BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
March 15, 1967

REGULAR HEARING

IN THE MATTER OF:

Application of Skelly Oil Company for a unit agreement, Lea County, New Mexico.

Application of Skelly Oil Company for a waterflood project, Lea County, New Mexico.

Cases No. 3538 and 3539 (consolidated)

BEFORE: A. L. (PETE) PORTER
GUYTON B. HAYS

TRANSCRIPT OF HEARING

MR. PORTER: Take up Case 3538.

MR. HATCH: Case 3538; Application of Skelly Oil Company for a unit agreement, Lea County, New Mexico.

MR. KELLY: Booker Kelly of White, Gilbert, Koch and Kelly, on behalf of the applicant. I have Mr. Jacobs associated with me and he will be putting on the testimony. We would like to have this case and the next one be consolidated for the purposes of testimony.

MR. PORTER: If there is no objection to the consolidation of the two cases, they will be consolidated for the purposes of testimony.

MR. KELLY: I would also like to ask for any other appearances at this time.

MR. PORTER: Are there any other appearances in Cases 3538 and 3539? Do we have any correspondence on either of these cases, Mr. Hatch?

MR. HATCH: We have a letter from the State Engineer which was handed to me this morning. I haven't had time to read it. I just got it. I am sure it does, and then there is correspondence from Samedan in one of the cases.

MR. PORTER: Would you indicate what that correspondence is?

MR. HATCH: "Samedan Oil Corporation, owner of certain working interest in the proposed unit, by this letter expresses

concurrence and approval of the establishing of the proposed Skelly Penrose A Unit as defined in the application." This is dated March 9th, 1967, by George W. Putnam.

MR. PORTER: You have no other letters pertaining to the cases?

MR. HATCH: I believe that's all I have.

MR. PORTER: Apparently there are no appearances, Mr. Kelly.

MR. KELLY: We have three witnesses and ask that they be sworn at this time.

(Witnesses sworn.)

MR. JACOBS: We will call as our first witness Mr. A. H. Hurley and ask that he take the stand.

A. H. H U R L E Y, called as a witness herein, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

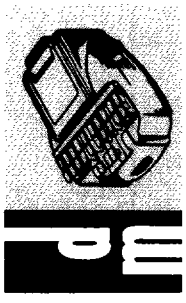
BY MR. JACOBS:

(Whereupon, Applicant's Exhibit 1 marked for identification.)

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

A My name is A. H. Hurley. I am employed by Skelly Oil Company as a Unitization Engineer.

Q Have you testified before this Commission on prior occasions and on such occasions have your qualifications as



Unitization Engineer been recognized?

A Yes, sir, I have.

Q Are you familiar with the Skelly Penrose "A" Unit?

A Yes, I am.

MR. JACOBS: Are there any questions as to this witness' qualifications?

MR. PORTER: No, the Commission considers the witness qualified.

Q (By Mr. Jacobs) Directing your attention to what has been marked for identification by the reporter as Exhibit Number 1, will you please relate to the Commission what this exhibit is and what it contains?

A This is the unit agreement for the development operation of the Skelly Penrose "A" Unit, Lea County, New Mexico and contains the text of the unit agreement for the purpose of putting together a unitized secondary recovery project.

Q Is the description of the unit agreement contained in the application?

A I believe it is.

Q Does the unit agreement also contain an Exhibit A, which is a list or shows a plat of the proposed unit area?

A Yes, sir, it does.

Q Does it cover portions of Section 33, 34 of 22 South, 37 East?

A Yes, sir.

Q And portions of Section 3, 4, 9 and 10 of 23 South, 37 East, Lea County, New Mexico?

A It does.

Q It's all accurately described in the application and on the exhibits attached to the unit agreement, is that correct?

A That's correct.

Q What type of an agreement is this, Mr. Hurley?

A It's a more or less standard State Federal form unit agreement with the provisions relating to the Commissioner of Public Land removed since there is no State acreage involved.

Q So the lands included in the proposed Skelly Penrose "A" Unit are comprised of fee and Federal lands, is that correct?

A That is correct.

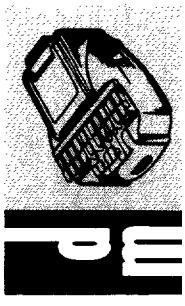
Q Does the proposed unit area contain 2,426.85 acres, more or less?

A That is correct.

Q You mentioned this as a standard type agreement; has this same type of agreement been utilized for other units in this area?

A Yes, sir, it has.

Q Are there any unusual provisions of this agreement



that would distinguish it from other prior agreements?

A No, sir, not that I know of.

Q Would you please read for the record the definition of the unitized interval?

A That's under Section 2-M, Page 3, and it reads, "Unitized formation or Penrose Sand formation, means that interval underlying the unit area which is productive of unitized substances and the vertical limits of which extend from a point 100 feet above the base of the Seven Rivers formation to the base of the Queen formation. Said interval having been heretofore found to occur in Skelly Oil Company Simms Number 2D Well located in the south half southeast quarter of the northwest quarter of Section 3, Township 23 South, Range 37 East, Lea County, New Mexico, at an indicated depth of from 3,279 feet to 3,673 feet as recorded on the Schlumberger electric log run number one taken November 5th, 1948, said log being measured from the derrick floor elevation of 3,308 feet above sea level."

Q What is the purpose of forming this unit? Is it a development unit or waterflood unit, or what is the purpose?

A It's a unit for secondary recovery by waterflood.

Q In your opinion, does the unit agreement, proposed unit agreement, accomplish the purposes that it sets out to do? That is, that it provides for the proper agreement for the

consolidation of leases in the conduct of waterflood operations?

A Yes, sir, it does.

Q Would you please relate to the Commission what the participation formula is within this unit?

A The participation formula is based 10 per cent on production for the period of January 1, 1963 to April 1, 1963, and 90 per cent on ultimate primary recovery.

Q What success have you had as to the ratification or joinder of parties within the proposed unit area? Let's take the working interest owners first.

A We have three working interest owners, Skelly, Samedan Oil Corporation, and Atlantic Richfield Company, all of whom have signed. It's 100 per cent signed as to working interest.

Q So that all the working interest owners within the proposed unit have ratified or joined in this unit agreement?

A That is correct.

Q What success have you had with respect to the royalty interest and overriding royalty interest within the proposed unit area?

A Approximately 77.98 per cent of the royalty and overriding based on the participation formula have executed the agreement. There are five royalty owners in one family group who have not signed. All other royalty and overriding owners in the unit area have committed their interest to the agreement.

Q On an area basis, Mr. Hurley, approximately what per cent of the royalty interest owners have ratified this unit agreement?

A 79.37 per cent.

Q Are all the tracts qualified or will they be qualified on the effective date of the unit?

A All tracts have been qualified, all except Tracts 7, 9, 13 and 14 were automatically qualified under provisions of Section 14 A of the unit agreement. Tracts 7, 9, 13 and 14 were qualified by the working interest owners under provision of Section 14 B of the unit agreement, so that all tracts are now qualified under provisions of the unit agreement.

Q In your opinion, Mr. Hurley, does this unit agreement, proposed unit agreement, protect the correlative rights of all of the interested parties within the unit area?

A Yes, sir, it does.

Q Does the unit agreement bind only those parties that have executed it?

A That is correct.

MR. JACOBS: That's all the questions we have on direct examination. We offer in evidence Exhibit 1.

MR. PORTER: Are there any questions of the witness? The exhibit will be admitted to the record.

(Whereupon, Exhibit 1 offered and admitted in evidence.)

MR. PORTER: This is concerning the unit agreement?

MR. JACOBS: Yes. We have two additional witnesses on the waterflood program.

MR. PORTER: This witness won't testify as to the waterflood?

MR. JACOBS: That is correct.

MR. PORTER: The witness may be excused.

(Witness excused.)

O. V. S T U C K E Y, called as a witness herein, 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 in what capacity?

A O. V. Stuckey, Skelly Oil Company, Senior Production Engineer in Hobbs, New Mexico.

Q Have you heretofore testified before this Commission as Petroleum Engineer?

A I have.

Q On such occasions, have your qualifications as Petroleum Engineer been recognized?

A They have.

Q Are you familiar with the Skelly Penrose "A" Unit and the proposed injection project to be accomplished on this unit?

A I am.

MR. JACOBS: Are there any questions of this witness' qualifications?

MR. PORTER: No questions.

Q (By Mr. Jacobs) Mr. Stuckey, what does Skelly Oil Company propose to do within this unit area?

A Skelly Oil Company proposes to commence water injection in the 30 proposed injection wells to increase recovery and secure maximum recovery, prevent waste.

(Whereupon, Exhibit A marked for identification.)

Q (By Mr. Jacobs) I direct your attention now to what has been marked by the reporter as Exhibit A. Would you please relate to the Commission what this exhibit shows?

A Exhibit A is a map showing lessees, location of wells included in the project, location of the proposed injection wells, and all other wells within a radius of two miles from the proposed injection wells. This exhibit also shows the formation from which these wells are producing, or have produced. This exhibit was presented with the application for permit to inject into 30 wells. However, this is a corrected copy. There was one error in lease line location on the original.

Q The original map that was submitted to the application has an error in the lease line and that has been corrected, is

that right?

A That's right.

Q Would you point out just where the lease line correction occurs, Mr. Stuckey?

A There was, in Section 10 there was a line drawn separating the northwest quarter of the northeast quarter of Section 10, from the northwest quarter of Section 10. This 40-acre tract should be included in the G. W. Sims lease, which is the northeast quarter, which is the northwest quarter of this section.

Q Are there other waterflood projects in the immediately adjacent area to the proposed Skelly Penrose "A" unit?

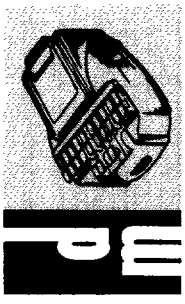
A There are three waterflood projects immediately adjacent to this unit. The State M project operated by Humble Oil, which started injection in November, 1963. It is the unit outlined in the upper left-hand corner of this exhibit.

Q Covers portions of Section 19, 20, 29 and 30, 31 of 22 South, 37 East?

A Right. Then there is the Skelly Penrose "B" Unit which is immediately to the west of the proposed unit area which became effective in July, 1965, and we commenced water injection in August of 1966 on this unit.

MR. HAYS: It's under your supervision?

A Yes, sir. Then, immediately to the north of the



proposed Skelly Penrose "A" Unit is the Langlie Mattix Penrose Sand unit, which is operated by Anadarko Oil Company. This Anadarko Unit was expanded in the original pilot in that area in December of 1964 and is now experiencing a further expansion. The success of project one and three has been indicated by their expansion since the start of the initial programs. The additional expansion for project number three is now under way. Project number two started injection on August 20, 1966 and some limited response has already been noted. Completion of the injection pattern for these three units has been held up waiting on agreements with this proposed Skelly Penrose "A" Unit.

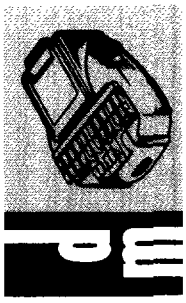
Q (By Mr. Jacobs) In other words, your study has indicated that a response has been experienced in the Anadarko Langlie Mattix Penrose Sand Unit and the Humble operated State M Unit, is that correct?

A Yes, sir.

Q Are there other units or waterflood projects being proposed in any other area, for instance, to the south of your unit?

A We are endeavoring to put together one unit immediately south of this area which would be our Skelly Penrose "C" Unit.

Q Just exactly what do you plan to do, Mr. Stuckey, with regard to conversion of wells, the pattern of injection, and



the amount of water you plan to utilize in this project?

A Skelly proposes to inject water into the Langlie Mattix on a full scale basis to stimulate the recovery of the secondary reserves. The proposed injection pattern is an 80-acre five-spot requiring conversion of 30 wells to injection service. The anticipated injection wells are 9,555 barrels per day for an average of approximately 300 barrels of water per day per injection well. The water supply will be Skelly's Jal Water System. This system is presently delivering produced water from the Seven Rivers formation to the adjacent Skelly Penrose "B" Unit. The Seven Rivers water is produced in association with oil production from wells located in Section 3, Township 23 South, Range 36 East.

MR. PORTER: Is that brackish water or brine, salt water?

A It is a brine.

MR. HAYS: I want to go off the record.

(Whereupon, a discussion was held off the record.)

MR. HAYS: Back on the record.

Q (By Mr. Jacobs) Mr. Stuckey, will you proceed then with an explanation of how you are going to inject this water?

A Injected fluid will be confined to the unitized interval. Injection will be down internally lined tubing set on a packer approximately 50 feet above the casing seat, or

uppermost perforation. Primary cementing operations at the time of the original completion of the well should prevent fluid migration up the hole behind the casing. Periodic injectivity surveys will be run to monitor injection and check for channels behind the pipe. Any mechanical failure will be promptly repaired when detected. The annular space between the tubing and casing will be filled with an inhibited fluid to prevent corrosive damage.

Q In your opinion, will this type of injection then prevent any contamination of any other zones and any fresh water sands that might occur in the area?

A In my opinion, following this program will prevent any contamination of any other zones and will confine the water to the unitized interval.

Q Do you propose to operate this waterflood project under the Rule 701 of the Conservation Commission?

A We do.

Q Have you calculated what the project allowable would be?

A The normal waterflood allowable for the 60 Project Area wells using the 42 barrels per day basis would be 2546 barrels per day. Operators report that 4,149,602 barrels of stock tank oil have been produced from the unit area to January 1, 1967. Deducting 170,383 barrels of secondary oil recovered

to January 1, 1967 by the H. O. Sims pilot flood leaves 3,959,219 barrels of primary production from the unit area up to January 1, 1967. This is an average cumulative primary production per well of 65,987 stock tank barrels.

Q Have you furnished the State Engineer with a copy of the application and the map and your diagrammatic sketches?

A We have, and also water analysis of produced and source water.

MR. JACOBS: I believe the Commission's file reflects that a letter has been received from the State Engineer indicating his approval of this project.

(Whereupon, Exhibit B marked for identification.)

Q (By Mr. Jacobs) I direct your attention now to what has been marked for identification as Exhibit B. Will you please relate to the Commission what this exhibit shows?

A Exhibit B is down hole diagrammatic sketches of the 30 proposed injection wells. Shown on the sketches are all casing strings, diameters, and setting depths, quantities of cement used, tops of cement, perforated or openhole intervals, tubing strings including diameters and setting depth, and type and location of the packer. These sketches were presented with the application for permit to inject. However, an error was noted in the location description on the schematic for the H. O. Sims Number 2 Well. A corrected copy is hereby

submitted. These exhibits contain the corrected copy.

Q It was merely an error in description of the location of that H. O. Sims Well Number 2?

A Description in the location.

(Whereupon, Exhibit C marked for identification.)

Q (By Mr. Jacobs) I direct your attention now to what has been marked for identification as Exhibit C. Would you please relate to the Commission what this exhibit shows?

A Exhibit C is a primary performance graph for the unit area, which shows the primary production from the unit area from the date of inception in 1963 up to January 1, 1967. This primary performance graph indicates there is no remaining primary oil for this unit. Ultimate primary unit for the study area was established as 3,934,638 barrels by the Engineering Subcommitee study in January, 1964. You will note that in the years 1958 through 1962 there is a sharp increase. This increased rate was due to drilling of ten wells during the 1957, 1961 period.

Q Will you please relate to the Commission then, the approximate location of this unit and the pool in which it is located, and which you propose to conduct these waterflood operations?

A The proposed Skelly Penrose "A" Unit is located in all or parts of Sections 33 and 34, Township 22 South, Range

37 East, and Sections 3, 4, 9 and 10, Township 23 South, Range 37 East, Lea County, New Mexico, contains 2426.85 acres, more or less, of Federal and fee lands. The oil pay formation in the unit area is the Penrose Sand,a lower member of the Queen formation in the Langlie Mattix Pool.

Q Has the New Mexico Oil Conservation Commission nomenclature designated the Penrose Sand or the Queen Sand of the Langlie Mattix Pool, rather?

A The New Mexico Oil Conservation Commission nomenclature designates the vertical limits of the Langlie Mattix Pool as those formations encountered between the lower 100 feet of the Seven Rivers formation and the base of the Queen formation. This is our proposed unitized interval.

Q Would you please relate to the Commission briefly the history and development of wells within this proposed area?

A The development of the Penrose Sand within the unit area was started with the drilling of Skelly Oil Company's H. O. Sims Well Number 1 which was completed December 7, 1936 and development proceeded rapidly with 50 of the 60 Langlie Mattix or Penrose producers being completed by 1940. Development of the unit area has been on regular 40-acre spacing. Four additional wells were drilled to formations below the Langlie Mattix. Skelly's R. R. Sims Number 7, which

is located in Unit K of Section 3, Township 23 South, Range 37 East, produces oil from the Blinebry formation, is the only one of these currently on production.

Skelly's H. O. Sims Number 16 located in Unit M of Section 34, Township 22 South, Range 37 East was originally drilled to the Drinkard formation, has been plugged and recompleted in the Glorieta formation as a water supply well for the pilot waterflood which is in operation on Skelly's H. O. Sims lease. Skelly's Sims D Number 2 located in Unit F of Section 3, 23 South, 37 East, and Ellen Sims No. 6 located in Unit J, Section 3, 23 South, 37 East, were originally drilled to the Drinkard and are plugged and abandoned.

Of the 60 Langlie Mattis producers completed on this approximately 2400 acre unit area, 52 wells are currently producing. Six wells are shut in and two wells are currently serving as injection wells for the pilot waterflood.

Monthly oil production rate for the unit area in December, 1966 was 4846 barrels of which 2363 barrels were attributed to primary recovery. This is an average of 1.5 barrels of oil per day per producing well, which is the approximate economic limit as shown on our Exhibit C. Therefore, primary recovery in the unit area is approximately 100 per cent complete.

Q Then, in your opinion, Mr. Stuckey, since the wells are at or near the economic limit, some sort of program is necessary to recover oil which would not otherwise be recovered, is that correct?

A It is.

(Whereupon, Exhibit D marked for identification.)

Q (By Mr. Jacobs) I direct your attention now to what has been marked for identification as Exhibit D. Would you please relate to the Commission what this exhibit shows?

A Presented as Exhibit D, well completion data for the 60 wells in the unit area, shown in this tabulation are operator, lease and well number, location, elevation, total depth, casing program, including diameter setting depth and volume of cement used, and the producing interval of each well. Also noted under remarks are those wells scheduled for injection service. Of the 60 project area wells, ten wells are completed through perforations, 49 wells are completed with openhole intervals and one well is completed with both perforations and openhole section.

(Whereupon, Exhibit E marked for identification.)

Q (By Mr. Jacobs) I direct your attention now to what has been marked for identification as Exhibit E. Would you please relate to the Commission what this exhibit shows?

A Exhibit E is supplemental well data showing completion date, initial and current producing rates and cumulative oil production to January 1, 1967. Current oil production from producing wells in the unit area ranges from zero to 43 barrels of oil per day with an average of 3.2 barrels of oil per day. This consists of 1.5 barrels of oil per day primary and 1.7 barrels of oil per day secondary. Water production from the unit area is approximately 197 barrels of water per day. This produced water will be reinjected under our plan of operations.

Q Then you do plan to reinject produced water back into the formation in furtherance of the waterflood project?

A That is correct.

(Whereupon, Exhibit F marked for identification.)

Q (By Mr. Jacobs) Mr. Stuckey, I direct your attention to what has been marked for identification as Exhibit F. What is that exhibit?

A Exhibit F is available well logs on the proposed injection wells. Of the 30 proposed injection wells, only six have been logged to date. We have presented five of these in this exhibit. The log on the Samedan Hughes "A-2" Number 8 Well is not available.

(Whereupon, Exhibit G marked for identification.)

Q (By Mr. Jacobs) I direct your attention now to what has been marked for identification as Exhibit G. Would you please relate to the Commission what this exhibit shows? What is Exhibit G, Mr. Stuckey?

A Presented as Exhibit G are analyses of produced water from the unit area and from the water supply source. Water injection in the unit wells will be through internally lined tubing set in a tension-type packer set approximately 50 feet above the casing seat or uppermost perforations. Injection rates of approximately 300 barrels of water per day at maximum injection wellhead pressures of approximately 1850 psi are anticipated.

Q Were Exhibits A through F prepared by you or under your supervision and direction?

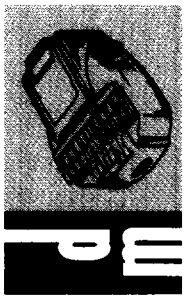
A They were.

Q Mr. Stuckey, do you feel that the water source that you anticipate using will be adequate to handle the waterflood project and any increases you might reasonably foresee in the future?

A I do.

MR. JACOBS: We would offer into evidence, Mr. Commissioner, Exhibits A through G.

MR. PORTER: Without objection, the exhibits will be admitted.



(Whereupon, Exhibits A through G offered and admitted in evidence.)

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Stuckey, I believe you indicated that the water would be from the Skelly Water System and that this comes from the Seven Rivers formation?

A Yes, sir.

Q At the present time, is this water being disposed of in pits?

A No, sir. We are limiting the water production rates to the water that we're putting to beneficial use on the Skelly Penrose B Unit, now. This, by use of larger lift equipment, we can increase --

Q Increase the volumes?

A -- increase the volumes to handle our needs for this unit.

Q Did you testify as to what you expect in the way of secondary recovery as compared to primary?

A No, sir.

MR. JACOBS: We have a witness who will cover that.

MR. PORTER: Oh, we have a witness. That's all the questions I have. Anyone else have a question?

CROSS EXAMINATION

BY MR. NUTTER:

Q Do I understand correctly that you already have some wells on this area that are injecting?

A Yes, sir, we do have.

Q That's the two wells in the extreme northeast corner of the unit which are on injection by virtue of an agreement with the Anadarko project, is that it?

A That is correct.

Q Have you had any response from water injection in that area as far as the producing wells in this Penrose "A" Unit are concerned?

A Yes, sir. We have. That is where we produce the secondary recovery which we have listed in our testimony, Mr. Nutter.

Q I think you mentioned in December that the unit as a whole had made 4800 barrels in December, is that correct?

A In December the unit as a whole produced 4846 barrels.

Q And 2300 of it you said was primary?

A 2363 barrels.

Q So the other 2500 was secondary oil right up there in that corner?

A The other 2483 barrels we attributed to secondary operations.

Q That would be limited to that northeast corner there?

A Yes, sir.

Q You mentioned that you had calculated that your allowable would be 2546 based on a minimum of 42, that's for 60 units. I would calculate 2520, or is there an acreage factor attributable to some of those 40-acre tracts?

A There's an acreage factor. We use 59 times 42, we get 2478, and 66.85 divided by 40, which gives an acreage factor of 1.671.

MR. PORTER: Is that a unit where you have more than one well on a 40?

A No, sir. There are some acreage variations within the unit.

Q (By Mr. Nutter) Would you repeat that again for me please, the acreage factors that you used?

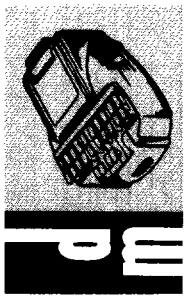
A We considered fifty-nine 40-acre tracts.

Q Fifty-nine 40's?

A Which would, times 42 would be 2478, then the additional acreage would be 66.85 divided by 40, gives a factor of 1.671 times 42, equals 68 barrels.

Q Now, that 66.85, that's not all on one 40-acre tract. That's the excess acreage on several 40's?

A Yes. I did not have the breakdown so I used that method for calculation.



Q The anulus between the tubing and the fluid will be filled with an inert fluid. Do you propose to keep the anulus open or have a pressure gauge so you could detect a leak if it should occur?

A We plan to install a pressure gauge to check periodically for that.

Q And all produced water will be reinjected?

A Yes, sir.

Q Now, these analyses on Exhibit G, this Coats Lease, that's the supply system, is it?

A Yes, sir.

Q That's in 24, 36?

A In Section 3, 24, 36.

Q The other analyses is some of the produced water that's right here in this area?

A Yes, sir. The other analysis is of the W. P. Sims Number 2, which is within the unit area.

MR. NUTTER: That's all, thank you.

CROSS EXAMINATION

BY MR. HAYS:

Q Now, we have been talking about "A" and this operation has already been going on in "B" over here to the left?

A Yes.

Q And both operations are the same, I take it, practically?

A No, sir.

Q What's the difference?

A There's a difference, reservoir-wise.

Q No. I mean in the amount of water you are putting in the ground, the way you are disposing of the water and everything like that. Are they similar?

A Yes, sir. We are reinjecting all produced water now and --

Q How about the north up here, where somebody else is operating, is theirs sort of like that too, or do you know?

A Generally, very similar, specifically, I couldn't --

MR. HAYS: Off the record.

(Whereupon, a discussion was held off the record.)

MR. HATCH: "In view of the statements of Mr. Stuckey and Mr. Cox, it appears that the granting of this application will not cause a threat of contamination to any fresh waters which may exist in the area, and therefore, this office offers no objection to the granting of the application." Frank E. Irby, State Engineer's Office.

MR. PORTER: Off the record, again.

(Whereupon, a discussion was held off the record.)

MR. PORTER: Back on the record. Were there any further questions of Mr. Stuckey? Had you completed your questions, Mr. Nutter?

MR. NUTTER: I had completed mine.

MR. PORTER: I think I had asked all the questions I had. Anyone else? The witness may be excused.

(Witness excused.)

J. T. C O X, called as a witness herein, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. JACOBS:

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

A My name is J. T. Cox. I am employed by Skelly Oil Company as a Senior Reservoir Engineer in Hobbs, New Mexico.

Q Have you on prior occasions testified before this Commission as a Petroleum Reservoir Engineer and on such occasions have your qualifications been recognized?

A Yes, they have.

Q Are you familiar with the reservoir characteristics with respect to the proposed Skelly Penrose "A" Unit area?

A Yes, I am.

MR. JACOBS: Any questions as to this witness' qualifications?

MR. PORTER: No, no questions.

Q (By Mr. Jacobs) Would you briefly relate to the Commission the geology and reservoir characteristics in the

Langlie Mattix Pool in this area?

A The oil pay in the Penrose "A" Unit is the Penrose Sand, a lower member of the Queen formation. The Penrose Top is encountered from depths of 3475 to 3650 feet for an average depth of 3540 feet. The Penrose Sand is described as a lenticular, closely cemented sand lenses contained in a dense dolomitic limestone deposited during Permian Age along the western edge of the Central Basin Platform. The oil reservoir is contained in a generally northwest trending anticlinal stratigraphic trap broken by small saddles.

Core analyses available on two wells adjacent to the proposed unit indicate porosity to be approximately 13 per cent and permeability in each of these two wells was five millidarcies and 150 millidarcies.

Gas is usually present in those areas where the Penrose Top is encountered above 200 feet subsea. The arithmetic average gross Penrose section thickness below the minus 200 foot subsea level is 107 feet thick.

The Grayburg formation immediately below the Penrose is essentially water bearing. Static water levels have been encountered at subsea elevations of minus 375 to minus 443 feet in various wells.

Q Mr. Cox, what is the primary mechanism for producing oil in this reservoir?

A The primary driving mechanism for the Penrose is solution gas, producing oil of approximately 36 degrees API gravity. The gas zones present in the upper Penrose as well as the immediately higher Queen and Seven Rivers formations are present as localized gas stringers, these are found in the higher portions of the general anticlinal effect. There is no evidence to suggest that the Penrose formation contains enough continuous vertical permeability that these gas zones could have furnished energy as a primary driving force in the production of primary oil from the Penrose.

Q Do you have an estimate as to the amount of secondary oil that has been recovered and will be recovered within this proposed unit area?

A Secondary oil reserves by waterflood of the Skelly Penrose "A" Unit have been estimated at 3.96 million barrels. These reserves assume that recoverable secondary oil would be equal to the estimated ultimate primary recovery. Waterflood performance is expected to yield a peak producing rate of approximately 2600 barrels per day three years after the injection project starts. Life of the injection project has been estimated to be twelve years from the start of injection.

Q Mr. Cox, do you know approximately how deep the fresh water sands occur in this area?

A Not specifically. I would say in the neighborhood of

twelve to 1500 feet at the most.

Q Based on your reservoir studies and your observance of the waterfloods in the immediate area to the north and to the northwest, and based on your studies of the pilot waterflood that has been conducted in this area, do you have an opinion as to whether or not a waterflood project in the Skelly Penrose "A" Unit Area is feasible?

A Waterflood within the Penrose "A" Unit is feasible on the basis of evidence from successful offset operations.

Q In your opinion, is such a waterflood project reasonably necessary in order to recover oil which would otherwise not be recovered?

A Yes.

Q In your opinion, does the proposed injection project protect the co-equal and correlative rights of all the various interested owners, both signers and non-signers, to the proposed unit agreement?

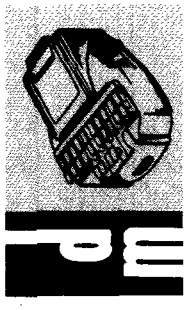
A Yes.

MR. JACOBS: That's all the questions we have of this witness.

MR. PORTER: Your testimony is that you would expect actually it's about one to one recovery.

A Yes, sir, a one to one recovery.

MR. PORTER: Any questions, Mr. Nutter?



MR. NUTTER: One question. What per cent of the oil in place has been recovered or will be recovered on ultimate primary?

A An estimate of oil in place has not been made. Consequently, I could not give you a percentage of the recovery to date.

MR. PORTER: What would you ordinarily expect in this type of reservoir as a recovery factor?

A Probably 12 to 14 per cent.

MR. PORTER: There's a possibility we may, with secondary recovery, get 25 per cent of the oil in place or something like that?

A Yes, sir, I would anticipate this.

MR. HAYS: How much money are you figuring on spending in this water deal?

A I did not conduct an economic study of this particular unit.

MR. HAYS: Has anybody in your outfit told you how much you are going to spend on it?

MR. JACOBS: We don't have that with us.

A An economic study was conducted in 1964, indicating that the discounted, cumulative discounted cash flow before taxes --

MR. HAYS: Never mind. It's going to take you some time

to figure it out. I will talk after.

MR. PORTER: It doesn't make any difference whether this is in the record or not. Any further questions? The witness may be excused.

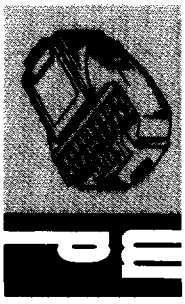
(Witness excused.)

MR. JACOBS: We would request that the application be made a part of the record and with that we have nothing further to offer in this case.

MR. PORTER: It will be made a part of the record. Anything further to be offered in either one of these cases, Case 3538 or 3539?

MR. HATCH: I have already read the letter from the State Engineer's Office.

MR. PORTER: The gist of the letter from the State Engineer is that they had examined the corrections that had been submitted and that they have no objections to the application. If nothing further to be offered, we will take the cases under advisement.



I N D E X

E X H I B I T S

NUMBER	MARKED	OFFERED	ADMITTED
Ex. 1	3	8	8
Ex. A	10	22	22
Ex. B	15	22	22
Ex. C	16	22	22
Ex. D	19	22	22
Ex. E	19	22	22
Ex. F	20	22	22
Ex. G	20	22	22

STATE OF NEW MEXICO)
)ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public 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 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.

Witness my Hand and Seal this 21st day of March, 1967.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires
June 19, 1967.