCATED IN THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 32, TOWNSHIP 18 SOUTH, RANGE 38 EAST, HOBBS POOL, NEW MEXICO.

Pursuant to notice by the Commission, duly made and published, setting August 3, 1943, at ten o'clock, A. M., for hearing in the above entitled matter, said hearing was convened on said day, at said hour, in the Coronado Room, La Fonda, Santa Fe, New Mexico, the Commission sitting as follows:

HON. JOHN J. DEMPSEY, Governor of New Mexico, Chairman
HOM. JOHN M. KELLY, State Geologist, Secretary
HON. H. R. RODGERS, Commissioner of Public Lands, Member
HON. CARL B. LIVINGSTON, Chief Clerk and Legal Adviser.

APPEARANCES:

Name	Company	Address
A. S. Willig	The Texas Company	Ft. Worth, Texas
Harvey E. Yates	Harvey E. Yates	Artesia, N. M.
Roy Yarborough		Hobbs, N. M.
Walter P. Luck	N.M.Asphalt & Ref. Co.	Artesia, N. M.
C. H. Brooke	Agua Negra Ranch	Santa Rosa, N. M.
A. M. McCorkle	Stanolind Oil & Gas Co.	Ft. Worth, Texas
P. H. Lillie	Agua Negra Ranch	Santa Rosa, N. M.
Leo Fry	Stanolind Oil & Gas Co.	Hobbs, N. M.
L. F. Peterson	Stanolind Oil & Gas Co.	Ft. Worth, Texas
Lake J. Frazier	Maryland Casualty Co.	Roswell, N. M.
Geo. P. Livermore	Geo. P. Livermore,Inc.	Lubbock, Texas
U. S. Welch	Flynn, Welch & Yates	Artesia, N. M.
F. W. Brigance	Rowan Drilling Co.	Ft. Worth, Texas
R. U. Fitting	Shell Oil Co.,Inc.	Midland, Texas
H. J. Kemler	Shell Oil Co.,Inc.	Midland, Texas
R.B.F. Hummer	Phillips Petroleum Co.	Bartlesville, Okla.
C. A. Daniels	Phillips Petroleum Co.	Amarillo, Texas
E. H. Foster	Phillips Petroleum Co.	Amarillo, Texas
Lloyd L. Gray	Gulf Oil Corp.	Tulsa, Okla.
Neville G. Penrose		Ft. Worth, Texas
Rice Tilley		Ft. Worth, Texas
Harvey Hardison		Houston, Texas
Edgar Kraus	Atlantic Oil & Ref. Co.	Dallas, Texas
R. F. Windjohr	Nash, Windjohr & Brown	Ft. Worth, Texas
James M. Murray	Me-Tex Co's.	Hobbs, N. M.
J. C. Echlin	American Employers Ins.Co.	El Paso, Texas
Glenn Staley	Lea County Operators	Hobbs, N.M.
K. M. Fagin	Magnolia Petroleum Co.	Dallas, Texas
S. P. Hannafin	Magnolia Petroleum Co.	Roswell, N. M.
C. C. Campbell	Texas Pacific Coal & Oil Co.	Midland, Texas
Leo R. Manning	State Land Office	Santa Fe, N. M.
W. K. Davis	El Paso Nat. Gas Co.	Jal, N. M.

Foster Morrell	U. S. Geological Survey	Roswell, N. M.
Harry Leonard	Leonard Oil Co.	Roswell, N. M.
Hugh L. Sawyers	N.M.Oil & Gas Asso.	Roswell, N. M.
John P. Morgan	Sun Oil Co.	Dallas, Texas
J. O. Seth	Seth & Montgomery	Santa Fe, N. M.
R. S. Dewey	Humble Oil Co.	Midland, Texas
W. L. Morrison	Honolulu Oil Corp.	Lubbock, Texas

The meeting was called to order by the Chairman, and upon request of the Secretary, the Chief Clerk read the call of the meeting, as follows:

"NOTICE FOR PUBLICATION
STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

The Oil Conservation Commission, by law invested with jurisdiction as the oil and gas regulatory body of the State of New Mexico, hereby gives notice of the following hearing to be held at Santa Fe, New Mexico:

Case No. 46

In the matter of the application of the Gulf Oil Corporation to connect to pipe line and run condensate from its West Grimes No. 4 located in the Northeast Quarter of the Northeast Quarter of the Northwest Quarter of Section 32, Township 18 South, Range 38 East, Hobbs Pool, New Mexico. This case is set for 10 A. M., August 3, 1943.

Any person having any interest in the subject of said hearing is entitled to be heard.

The foregoing Notice of Publication was made pursuant to the direction of the Commission at its Executive Meeting June 22, 1943.

Given under the seal of said Commission at Santa Fe, New Mexico, on July 8, 1943.

OIL CONSERVATION COMMISSION

BY (SGD) JOHN M. KELLY
SECRETARY"

(SEAL)

LLOYD L. GRAY

being first duly sworn, testified as follows:

BY MR. GRAY: Mr. Chairman, I would like to call attention to a typographical error in our application, which occurs in the next to the last line of the first paragraph, where it shows us to be in Section 38, it should read Section 32. In the preamble, however, the proper description is given.

BY MR. LIVINGSTON: For your information, the Commission noted that typographical error, and published the call with the correct description.

BY MR. GRAY: I might summarize what I have to present. Gulf is the owner of a 320 acre lease, on which a total of nine wells were drilled on one 40 acre unit. On the one on which this well No. 4 is completed, we have two wells drilled, all of them to the white lime formation, I believe what is now called the Hobbs Dolomite Formation. Along in 1934 the gas-oil ratio of this well became rather excessive, and the well was shut in, and the allowable from that unit was taken from our No. 7, located in the same unit. Then in about 1940 we were in need of gas to flow our north grounds lease, about a mile to the northeast. At that time it had been considered that the big gas, or what is commonly known as the Byers Formation, or Byers Sand, had a rather low heat content gas. That analysis, I think, was shown in the Lea County Engineer's Report dated in 1933. They plugged the well back to 3884 with cement, and perforated it with 7 inch holes, I guess there were 150 holes between 3630 and 3700, which covered the range of the Byers Formation, or zone. The Byers zone covers about 25 feet that is productive. The well tested at the rate of 23% per 750,000 cubic feet daily, and had a shut in gas pressure of 1625 pounds. It was found that the gas, instead of having a low heat content, was equal to that of other horizons, and did not contain any objectionable quantity of hydrogen sulfide. For this reason we abandoned using the well for gas at that time, since we had a temporary supply, and used the gas only for domestic purposes. During the period from 1940 to July 1942, the only use made of the gas was to take care of our camps and houses and miscellaneous lease appliances. During the period we were producing at low rates, probably not to exceed 1,000,000 to 1,500,000 a month, some condensate would build up in the well and would have to

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BY MR. GRAY: I might summarize what I have to present. Gulf is the owner of a 320 acre lease, on which a total of nine wells were drilled. On one 40 acre unit, the one on which this Well No. 4 is completed, we have two wells drilled, all of them to the white lime formation, I believe what is now called the Hobbs Dolomite formation. Along in 1934 the gas-oil ration of this well became rather excessive, and the well was shut in, and the allowable from that unit was taken from our No. 7., located in the same unit. Then in about 1940 we were in need of gas to flow our north grounds lease, about a mile to the northeast. At that time it had been considered that the big gas, or what is commonly known as the Byers formation, or Byers sand, had a rather low heat content gas. That analysis, I think, was shown in the Lea County Engineer's Report dated in 1933. They plugged the well back to 3884 with cement, and perforated it with 7 inch holes, I guess there were 150 holes between 3630 and 3700, which covered the range of the Byers formation, or zone. The Byers zone covers about 25 feet that is productive. The well tested at the rate of 23,750,000 cubic feet daily, and had a shut in gas pressure of 1625 pounds. It was found that the gas, instead of having a low heat content, was equal to that of other horizons, and did not contain any objectionable quantity of hydrogen sulfide. For this reason we abandoned using the well for gas at that time, since we had a temporary supply, and used the gas only for domestic purposes. During the period from 1940 to July 1942, the only use made of the gas was to take care of our camps and houses and miscellaneous lease appliances. During the period we were producing at low rates, probably not to exceed 1,000,000 to 1,500,000 a month, some condensate would build up in the well and would have to

be blown with air from time to time. About the middle of the year 1942, we began marketing the gas for fuel to the Lea County Water Company. The increased takes, of course, resulted in the production of increased quantities of condensate, and caused trouble in surface equipment and pipe lines, to the extent it was necessary to install a separator. At that time we found the well was capable of producing substantial quantities of condensate, and we immediately ran this condensate into tanks, and made application to the Commission for permission to market the condensate. Tests were run on the liquid, and it was found to be water white, having an A.P.I. gravity of 72.2 degrees. In our letter of February 17th, to the Commission, we discussed the condition of the well, and made request for marketing the condensate. I would like to have that letter made a part of this hearing, for I believe it includes all the pertinent data, up to the date of that letter. I don't know--should this be an Exhibit?

BY MR. LIVINGSTON: Yes, it can be marked for identification.

BY MR. GRAY: The letter is to the New Mexico Oil Conservation Commission, Attention of Mr. John M. Kelly, Secretary, dated February 17, 1943, from S. G. Sanderson, General Superintendent of the Gulf Oil Company. I want also to later introduce testimony that this is not an oil reservoir, but is a gas reservoir, and does not contain liquid in the reservoir,itself. I would like to read into the record one or two paragraphs that are particularly pertinent, of a letter from our District Geologist, Mr. R. L. Boss, to our Chief Geologist, Mr. W. B. Wilson, of Tulsa. (Reading):

> "The Byers zone appears to have an average thickness of 25 feet, and is composed predominantly of porous sandstone although interbedded anhydrite and dolomite are present. Of particular importance is the fact that the zone occurs over the structure at the uniform interval of 300 feet above the top of the Hobbs dolomite. From this apparent uniformity of interval, it is possible to estimate with some degree of accuracy the position of the zone in many wells from which samples are lacking through this portion of the stratigraphic Section." * * *

"The evidence suggests the following conditions relative to the Byars reservoir: It is a zone composed predominantly of porous sandstone and has an average thickness of 25 feet. It occurs over the structure at a relatively uniform interval of 300 feet above the Hobbs dolomite. Over the greater portion of the structure - more specifically, within the minus 400 feet contour - the zone may be expected to contain only gas, and throughout the remaining portion, or along the flanks, the zone contains salt water or is barren. There is no direct evidence that the reservoir contains oil."

I believe the description of condensate is, a liquid which is produced with gas, that exists in the reservoir as a gas. It is a result, I believe, in most cases, if not all cases, of a retrograde condensation, or a phenomena of the formation of liquid with the reduction of pressure. That is just about the opposite of the manner in which, in the earlier days, we considered the reaction of gas. In order to show that that condition existed in this reservoir, we obtained a sample of gas from the West Grimes No. 4, and I should like to read into the record, again, a portion of a letter which gives pertinent information concerning the taking of that sample. This letter is to Dr. Paul D. Foote, of Pittsburgh, Pennsylvania, who is in charge of our Gulf Research and Development Company. The letter is from Mr. Rush Greenslade, Vice-President in charge of the Geology Division of the Gulf. (Reads):

"West Grimes No. 4 produces condensate with a gas-oil ratio of approximately 100,000 cubic feet per barrel. The well is not equipped with tubing. In obtaining the bottom-hole sample the well was blown through 4" casing opened wide. The well was then shut in and static pressure of 1640 psi was found after a shut-in period of 18 hours and 45 minutes. Bottom-hole temperature was 92° F. The well was then produced at a rate of 50 MCF per day and a sample was taken at 3500 feet. The total depth of the well is 3884 feet. From a pressure gradient survey we concluded the liquid level in the well was approximately 3600 feet and the sample was therefore taken well above any standing liquid in the hole."

I want to digress there just a moment. The liquid level was 3600 feet, and the top perforation of the formation was 3630, approximately 30 feet through which this gas had to travel through liquid. (Continuing reading).

"Dr. Wescott discussed with Mr. Knappen the possibility that the liquid in the hole would tend to saturate the gas and, accordingly, the sample submitted might not be a satisfactory sample. The casinghead pressure of the well when standing shut in before blowing down was 1407 pounds. It was blown down to 1150 pounds to eliminate fluid from the hole and

casinghead pressure was 1410 pounds while producing 50 MCF daily. Since there is no tubing in the hole it is probably impossible to blow the well entirely dry, and there is a possibility that if we did blow long enough to dry up the hole we would produce sufficient pressure drop in the formation to cause condensation in the pore spaces surrounding the well. We therefore feel that the sample taken is the most accurate which can be secured unless we were to operate the well at 50 MCF for a period of several weeks to be certain that equilibrium conditions had been established. Since we need the gas for lease operations it is impractical to operate at the very slow rate over a period of many days.

"In view of the very high gas-oil ratio and the irregularity with which fluid is produced, we do not believe that a more accurate sample could be obtained by recombining samples of condensate and gas from the separator. For the reasons stated, we think the submitted sample is the best which can be submitted under existing operating conditions."

I have here a photostatic copy of a letter to Mr. Rush Greenslade, Tulsa, Oklahoma, dated July 10, 1943, regarding the testing of the sample taken from West Grimes No. 4 by the Gulf Research and Development Company, and signed by Paul D. Foote, which I will have marked as an Exhibit in this case. (Marked as an Exhibit in Case No. 46, and original attached to original copy of this Transcript).

It is my opinion that, due to the manner of taking the sample, the dew point may be slightly low. Personally, I would anticipate the dew point in the neighborhood of 1000 pounds, instead of 750, but because of the liquid standing in the hole, the liquid probably being heavy, there may have been some absorption of the liquid, so that it gave a lower dew point. However, our laboratory has been working for a period of years on what they term "single phase reservoirs" and "dew point determinations", and they state that in their experience they have never found a well that produced such a high ratio of gas to liquid, approximately 100,000 cubic feet per barrel, and one which produced water-white which was in single phase in the reservoir, or actually was a gas in the reservoir. There are a few figures on production since February, which I believe should possibly be introduced at this time. During March the production of condensate was 261 barrels. The sale was 1507 barrels. I will give the production of gas in the

nearest millions. The gas produced was 34,000,000 cubic feet. In April 165 barrels of condensate were produced, and 272 barrels marketed. And 14,000,000 cubic feet of gas was marketed. In May the production of condensate was 173 barrels. No sales. 43,000,000 cubic feet of gas was marketed. In June the production of condensate was 105 barrels. We have not completed our records on the gas production. The same is true for July, 105 barrels of condensate in 25 days. The runs, or the sales, were 364 barrels. I wish to call attention to the last previous run to the one made in July. At that time they still had relatively cool weather, and the gravity was 74 degrees A.P.I. Also it will be noted that the gas-oil ratio has greatly increased, and undoubtedly is the result of warmer weather and greater settling, and loss of liquid as a vapor into the atmosphere. Preliminary negotiations are now being carried out to determine whether the condensate can be marketed through some of the gasoline plants, for they will have full facilities for maintaining back pressure. Provided this sale does not materialize, it is believed that there will be a conservation measure to market this condensate through mixing with the crude with the other wells on the lease. It was obvious that, during the summer months, particularly serious losses result, due to evaporation. Because of the low volume, runs can be made only infrequently. The lease at this time has a production of approximately 320 barrels. So we average runs from the lease about 1 tank a day, or one every two days. If the condensate is mixed with the crude, there will be a tendency to haul higher fractions and solution and result in much less loss. But, of course, under such conditions we propose to put in proper additional separator equipment and test tankage, so that gas condensate pressure tests may be made at frequent intervals in order to determine as accurately as possible the amount of liquid produced daily. It is our opinion that this well should be classed as a gas well, and be subject to the laws, rules or regulations concern-

ing gas wells, and that the Gulf be permitted to market the condensate which is produced with the gas marketed or beneficially utilized.

BY MR. DUNLEVY: Is this distillate produced predominantly sweet?

BY MR. GRAY: The test on that is included in the letter that we submitted to the Commission on February 17th, and it was shown to be substantially sweet, although there was a small quantity of salt.

BY MR. DUNLEVY: At the time of drilling the wells in the Hobbs pool, did you people make any test in the Byers pay as to the gas condition, whether it was sweet or sour?

BY MR. GRAY: We did not. The only test we made of the Byers was in West Grimes No. 8, which blew out while drilling. We didn't obtain a sample of the gas, but the potential was measured, and it was approximately 90,000,000 cubic feet daily.

BY MR. DUNLEVY: The early records of the Hobbs pool indicate the Byers gas was sour. And the Bowers gas coming in between 3100 and 3200 feet was sweet.

BY MR. GRAY: I don't recall that particular test. It was well-known that Bowers was sweet, because in the blow-outs there they had apparently t aken tests, but in the Byers zone I don't know who made those original tests. I don't recall it was sour, but it was of a very low BTU content, in the neighborhood of 40 or 50, but this was found to be erroneous, and I imagine what was w rong was a substantial quantity got into the formation.

BY MR. DUNLEVY: Have you people attempted to do any test to determine if this gas is coming from the Byars definitely?

BY MR. GRAY: No, only that the well perforations are through a section that should not permit any other zones to produce. The well was cemented with sufficient cement to cover.

BY MR. DUNLEVY: Provided no channeling developed?

BY MR. GRAY: If channeling had developed, I believe there would have been indications of such by pressure on the bradenhead.

BY MR. DUNLEVY: As a matter of record, can you tell me where you landed the string of 9 5/8 or intermediate string of pipe?

BY MR. KELLY: According to the record, that string is landed at 2742 feet and cemented with 600 sacks of cement.

BY MR. DUNLEVY: That would be about the Bowers pay?

BY MR. KELLY: Yes.

BY MR. DUNLEVY: Other than that, I believe if the Gulf is permitted to produce this gas well, if it is possible, they should establish that this gas is coming from the Byars, since in the early days of the Hobbs Pool, in the years 1930 and 1931, it was commonly known that the Byars gas was sour. And we feel that it should be established that this gas is producing from that zone, and not from some other zone.

BY MR. GRAY: I believe the best answer to that question would be that this is not the only well in the pool producing from the Byars zone. There are at this time two other wells, the Humble Powers No. 1, and I believe Shell State-A No. 1. It is my understanding that these companies perforated a 7 inch casing through approximately the same zone as in Gulf's West Grimes N o. 4, and obtained substantially the same type of gas, although I don't know about the volume of condensate which may be produced.

BY MR. WILLIG: Mr. Gray, with the casing, the intermediate string of casing set at 2742 feet, doesn't that leave the Yates exposed to below that string?

BY MR. GRAY: I am not sure that the Yates is recognized as such in the H obbs Pool. I am not a geologist, but it may be--it is my understanding there is a little variation in there, there is, of course, a zone conforming to the Yates, and it is possible that the Bowers may be the Yates, but early tests show that the Bowers contains oil. I believe in the blow-outs occurring during the drilling of the Bowers there is a substantial quantity of oil produced. The Byers zone was considered the big gas zone, had exceptionally high initial bottom-hole pressure, but I recall no record showing it to be sour. But definitely the white lime of the Hobbs dolomite

zone was known to be sour.

BY MR. WILLIG: Isn't it true most of the wells in the Hobbs field have been completed in similar manner to this, with the intermediate string set fairly high, and possibly that the Byars and Bowers both operate with 7 inch casing, and the Byars with 8¼ or 9 5/8?

BY MR. GRAY: I believe that is correct, although I think generally we considered the setting of the intermediate string necessitates 2700 or 2800 feet. Subsequent to the time of the drilling of these wells, through a later study showing that the wells on the edge of the pool did not have either Byars or Bowers production. It was permitted to set the intermediate casing on top of the salt, or in some instances to eliminate it entirely. But the large majority of the wells built in the Hobbs Pool have the casing set in the same manner as this well.

BY MR. WILLIG: I would like to call the attention of the Commission to Texas' H. D. McKinley Well No. 1, which was drilled with cable tools, and the log on file with the Commission shows that a test was made at 3190 feet, showing what the drillers termed "one barrel of oil per hour." That log of the well is on file with the Commission.

BY MR. GRAY: Was that in the Bowers zone, or the Byars?

BY MR. WILLIG: I don't know, apparently in the same zone as your well.

BY MR. GRAY: No, that is what is commonly termed, I believe, the Bowers zone, found about 3200 feet, and is productive of oil.

BY MR. DUNLEVY: But if your casing, the intermediate string, is set at 2742, and your perforations, I believe you stated, at 3600, wouldn't that be exposed behind your casing?

BY MR. GRAY: Not unless in the cementing of the well a great deal of cement is lost in the formation. We cemented that with 600 sacks, and it should have been accurate to cover it all.

(Witness excused)

R. S. DEWEY

being first duly sworn, testified as follows:

BY MR. DEWEY: As Mr. Gray stated, the Humble has a well that is

producing from approximately the same horizon, and is netting approximately 10 barrels of distillate, or condensate, per day. However, we have not asked the Commission for a separate allowable from this gas condensate. I understand the Gulf has. However, if the Gulf is permitted to obtain a separate allowable, such as I understand the request is being made to the Commission today, we request that we have a similar allowable from our Federal B owers A-1 Well.

BY MR. KELLY: You would have to file an application with the Commission for it. This case today is specifically the Gulf case.

BY MR. DEWEY: I understand, and we would like to be allowed to do that without a separate hearing, without the necessity of going through a public hearing on a similar basis of fact.

BY MR. KELLY: We will take it up and will probably have to hear your case. This is specifically set out as the Gulf case. Is your condensate of a similar grade as Mr. Gray's?

BY MR. DEWEY: We haven't run an analysis on it. I know it is of a very high gravity, and being mixed with crude oil on the same unit as what the combined gravity of the two----

BY MR. KELLY: Mr. Murray, Mr. Gray stated they were selling to the Water Company, is that correct?

BY MR. MURRAY: That is correct. Are they still using some gas from this well for other purposes?

BY MR. GRAY: Still using it for camp purposes, and we are supplying the Air Base. I think I should add one more thing. As I said before, we perforated this well to get a supply of gas for use on our North Grimes wells. Recently our other gas supply decreased to such a point it was inadequate to supply that lease , and now we plan to use a portion of the gas produced from this well for gasoline purposes, as well as for minor uses, for domestic and camp use, there on these leases.

BY GOVERNOR DEMPSEY: The Commission willtake the case under advisement.

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CERTIFICATE.

I hereby certify that the foregoing and attached twelve pages of typewritten matter constitute a true, correct and complete transcript of the shorthand notes taken by me in Case No. 46, on the 3rd day of August, 1943, and by me extended into typewriting; that the original exhibits introduced in evidence in this case are attached to the original of this transcript.

Witness my hand this 12th day of August, 1943.

Alice Stewart

Alice Stewart.