BEFORE THE

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

May 21, 1969

EXAMINER HEARING

IN THE MATTER OF:	
Application of Skelly Oil Company for unit agreement, Lea County, New Mexico.	Case 4133
Application of Skelly Oil Company for a waterflood project, Lea County, New Mexico.	Case 4134

BEFORE: ELVIS A. UTZ, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 4133.

MR. HATCH: Application of Skelly Oil Company for unit agreement, Lea County, New Mexico.

MR. JACOBS: If the Examiner please, Ronald Jacobs, appearing for the Applicant, Skelly Oil Company. The Commission's file should have a letter from Mr. L. C. White, indicating that he is local Counsel for us in the following case. If the Examiner please, the two Cases No. 4133 and No. 4134 cover the same area. One, is for the unit agreement and the other is for the waterflood. They cover the same general subject matter and, consequently, we move that the cases be consolidated for the purposes of testimony.

MR. UTZ: Case 4133 and Case 4134 will be consolidated for the purposes of testimony.

MR. HATCH: Case 4134; Application of Skelly Oil Company for a waterflood project, Lea County, New Mexico.

MR. JACOBS: If the Examiner please, we have two witnesses, dealing with the unitization, and one dealing with the waterflood. We would like them both sworn at this time, please.

(Witnesses sworn)

FRANK MC ATEE

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

DIRECT EXAMINATION

BY MR. JACOBS

Q Will you state your name, by whom you are employed, and in what capacity?

A Frank D. McAtee, employed by Skelly Oil Company, and I am Senior Unitization Engineer, in Tulsa, Oklahoma.

Q Have you previously testified as an expert witness before the Oil Conservation Commission?

A No, I have not.

Q Would you, please, and briefly, outline your education and experience in the field of petroleum engineering and unitization?

A I was graduated in 1960 from the Oklahoma State University, having a Bachelor of Science degree in mechanical engineering, holding a petroleum option. I was employed by Skelly Oil Company in their New Mexico Oil District **Office** at Hobbs, for 3 1/2 years, where I was engaged in the planning and operating of secondary

recovery projects, as well as other normal activities. Since 1966, I have been employed in Skelly's Tulsa Office as the Unitization Engineer.

Q And you are familiar with the unitization proposed by the West Dollarhide Drinkard Unit Area?

A Yes, sir.

MR. JACOBS: Mr. Examiner, we move that his qualifications be accepted as an expert witness.

MR. UTZ: We will consider him qualified.

MR. JACOBS: Now, Mr. McAtee, I direct your attention to what has been marked for identification as Exhibit No. 1 in Case 4133. Would you briefly describe what this exhibit is?

A Exhibit 1 is a unit agreement, providing for the unitization of those lands shown in Exhibit A of that agreement, and described under Exhibit B of that agreement as to the unitized formation only.

Q Now, the unit agreement -- you mentioned that Exhibit A is attached to it; that is a plat -- is that correct?

A Yes, sir.

Q And it describes, in graphical form the area --

the geographical area sought to be unitized in this particular agreement?

A Yes, sir.

Q Now, the lands contained in the proposed unit area are of what nature?

A The lands are B lands, Federal lands and State of New Mexico lands.

Q Now, Exhibit B to the unit agreement contains the detailed description of the tracts; is that correct?

A Yes, sir.

Q Now, Mr. McAtee, on the application filed in this case, there is a complete description of the geographical areas sought to be unitized by this unit agreement, is that correct?

A Yes, sir.

Q For the record, Mr. McAtee, would you read or define the unitized interval?

A The unitized interval is the Tubb-Drinkard formation, underlying the unitized land. This interval has been found to occur in Kelly's New Mexico L No. 3, which is located 1980 feet from the east line, and 660 feet from the north line of Section 5, Township 25

South, Range 38 East, Lea County, New Mexico, at an indicated depth of 5,950 feet to 7,367 feet.

Q Mr. McAtee, what is the proposed participation formula in this unit?

A The participation formula in this unit comprises three phases. The First phase is based on each tract's percentage of current oil and gas income, as contributed from within the entire unit area. This phase will remain in effect until 1,000,000 barrels have been produced from the unitized formation, after September 1, 1967. Phase Two participation is based 25 percent on current oil and gas income, and 75 percent on remaining primary oil reserves in a unitized formation, as of September 1, 1967. Phase two will be effective upon expiration of the effectiveness of Phase One, and will remain in effect until 1,672,835 barrels have been produced after the termination of Phase One. Phase Three participation percentages are based 100 percent on ultimate primary oil recoverable from the unitized formation, and will be in effect from the termination of Phase Two until the termination of the unit.

Q Now, these formulae are obtained in the unit

agreement; are they not?

A Yes, sir.

Q Is this unit agreement similar to other units, heretofore approved by the Oil Conservation Commission?

A Yes, sir.

Q Mr. McAtee, what success have you had with regard to sign-up within this unit?

A We have secured execution of 99.91 percent of the royalty interests in this unit, and 99.97 percent of the working interests, based on Phase Three participation percentages.

Q I direct your attention to what has been marked for identification as Exhibit No. 2 in this case; would you relate to the Examiner what that shows?

A Exhibit 2 is a map similar to Exhibit A, attached to the unit agreement, except that we have shown for each tract depicted thereon, the percentage of royalty interests and working interests committed to the unit agreement as of this date, and the total percentages of the unit, based on Phase Three percentages.

Q Mr. McAtee, does the unit agreement contemplate the secondary recovery and injection of extraneous fluids

into the unitized formation?

A Yes, sir.

Q In your opinion, Mr. McAtee, is the unit agreement reasonably necessary to prevent waste and protect correlative rights of the parties within the unit?

A Yes, sir.

MR. JACOBS: That's all I have of this witness, Mr. Examiner. We do have another witness as to the waterflood.

MR. UTZ: Are there any questions of the witness? The witness may be excused. You may proceed.

LARRY HALL

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

DIRECT EXAMINATION

BY MR. JACOBS:

Q Will you please state your name, by whom you are employed, and what capacity?

A Larry R. Hall: I am employed with Skelly Oil Company as a Senior Reservoir Engineer in Hobbs, New Mexico.

Q Mr. Hall, have you previously testified before

this Commission as a Petroleum Engineer and had your qualifications accepted?

A Yes, sir; I have.

Q Are you familiar with the application in this Case, No. 4134, for permission to conduct waterflood project in the West Dollarhide Drinkard Unit Area?

A Yes, sir; I am.

Q Mr. Hall, would you explain what is being sought by this application?

A This is the application of Skelly Oil Company, as the operator of this proposed West Dollarhide Drinkard Unit for approval to commence water injection into forty-three proposed water injection wells.

Q Referring to what has been marked for identification as Exhibit A in this Case, would you describe that and what it shows?

A Exhibit A is a map, showing the leases, locations of the wells included in this project, and all other New Mexico wells within a radius of two miles from the proposed injection wells. Formations from which the said wells have produced or are producing is shown. The major portion of the Dollarhide field lies in Andrews County, Texas.

And this is an area of multi-paid production in which this Drinkard reservoir, or Tubb-Drinkard reservoir, is both overlaying and underlaying but productive reservoir. The proposed unit boundary of the Dollarhide Drinkard Unit is outlined in yellow, and the wells contained within the unit area are indicated by red. Also, on this Exhibit, we have shown the unit boundary of the presently Skelly Oil -- South Skelly Oil Company; West Dollarhide and Sand Unit, which was established in 1963, and the Gulf operated West Dollarhide Devonian Unit.

Q Mr. Hall, is the Tubb-Drinkard reservoir unitized in the Texas portion?

A Yes; this leaves only the New Mexico portion to be unitized, for secondary recovery. And on this Exhibit A, we have a portion of the Drinkard Well in the waterflood project that cross the Texas Stateline. And these are the Cities Service, north Dollarhide Clear Fork Unit, which is shown in Section 15, and the Union Oil Company of California, operated -- the Dollarhide Clear Fork Unit. I might say at this point, the designation of Clear Fork is synonymous with the Drinkard, as far as New Mexico is concerned.

Q Mr. Hall, the geographical area of the Unit is

the same geographical area that Mr. McAtee testified to earlier; is it not?

A Yes, sir. It is. I might say that our proposed project does include all the wells in the Dollarhide Tubb-Drinkard Pool, in the State of New Mexico.

Q All the wells in this Dollarhide Tubb-Drinkard Pool are going to be taken into and be a part of this proposed unit?

A Yes, sir.

Q Referring to what has been marked as Exhibit B, would you describe what it shows?

A Yes, sir. Exhibit B is a listing of the injection wells and a plat showing the Dollarhide Tubb-Drinkard Wells and the proposed injection pattern. Skelly is the unit operator -- proposed to inject water into the Tubb-Drinkard formation through thirty nine wells, initially, using an eighty-acre five-spot pattern. Our future plans include the conversion of four unit wells along the Texas-New Mexico Statelines, for injection, at such time as lease line agreements are negotiated between the Texas operators and the propose West Dollarhide Drinkard.

Q I noticed on that list that you have shown the former operator as -- for instance, Sinclair. That, in truth, in fact, is Atlantic Richfield; is that correct?

A Yes, sir. All the maps and exhibits do reflect Sinclair. And, I might add, also, that our proposed pattern for the eighty to five spot is a continuation of the waterflood pattern being utilized in the Texas flood.

Q Mr. Hall, what water rates do you anticipate and, approximately, what pressure do you anticipate using in this waterflood project?

A Our anticipated waterflood injection rates are nine hundred to a thousand barrels of water per day, per well, and our maximum injection pressure is expected to be fifteen hundred psi. The injection will be confined in the unitized interval, which is the Tubb Drinkard formation, as was defined in the unit agreement. Injection will be down internally-lined tubing, set on a packer approximately fifty feet above the zone open for injection. Our primary and cementing operation at the time of the original comletion, will prevent further migration up the hole, behind the casing. and any mechanical failure will be promptly repaired, when detected.

Q Mr. Hall, do you anticipate utilizing corrosion inhibited fluid between the tubing casing annulus?

A Yes. I might, at this point, elaborate on our proposed method for converting these wells. We proposed, initially, to pull the rods and tubing from the wells, rerun bare tubing in the packer and inject for an estimated thirty-day period, until the well will hold a static column of fluid. In primary operations we have experienced a lot of clean-out problems in this Drinkard reservoir -- with sand fill-up. And we proposed to inject until the well will hold a static column of fluid, and use the reversing to clean out the TD; at which time, and we are estimating a thirty-day period -- we will run back in, pull the rods and tubing -- I mean, pull the tubing and packer out of the well, run a coated tubing and injection packer, load the annulus with an inhibited fluid at that time.

Q Mr. Hall, have you made a calculation to determine, approximately, what the unit waterflood allowable or the project waterflood allowable may be?

A I have calculated a normal waterflood allowable. When the normal was forty-two barrels a day -- and I calculate sixty-six-nineteen barrels per day alone.

This proposed West Dollarhide Drinkard Unit contains eighty-seven units, and will ultimately contain forty

four producing wells and forty-three injection wells; and as I stated earlier, thirty-nine of these wells will be initially converted, and the remaining four, when the loose line agreements permit. Skelly, by this application, is requesting approval to convert all forty-three wells to injection. And we further ask that the provision be made to allow for additional wells to be converted by injection; by administrative approval, by the Secretary-Director, in the event that additional wells be needed to convert to injection before production response is received.

Q Mr. Hall, referring to what has been marked as Exhibit Number C, would you relate to the Commissioner what that shows?

A Exhibit C is a primary performance graph for the West Dollarhide Tubb-Drinkard Pool, and it indicates the remaining primary oil to be two point two million barrels, as of January 1, 1969. And the current monthly oil producing rate for the Tubb-Drinkard wells ranges between twenty-one and twenty-four thousand barrels of oil per month.

Q When was the first development of the Drinkard

reservoir in the State of New Mexico, in this general area?

A The New Mexico development began with the completion of the Skelly Oil Company K Number One in December of 1951. The unitized vertical interval for the West Dollarhide Drinkard Unit is to be the same as that that has been established for this Clear Fork Unit in Texas -- the same as was established for the Clear Fork in Texas. This includes the Tubb-Drinkard, and Abo Baish section. These comprises a growth interval of ranging from six hundred to approximately a thousand feet. The proposed unit area was fully developed by mid-year, 1958, and we have shown on Exhibit C a number of producing wells and this can be noted -- with eighty-seven completions -- currently eighty-three of these wells continue to produce -- we have one temporarily abandoned and three shut-in wells.

Q Mr. Hall, what has been your experience with regard to production and recovery from this unit area so far?

A From the statistical reports; the operators report that thirteen-million ninety-six thousand-six

hundred and sixteen barrels of stock tank oil have been producing from these unit areas since January 1, 1969. This is an average well accumulative of a hundred fifty-thousand five-hundred and thirty-six barrels. The ultimate recovery by primary has been estimated to be fifteen-million three-hundred ninety-nine thousand ninety barrels. The proposed unit is eighty-five per cent depleted, by the primary drive mechanism solution, gas drive, as of January 1, 1969. This reservoir produces oil at approximately thirty-six degrees api gravity.

Q Mr. Hall, referring to what has been marked for identification as Exhibit D; would you explain what that exhibit shows?

A Shown on Exhibit D is the well completion data for all the wells within the unit completion data. We have a tabulation of operator, lease and well number; the location, the elevation -- total depth, casing program, including the diameters and setting depths; the volume of cement used in the producing intervals. And also, in the remarks column we have denoted which wells will be converted to water injection service. And on the eighty-seven wells in the unit area, forty of these wells are

are completed behind pipe; sixteen are completed open-hole, with the remaining thirty-one wells being a combination. All wells are completed either by using five-and-a-half and seven-inch production casing.

Q Mr. Hall, referring to what has been marked for identification as Exhibit E, would you explain to the Examiner what this shows?

A Exhibit E is supplemental well data, on which we have shown the initial and current producing rates in the accumulative oil production for January 1, 1969. The current producing data rates on the wells in this unit area range from one to twenty-two barrels of oil per day, with an average of nine per day per well. The produced water from the unit area is approximately two-hundred seventy-five to three-hundred barrels of water per day. And this produced water will be transported to our injection plant for reinjection as soon as possible after being reunitized.

Q So, you do anticipate utilizing the produced water in the injection operations also?

A Yes, sir.

Q Now, Mr. Hall, referring to what has been marked

for identification as Exhibit F; will you explain what that exhibit is?

A Yes. Exhibit F consists of the forty-three downhole diagrammatic sketches of the proposed injection wells. On this Exhibit, of course, we have shown the casing string, the diameters, setting depths, quantity of cement used, and the tops of the cement, and the cement intervals, the tubing strings between the diameters and the setting depths, and the location of the packers. All of these wells will be conventional well hook ups, with the exception of four wells. These wells are currently the Queen Drinkard duals. Injection will be below a packer and the Queen produced from the casing tubing annulus. And these four wells -- I might give you the tabulation of them. Sinclair Oil and Gas, which is now Atlantic, McClure No. 19, and Unit J, Section 19, Township 24, Range 38. The Texaco, E. M. Buyers No. 1, located in Unit L, of Section 19. The Texaco-Stephens, the State No. 2; and Unit D of Section 19; the Texaco-United Royalty A, Number Three, in Unit F of Section 19.

MR. UTZ: Well, I haven't found the Texaco -- United Royalty?

THE WITNESS: Yes, sir. The United Royalty A, Number Three.

MR. UTZ: Three and what?

THE WITNESS: And the other one is the Stevens State No. 2.

MR. UTZ: And those were dualled in what zone?

THE WITNESS: The Queen-Drinkard duals.

MR. UTZ: Okay.

MR. JACOBS: Mr. Hall, do you have a copy of the available log from the proposed injection wells?

A Yes. I have included, as Exhibit G, Xerox log sections of the available well logs.

Q Approximately, how many logs are there, Mr. Hall?

A I think we have all but just five or six injection wells.

Q These were all of the logs that were available to you?

A Yes, sir.

Q Referring to what has been marked for identification as Exhibit H; would you explain what that Exhibit shows?

A Exhibit H is an analysis of the produced water

from the unit area, and our proposed water supply source. The water supply source will be the Skelly-Jal water supply system. And this system is presently delivering produced water from the Seven Rivers formation and Capitan Reef. The Seven Rivers water is produced in association with the oil production from Skelly wells, located in Section 3, Township 24, Range 36 East, Lea County, New Mexico. Capitan Reef water is produced from water supply wells, located in Section 4 and 16, Township 24, Range 36, Lea County, New Mexico.

Q Mr. Hall, referring to what has been marked for identification as Exhibit I: would you explain what Exhibit I shows?

A Exhibit I is a structural map, and this shows the Dollarhide Tubb-Drinkard Pool to be the northwest southeast inter-cline. The various pay sections to be the Tubb-Drinkard Abo are composed of finely **crystalline** shale dolamite and limestone, of premium age. We have four colors: and from these, we will determine the average rock properties. And our porosity, is about seven per cent; the permeability is about four millidarcies, and the connate water section is twenty-eight per cent. The geometry of this reservoir is that it lends itself favorably to the proposed eighty-acre five-spot pattern.

And we have estimated that ultimate secondary, by waterflood, will be eleven point five-five million barrels. These reserves were determined by assuming that recoverable secondary oil would be equal to seventy-five per cent of estimated ultimate primary, which is approximately fifteen-million four-hundred barrels. We expect a response from the injection program to result in a maximum oil producing rates in the fourth year of unitized operations.

Our total project life is estimated to be fifteen-and-a-half years.

Q Mr. Hall, will the granting of this application result in any waste?

A No. In my opinion, the unitization in the waterflood and in the west Dollarhide Drinkard Unit will prevent waste by recovering oil that would not be recovered by primary operations.

Q Mr. Hall, will the granting of this operation result in any impairment of the correlative rights of any of the interested parties, both within and without the unit area?

A No, sir.

Q Were Exhibit A through I, and the various sub-divisions of those Exhibits prepared by you or under your

supervision and direction?

A Yes, they were.

MR. JACOBS: If the Examiner please, we would like to offer into evidence Exhibits A through I in Case 4134, and, also, Exhibits 1 and 2 in Case 4133.

MR. UTZ: The Exhibits will be accepted into each case.

MR. HATCH: Do you have Exhibit G?

THE WITNESS: Yes; it's a little package of logs.

MR. JACOBS: That's all the direct testimony we have Mr. Examiner. I do have two listings that may be of benefit. We have to find unit well numbers to these, and here is a listing of the old operator, with the new. And also of a listing showing the old operator and also we have marked the proposed injection wells with the new numbers on them. We anticipate, for effective date on this one, June 1, 1969. That is, we hope we can make that the effective date of this unit.

MR. UTZ: These lists both include forty-three wells?

MR. JACOBS: Includes all of the wells.

THE WITNESS: Eighty-seven.

MR. JACOBS: Eighty-seven -- but the wells marked here are the proposed injection wells. These two lists are the same except this list, that has the injection wells marked.

MR. UTZ: Are you proposing to use the new designation for the wells in the Order?

MR. JACOBS: I think it might be clearer, Mr. Examiner -- that the new unit designation be included, if you desire.

MR. UTZ: Do you have any objections?

MR. HATCH: I have no objections.

MR. UTZ: Let's see; you gave us the four duals; didn't you?

THE WITNESS: Yes, sir; I did.

MR. UTZ: That would probably be easier than giving them to me again.

THE WITNESS: The first one was -- Sinclair is still reflected in this list --

MR. JACOBS: The old, but the new has the correct names.

THE WITNESS: Atlantic McClure No. 19 -- this is

in Unit J, Section 19.

MR. UTZ: Let me find it on this. No. 19?

THE WITNESS: Yes.

MR. UTZ: All right.

THE WITNESS: The Texaco E. M. Buyers, No. 1, of Unit L of 19.

MR. UTZ: E. M. Buyers?

THE WITNESS: Yes; it ought to have a real low well number -- Unit Number Nine; I believe, sir.

MR. UTZ: All right.

THE WITNESS: The next one is the Texaco Stevens State No. 2, and as shown on this list, is Unit Number Three -- W. L. Stevens.

MR. UTZ: All right.

THE WITNESS: Texaco United Royalty A Number Three. I believe, it's Well Number Five, located in F of 19.

MR. UTZ: Yes.

CROSS EXAMINATION

BY MR. UTZ:

Q Now, you have schematics on those four duals?

A Yes, sir. These schematics are in alphabetical order.

MR. JACOBS: By what: operator?

THE WITNESS: Operator. Operator; and then by lease. One of them is at the back -- in fact, it's the second sheet from the back, sir. If we are in the same order.

MR. UTZ: The only difference between the single and the dual is the extra tubing and all four will be completed in the same manner?

THE WITNESS: Yes, sir.

Q And all are Queen producers?

A That is correct. Queen and -- and they will be Drinkard injections.

Q Now, on the single completion, do you intend to load the annulus?

A Yes, sir. As I stated earlier, we intend to load the annulus with inhibited fluid, but we are proposing to initiate -- and we are talking about a short, short term project here -- to go in and inject this well, until we can circulate clean, and save considerably on clean-out money. At that time, and then, we will run out internally-

lined tubing and then, load the annulus with the fluid.

Q Now, I believe you said that you were going to use Capitan-Seven Rivers water for injection. Now, is that going to be all your injection water, or --

A We will reinject the water -- the produced water, as soon as we can get out tank battery consolidation -- we have to make a unit inventory, and we have it set up, tentatively, for the third of June, and as soon as we do see what materials are available, we can start on our tank battery consolidation, as soon as possible. And the produced water will be gathered -- brought to our injection plant to be reinjected.

Q What is the **chloride** content of the Capitan water, again?

A The chloride contents as shown on Exhibit H, of the Jal -- the Capitan Reef water, Jal water system, is twenty-four hundred.

Q The producing water will undoubtedly be higher?

A Yes, sir. It is a hundred-twenty-five-thousand two-hundred and fifty. We have ran compatibility **tests on** these wells.

Q So, you will have unlined tubing in the wells

for approximately thirty days?

A Yes, sir.

Q How much oil did you say you would be able to recover? On the secondary recovery?

A Secondary recovery is eleven point five-five million barrels.

Q You are asking approval in this Order of forty-three wells, is that right?

A Yes, sir.

Q Now, there was a few of those wells -- four of them; was there? That you had to have lease-line agreements on?

A Yes, sir. Would you like the number --

Q I think they are shown.

A On the plats: yes, sir. They are right adjacent to the Texas Stateline.

Q I believe you requested administrative approval for additional injection wells; don't this complete the unit?

A It currently contains all the wells within the Pools, but should these -- agewell drill, or any other problems, well -- well, on additional wells, this is

what we have asked for. At the present time, it does contain all the wells in the pool.

MR. UTZ: Any questions of the witness? You may be excused. Statements? The case will be taken under advisement.

I N D E X

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, CA FENLEY, Court Reporter in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reprted 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.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4133, heard by me on May 21, 1969.

..... Examiner
New Mexico Oil Conservation Commission