

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
December 15, 1964

EXAMINER HEARING

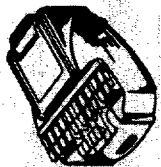
IN THE MATTER OF:)
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)

Application of Shell Oil Company for a)
unit agreement, Chaves County, New Mexico.)
Applicant, in the above-styled cause, seeks)
approval of the Comanche (San Andres) A Unit)
Area comprising 16,895 acres, more or less,)
of Federal, State and Fee lands in Townships)
6 and 7 South, Ranges 25 and 26 East,)
Chaves County, New Mexico.)
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Case No. 3178
through
3183

BEFORE: ELVIS A. UTZ, EXAMINER

TRANSCRIPT OF HEARING



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Case Nos.

3178 through 3183

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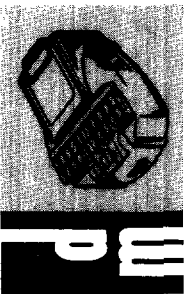
MR. UTZ: Case 3178, through 3183 will be
consolidated for the purposes of testimony, separate orders
will be written on each case.

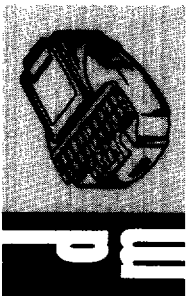
MR. MORRIS: I'm Richard Morris, appearing on behalf
of the applicants, Shell Oil Company, in Cases 3178 through

dearnley-meier REPORTING NEW MEX. CO.

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3183. We will have one witness, Mr. Bob Johnson.

MR. UTZ: Are there any other appearances in these cases?

(Witness sworn)

MR. UTZ: You may proceed.

ROBERT E. JOHNSON

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Johnson, please state your name, by whom you are employed, in what capacity and where you're located.

A Mr. Robert E. Johnson, I'm employed as a reservoir engineer for Shell Oil Company in Roswell, New Mexico.

Q Have you previously testified before the New Mexico Oil Conservation Commission or one of its Examiners?

A No, sir, I haven't.

Q Would you briefly outline your education and your experience in the petroleum industry?

A I graduated from Ohio State University with degrees of

Bachelor of Petroleum Engineering and Master of Science. I've been 9½ years with Shell Oil Company as petroleum engineer in Corpus Christi, Texas, and as reservoir engineer in Houston, Texas, and Roswell, New Mexico.

Q Are you familiar with the applications of Shell Oil Company for the Comanche Unit Area "a", "b", "c", "d", "e", and "f", which are the subject of this hearing today?

A I am.

MR. MORRIS: Are the witness's qualifications accepted?

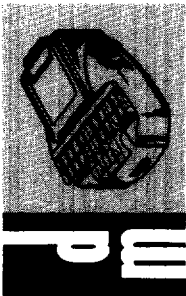
MR. UTZ: Yes, they are.

Q (By Mr. Morris) What does Shell seek by these applications today, Mr. Johnson?

A We're seeking approval of the Unit Agreement and designation of Unit Area for six San Andres formation units and we request that these applications be considered separately for each individual unit, although in the following testimony all references, unless otherwise indicated, are intended to mean the collective area of all six units.

Q Referring to what has been marked Exhibit Number 1 in these cases, would you tell us what that exhibit is and what it shows?

A The exhibit is a map showing the requested units by designation in Chavez County, Texas.



Q New Mexico?

A New Mexico.

Q Also shown on this exhibit, Mr. Johnson, do you have shown the Bitter Lake Area?

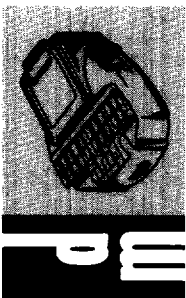
A Yes, the South Bitter Lake Area is shown down in the left-hand corner, the South and West Bitter Lake Area, and the Bitter Lake Area, about six miles of Unit "e".

Q What will be the purpose for formation of this units?

A These units will be for the purpose of delineating the accumulations and developing by the employment of supplemental recovery techniques the oil reserves in the Slaughter Zone of the San Andres formation within the respective Unit Areas.

Q Referring to what's been marked as Exhibit Number 2, in the course of your testimony, Mr. Johnson, would you outline it briefly, the geology of the area, in which the units are located?

A Exhibit Number 2 is a structural plate showing the outline of the six areas, this is the Hasher Area (indicating) that you see roughly in the center of the map. I have a statement that I'd like to read regarding the geology of the units. A large stratigraphically controlled oil accumulation situated about nine miles northeast of Roswell, New Mexico, and localized at shallow depth of from 800 to 1500 feet in the Slaughter Zone of the San Andres formation is suggested by the



following factors: 1. Regional easterly dip. Tertiary uplift along the Sacramento Mountains is reflected in regional, north-northeasterly strike and easterly dip in the San Andres. Structure is regionally homoclinal and dips averaging 100 feet per mile into the Permian Basin. A sharp easterly plunging syncline is indicated at the southern end of the proposed Unit Area.

2. Northward Loss of Porosity. The Slaughter Zone is present over the northwestern shelf area of the Permian Basin and occurs as a 150-foot thick porous dolomite unit about 600 feet below the top of the San Andres, and this is in our Figures 3 and 4, which will be the cross section.

Q All right. Referring to those Exhibits 3 and 4, is there anything in particular with respect to those exhibits that you'd like to point out at this time?

A Well, in the exhibit this would show the northward loss of porosity, this being Figure 3.

Q When you say "Figure 3," you're referring to Exhibit 3?

A Yes, sir, Exhibit 3. The upper part of the zone is replaced to the north by tight anhydrite and anhydritic dolomite, with porosity being lost progressively downward in a series of interfingering shingle-like steps designated as Divisions A and B.

Q And are those shown on Exhibit 3?

A Exhibit 3, yes.

Q All right, go ahead, Mr. Johnson.

A 3. Westward Permeability Barrier. A sharp transition from fresh to very saline formation water in the Slaughter Zone, this is shown on Exhibit 4, is believed to be caused by a permeability barrier, possibly developed by an asphaltic seal or by the precipitation of gypsum or anhydrite derived from solution near the outcrop some 20 to 30 miles west. The position of the fresh-salt water transition in the Slaughter Zone, as indicated by a few deep irrigation wells and scattered oil tests, extends north-south parallel to and approximately 3 miles west of the Pecos River.

There have been several small San Andres oil fields noted on Figures 1 -- Exhibits 1 and 2, have been developed in and adjacent to the area of the proposed Comanche Units. During the past 35 years, a total of 37 penetrations of the Slaughter Zone throughout the Unit Area have been reported. Of these tests, thirteen completions have been effected (5 in Linda, 4 in Pecos, and 4 in an undesignated area) with nine wells currently testing completions. The remaining fifteen wells were plugged and abandoned as "dry" holes. The history of field wells indicates very low productive rates and unattractive ultimate primary recoveries, even though considerable oil is indicated to

be in place. Most of the "dry" holes drilled in the area encountered excellent oil shows in the Slaughter Zone. Many of these wells bailed, swabbed, or production tested live oil in quantities comparable to field wells. Many of the reported shows were in old wells drilled in the 1920's and 1930's, others were in wells drilled to deeper objectives and not evaluated.

In summary, a very large oil accumulation at shallow depth is indicated in the upper part of the Slaughter Zone at the updip limits of porosity and permeability. The proposed boundary of the Comanche Units is drawn to include the suggested area of accumulation downdip from these limits and updip from the synclinal area to the south, and the Linda and Acme Field areas are excluded since it would be difficult to include them on an equitable basis.

Q What are some of the reservoir features of the Strawn Zone?

A Based on available log, core analysis and production data the Slaughter Zone has a gross thickness of 150 feet, average porosity of $10\frac{1}{2}$ per cent, permeability 2-5 millidarcies, average pay thickness of 27 feet, water saturation 35 per cent, and the oil gravity 22-27 degrees API. And it is estimated to be 12,420 stock tank barrels per acre.

MR. UTZ: What was the porosity?

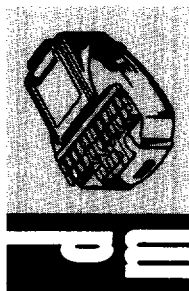
THE WITNESS: $10\frac{1}{2}$ per cent.

Q (By Mr. Morris) Mr. Johnson, you've given us some basic data concerning the number of wells that have been drilled to the Slaughter Zone in this area and the present status of those wells and have given a general indication of production from the Slaughter Zone in this area that has not been satisfactory. Would you elaborate a little more on that?

A As I previously mentioned, the primary performance of the Slaughter Zone Fields in the general area have been very poor. The average per well primary recovery is estimated to be less than 4,000 barrels, or approximately 1 per cent of the estimated original oil in place which is not sufficient to pay out development cost. It is considered that the principal reason for these extremely low recoveries can be attributed to the lack of natural reservoir energy associated with the shallow depth of this accumulation. Contributing factors are low permeability and moderately high crude viscosity.

Q Does Shell have any interest in the South Bitter Lake Area?

A Shell has an interest in the South Bitter Lake San Andres Field. We recently instituted a pilot water flood project. It is anticipated that an injection of water in this field will supplement the natural reservoir energy and result in the recovery of heretofore unrecoverable oil, but as yet we have not observed any conclusive results at this time.



Q How long has the project been going on?

A It has been going on since April.

Q In this South Bitter Lake Area it has been strictly water injection?

A Strictly water injection program, yes.

Q Will you be able to gain valuable information from the South Bitter Lake Field that you hope to be helpful in analyzing the situation in the Comanche Area?

A Right, since we feel that the reservoir parameters are the same, basically the same, we feel that anything we do in the Bitter Lakes Area can likewise apply to the Comanche Area.

Q And if the water flooding should not prove to be entirely satisfactory in the Bitter Lakes Area, other forms of supplementary recovery might be considered, presented to the Commission at a later time for the Comanche Area?

A That's correct.

Q Now, Mr. Johnson, you've taken a rather large area here and instead of presenting it to the Commission as one unit it's been broken up into six contiguous Unit Areas, what is the reason for that?

A The division of the proposed unitized area into six smaller units in lieu of one large unit, is strictly for unitization and operational convenience. All geologic evidence indicates the entire Unit Area to possess equal production

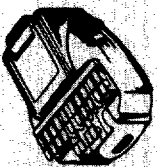


potential. In this regard, the smaller Units will reduce the diverse working and royalty interest ownerships, facilitate both unitization and subsequent operations in each unit. The individual unit boundaries were determined as much as possible with the objective of creating units of roughly equivalent areas and shapes. However, adjustments wherever necessary to maintain individual royalty and/or working interest ownership within a single unit were made, if such adjustments proved feasible.

Q What is the basis for participation in the Comanche Unit Area?

A Each Unit is a fixed participation type unit, as to both working and royalty interests, based on surface acres has been selected as the best suited for the planned type of operation inasmuch as no one portion of any unit can be considered as having greater potential than any other portion of the same unit. And since the use of supplemental recovery methods will be required at or shortly after primary development in order to recover the reserves in this area, an expanding participating area type of Unit would not be practical from both administrative and operational standpoints.

Q Mr. Johnson, we have marked as Exhibit 5 in each of the cases a copy of the Unit Agreement for each unit and these Unit agreements are before the Examiner at this time, marked as Exhibit 5 in each case. Would you describe briefly the form



that each of these Unit agreements take?

A Well, to my understanding, the Unit Agreement for each Comanche Unit is the conventional form employed wherever Federal and State lands are involved. However, there are some unusual features which occur in Section 11 of this agreement entitled Development Obligation, which provides for a fixed minimum number of wells to be drilled during the first two years after formation of the Unit, and in Section 12, a Plan of Development and Operation, which provides that a plan for development be filed for not only the first two-year period after unitization, but also for an additional three-year period whereby a minimum fixed number of wells be drilled.

Q Now, before we go further into the plan of development would you refer to what has been marked Exhibit 6 and state what that is?

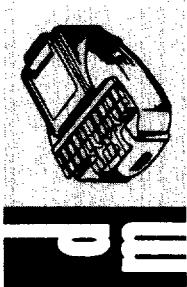
A Exhibit 6 is just a breakdown of each Unit with the amount of acreage approximately, the location, township, range and section within each Unit.

Q Referring next to what we've marked as Exhibit 8 in each of these cases, would you state what that is and what it shows?

MR. UTZ: Exhibit 7 or --

THE WITNESS: Exhibit 7.

MR. MORRIS: Excuse me, Exhibit 7.



THE WITNESS: Exhibit 7 is the classification of the Unit acreage in the Comanche San Andres Unit, broken down by Unit, by Federal, State, by private, along with the percentage of each classification within the Unit.

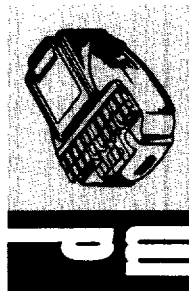
Q (By Mr. Morris) And by Exhibit 8, what does that show?

A Exhibit 8 is a breakdown of the development obligation wells and the plan of development which I previously mentioned by Unit, showing the number of wells to be drilled in each Unit over the five-year period.

Q Would you amplify somewhat, Mr. Johnson, on what your development plan for the Comanche Unit is?

A The initial development plans for each of the six units will consist of drilling evaluation wells to determine reservoir continuity and productivity throughout the respective Unit Areas. In this regard, a minimum number of Development Obligation Wells as provided in Section 11, is set up to be drilled in each of the six units during the first two years. The total combined obligation during this period for the six units will amount to 25 wells which is just slightly less than the development during the past 35 years.

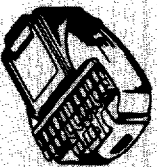
Under the provisions of Section 12, "Plan of Development and Operation," of the Unit Agreements, a commitment for the third, fourth, and fifth years' development in each unit



is set forth. The five-year development plan for the Comanche Units will call for a total of 118 wells. Our plans for instituting supplemental recovery programs in each of the six units will be formulated based on information obtained from the evaluation wells in conjunction with the results of pilot operations currently being conducted in the South Bitter Lake Field, and possible future pilot operations within the requested Unit Areas.

Q What is the present status of the formation of each of the Comanche and San Andres Units?

A As the initial step in the formulation of the aforesaid six units, Shell, as the major working interest owner in each unit, called a meeting with the other working interest owners on May 6m 1964, in order to submit geologic and engineering data, economics, and a draft of the Unit Agreement. Subsequent to this meeting, application for preliminary approval of the Unit Agreement and designation of Unit Area was submitted to the United States Geological Survey and the Commissioner of Public Lands. This preliminary approval was received August 6, 1964, from the United States Geological Survey and ratification copies of the Unit Agreement and Unit Operating Agreement were dispersed to the various working interest owners in all units upon receipt of this approval. Subsequently, copies of the Unit Agreement have been dispersed to the royalty owners and



overriding royalty owners for ratification also.

Q Now, have all working interest owners in each of these units been contacted insofar as oil working?

A All working interest which we know of or are indicated by our records have been contacted.

Q And what response have you received so far?

A Well, the response has been twofold from the working interest so far, including Shell's section, we've got, and these are approximate figures, because the numbers change from day to day, we have about 52 per cent of the working interest in Unit A, 50 per cent in Unit B, 46 per cent in Unit C, 58 per cent in Unit D, 53 per cent in Unit E and 45 per cent in Unit F, but so far we've only received refusals from two parties.

Q And do these two parties own substantial working interests?

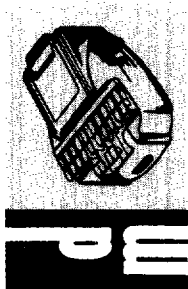
A No, one of them owns two tenths of 1 per cent, and the other one owns 4 per cent in Unit C and two tenths of 1 per cent in Unit F.

Q Would the nonjoinder of those interests adversely affect your control of the Unit Area?

A No, it would not.

MR. UTZ: What percentage do you have in Unit B?

THE WITNESS: 51, 50½ per cent.



Q (By Mr. Morris) Do you expect to receive further ratifications or approvals of your proposed Unit Agreement from other working interests?

A Oh, yes, we can expect to receive further ratifications, it is just that wheels turn slowly on things like this.

Q Now, with respect to royalty interests, you have Federal, State and private lands involved in each of these units?

A That's right.

Q Now, would you amplify your comments a little bit with respect to your negotiations with the United States Geological Survey?

A We have received the temporary approval of the U.S. G.S. as I have indicated, and I believe the exhibits which we have designated for each unit are copies of their approval.

Q I believe that those letters of approval with respect to each unit are marked as Exhibit 9 in each case?

A Exhibit 9 in each case.

MR. MORRIS: Is that correct, Mr. Examiner, it's marked as Exhibit 9?

MR. UTZ: Yes, sir.

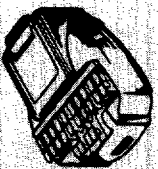
Q (By Mr. Morris) What steps have been taken to present this matter to the State Land Office, Mr. Johnson?

A The State Land Office we have written, filed with the Land Office, paid the filing fee and requested the temporary

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approval for the unit, there has been to my understanding, two meetings held with the State Land Office, one with the Commissioner and his staff regarding these units. We have not received anything to indicate they would not go along with it.

Q Have you been in touch with the royalty interests that are held in fee insofar as possibilities?

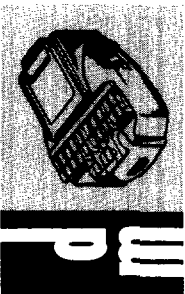
A Insofar as possibilities, we've attempted to contact every royalty interest and overriding royalty interest in the six-unit area and we've received replies from approximately 150 royalty interests and we've received approval from 67 of them, which is about 44 per cent.

Q Now, as to all interests in the unit, both working interests, royalty interests and overriding royalty interests, will continuing efforts be made by Shell Oil Company to secure their approval and ratifications to these Unit Agreements?

A It will be, yes.

Q Would you summarize your proposals, Mr. Johnson?

A In summary, Shell has attempted to show that the formation of the six Comanche Units, as proposed, will result neither in waste of hydrocarbon resources nor violation of correlative rights, but will, through the application of supplemental recovery methods, result in increased recovery from this heretofore low-potential San Andres (Slaughter) accumulation.



We therefore request approval of the Unit Agreement and designation of Unit Area for Comanche San Andres Units A, B, C, D, E, and F.

Q Were Exhibits 1 through 8 prepared at your direction or under your supervision?

A They were, yes.

Q And Exhibit 9, of course, are letters from the U.S.G.S. We offer Exhibits 1 through 9 in evidence with respect to each of the cases before the Examiner at this time.

MR. UTZ: Without objection Exhibits 1 through 9 will be entered into the record of these cases.

MR. MORRIS: That completes our direct examination of Mr. Johnson.

MR. UTZ: Any questions of the witness?

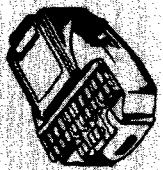
CROSS EXAMINATION

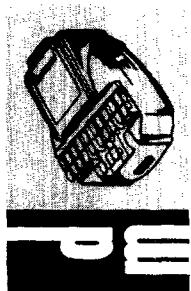
BY MR. UTZ:

Q The main difference in this type of Unit Agreement, the usual type, would you say is in the matter of the participating area?

A That's right.

Q MR. UTZ: Any other questions? The witness may be excused. Any other statements in this case? The case will be taken under advisement and we will have a delayed coffee break.





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STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, JOHN ORFANIDES, Court Reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

John Orfanides
COURT REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Examinar hearing of Case No. 3128-3183 heard by me on Dec. 15, 1964.

Thurman G. Joffe, Examiner
New Mexico Oil Conservation Commission



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