BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 2, 1958

In the matter of the application of Skelly Oil Company to amend Order No. R-179-A to permit the transfer of allowables from water injection wells to producing wells on the same basic lease and to establish a lease allowable for its H. O. Sims pilot water flood project in the Penrose-Skelly Pool in Lea County, New Mexico, to enable the production of six times the normal unit allowable from any well or wells in said project.	Case 354

BEFORE:

Mr. Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

MR. NUTTER: The hearing will come to order, please. The first case on the docket this morning will be Case 354.

MR. PAYNE: In the matter of the application of Skelly Oil Company to amend Order No. R-179-A.

MR. SELINGER: George W. Selinger representing the applicant. We have one witness, Mr. Joe Ramey. We would like to have him sworn.

(Witness sworn.)

JOE D. RAMEY

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

DIRECT EXAMINATION

BY MR. SELINGER:

Q State your name.

A Joe D. Ramey.

Q You are associated with what company?

A Skelly Oil Company.

Q In what capacity?

A District Petroleum Engineer.

(Marked Skelly's Exhibits One through Six for identification in the case.)

Q Where are you located, Mr. Ramey?

A Hobbs, New Mexico.

Q Are you familiar with Skelly Oil Company's operation in what we designated as the Sims area, classified by the commission as the Langley-Mattix area?

A Yes, I am.

Q Are you also familiar with the pilot water flood injection program on our Sims lease? A Yes.

Q Is that a cooperative flood with Humble and Gulf Coast Western? A Yes.

Q Will you describe the area that our Sims lease is and the location of the Humble and Gulf Coast Western?

A First I would like to say that that's the H. O. Sims lease.

Q Skelly H. O. Sims lease.

A Yes, we have several other Sims leases in the area. The H. O. Sims lease consists of the southeast quarter of Section 33, the southwest quarter of Section 34, in Township 22 south, Range 37, east and the northeast quarter of Section 4, and the west half, and the northeast quarter of the northwest quarter of Section 3 in Township 23 south, Range 37 east.

Q Now, I'll ask you hasn't the Commission heretofore in 1952 issued Order R-179 and Order R-179-A which approved a pilot injection program to the three companies involved?

A Yes, it did.

Q Referring to Exhibit One, will you advise the Examiner just what that purports to show?

A This is a plat of the area in question, with our H. O. Sims lease colored in yellow. The injection wells are outlined in blue.

Q That is not only on Skelly's Sims lease, but also those of Humble and Gulf Coast Western?

A Yes, that's correct. The red enclosed area are those wells mentioned in the application which should respond to water flooding.

Q Those are the wells that have shown response and are responding to the water flood at the present time?

A Yes. Wells Number 6 and 10 have responded at this time.

Q Have you also indicated some increased production in the other adjoining producing wells?

A We have a small increase in our well Number 11. It has increased from 3 to 5 barrels. This has been within the last month and is not enough producing history accumulated to say definitely that it is responding.

Q Now, I'll hand you what has been marked as Skelly Exhibit Two which is entitled, "Pilot Water Flood Performance, H. O. Sims Lease". Would you explain that to the Examiner?

A This is just a performance curve showing injection rates and oil production for our H. O. Sims lease, only the injection well, which is the dashed line, is for wells H. O. Sims wells 8 and 9, and the oil production curve, which is the solid line, is for wells 6, 7, 10 and 11 only.

Q Does that indicate, in a general way, the responsiveness of the production of oil to the injectivity of the water?

A Yes, I believe it does. Although this curve does not reflect it, we had our first increase in December of 1956. Then based on this increase, we stepped up injection in May of 1957, and immediately had a further increase in production; however, after about three months of high injection, why, we encountered some operational difficulties and we were forced to cut back our injection. During that time our production curve seemed to reach a level of about, well, 1150 barrels per month and then again in

May of this year we increased injection again and almost immediately our production curve increased sharply.

Q How much injection of water barrelage is indicated on the last point on your section here?

A We have about 2810 barrels.

Q How many barrels of oil is indicated by your last point on this curve?

A About 1890. Those are monthly.

Q Yes, per month. A Yes.

Q Now, I hand you what has been marked as Skelly Exhibit Three, which is entitled, "Pilot Water Flood Performance H. O. Sims Well Number Six", and ask you to state what that indicates.

A This is just a production curve showing the monthly production rates for H. O. Sims Well Number Six.

Q Is that the first well to respond to the water flood injection program?

A No, I believe our first concrete response was on the H. O. Sims Well Number 10. However, this one had an increase the month after the H. O. Sims Number 10 increased in December 1956, and our Number 6 in January of '57.

Q What was the productive capacity of Well Number 6 before injection and what is it at the present time?

A Before injection it was about 6 barrels a day; at the present time it is producing 60 barrels a day.

Q Is the producing ability of that particular well increasing

at the present time?

A Yes, it is.

Q Is it your opinion that the well is approaching the zenith or apex of its productive capacity?

A Well, it could be possible. We originally thought it would level off at about one hundred barrels a day based on our injection rate, and our partners in this cooperative flood based on their injection rate; however, the last few months, why, Humble and Gulf Coast Western have increased their injection appreciably and so --

Q -- Would the increase of injectivity by those offset operators, would the productive capacity of this particular well be the first to be affected by the increased injectivity?

A Yes.

Q It is, therefore, that the productive capacity of this well would be greater than one hundred barrels?

A Yes.

Q Now, I hand you what has been marked as Skelly Exhibit Four, which is entitled, "Pilot Water Flood Performance, H. O. Sims Lease, Well Number Ten", and ask you to state what that is.

A This is a production curve showing the monthly production against time for H. O. Sims Well Number Ten.

Q What was the ability of this well to produce before injectivity and at the present time?

A It was approximately 120 barrels per month, or three

barrels a day, and the well is now making slightly in excess of 15 barrels per day.

Q It was three barrels per day before the water flood and it's presently 15 barrels? A Right.

Q I'll hand you what has been marked as Skelly Exhibit Five, which is entitled, "Pilot Water Flood Performance Injection Wells", and ask you to state what that is.

A This is a curve showing the upper curve as injection pressures on the four injection wells that directly offset our H. O. Sims Number Six and the lower curve is the monthly injection rate.

Q Does the exhibit indicate that Skelly Oil Company on its H. O. Sims wells Numbers Eight and Nine are using a greater injection pressure and greater injection rate than either the Gulf Coast Western or the Humble?

A Our injection rates are considerably above Gulf Coast and Humble, but our injection pressures are not. Our H. O. Sims Number Nine has slightly over 1500 pounds. I believe it's 1565 pounds at this time, and Gulf Coast Western has the high of 1900 pounds. Our H. O. Sims Number Eight is the lowest insofar as injection pressures are concerned.

Q I'll hand you what has been marked as Skelly Exhibit Six, and ask you to state what that is.

A Exhibit Six shows a portion of the log from our H. O. Sims Number Nine injection well and correlated on that log are

permeability and porosity values from the core taken on the Humble state H, Number Seven injection well.

Q Now, Mr. Ramey, at the present time the allowable of the 13 producing wells on the H. O. Sims lease total 91 barrels a day, is that correct?

A That is correct.

Q And there's no allowable for the injection wells Number Eight or Nine assigned under the state?

A That is correct.

Q What is the --

A -- Mr. Selinger, I might correct that. We do have a capacity allowable. We have an emergency order on Well Number Six at this time.

Q That's what I was getting. At the present time Well Number Six that has responded to the water flood does exceed the top unit allowable in existence in this field after 33 barrels?

A That is correct.

Q Now, your request here is for the assignment of a lease allowable covering all of the wells both producing and injection wells, is that correct?

A That is correct.

Q And to operate the property on a unit or lease basis?

A Correct.

Q Under the present 91 barrels of allowable assigning the top of 33 to Well Number Six, that would give you an average of

less than five barrels per well per day for all of the wells in the field?

A Right.

Q On this lease?

A Yes.

Q And your request for assignment of allowable on a lease basis is the top unit allowable multiplied by the total number of wells both producing and injecting as a maximum, is that correct?

A That is correct.

Q You are not asking for capacity allowable but you are asking for the permission to produce up to the unit allowable multiplied by the number of wells on this lease?

A That is correct.

Q And hence you desire the transfer of allowable. With what maximum for any one or single well?

A Up to six times the normal unit allowable for any well.

Q Now, on your Exhibit One you have indicated the area outlined in red which has been affected by the flood either in the past or at the present time, is it your opinion that the effects of the flood will extend on beyond the red line as indicated on your Exhibit One?

A It is very possible. It depends on our future expanse. However, we don't contemplate any future expanse at this time until we can prove that we have a reasonable pay out on our money spent to date. But it is possible that Wells 15 and 4 and also on further down the line to 13, 14 and 12 could respond.

Q In other words, Mr. Ramey, this is a pilot water flood

in an area which is of salvage type nature of production, is that correct?

A Yes, very definitely.

Q The economics are one which will depend on whether or not the pilot flood would be expanded?

A That is right.

Q Do you have any estimates of the cost of the project at the present time?

A Well, our cost has been in the neighborhood of $73,000 to the present time, that includes our water supply well and conversion of Wells Eight and Nine and also a treating plant and injection pumps. In addition to that we will have probably two or three thousand dollars chemical costs, plus labor.

Q At the present time under the theoretical effects of your very limited effect of water flooding, do you have any estimates of the increase resulting from your water injection over and above the primary oil?

A We are looking at on Number Six in the neighborhood of 120 thousand barrels. This is merely a one to one ratio of the primary.

Q Would the assignment of an allowable on a lease basis, based on the total number of wells both producing and injection multiplied by the top unit allowable in existence in this field, be sufficient to give you the flexibility of operation without any restrictions in your mechanical and productive effects?

A Yes, it would.

Q Would the granting of such a request as made herein by the applicant be in the interest of conservation?

A Yes, it would be.

MR. SELINGER: I believe that is all we have. We would like to offer Exhibits One through Six inclusive.

MR. NUTTER: Inasmuch as this has been advertised as a reopening of Case 354 and there may be other exhibits in Case 354, I wonder if we could identify them so that they will be identified as pertaining to this hearing. We can call this Exhibit Number One, Case Number 354, July, 1958.

MR. SELINGER: In other words, just date the case, Number 354, July, 1958.

MR. NUTTER: Let's put the date on the case number and that will identify that.

MR. SELINGER: Then we offer in evidence Skelly Exhibits One through Six, Case 354, July 2, 1958.

MR. NUTTER: Is there any objection to the entrance of these exhibits in this case? If not they will be received.

(Whereupon Skelly Exhibits One through Six, Case 354, July 2, 1958, were received in evidence.)

Q (By Mr. Selinger) Would you refer to your Exhibits Two and Six, Case 354, July, 1958, and explain to the Examiner why the granting of this application would be in the interest of prevention of waste?

A Exhibit Number Two reflects that our injection rate is in proportional in some part to our production rate. Now, in Exhibit Number Six, core analysis plus the log indicates that the Penrose sand of the Queen formation in this area is a lenticular sand that is interbedded with dense impermeable dolomite; so to prevent waste and to prevent early flooding out in our production wells, we must inject water into all zones or each individual sand stringer. Now, the core analysis indicated permeability ranges of from 159 to 588.

Q 149.

A 149. And that at a low injection rate it would be very possible and probable that water would enter into these zones with high permeability. We must have sufficient injection pressures and injection rates to insure the water entry into each individual sand body.

Q So that if any restriction is had, insofar as producing is concerned, it would prevent the flooding of the less permeable zones in the reservoir, and, hence, would not recover any of the oil lying on those low permeable streaks, is that correct?

A That is correct.

Q It is necessary, therefore, to maintain a high injection rate and high pressure and actually unrestricted production of oil in order to flush out the low permeable streaks?

A Yes.

Q Is that evidenced by your Exhibit Six, the variation in

permeability of the several zones from 149 to 588

A That is right. If we had to prorate or cut back our Well Number Six, we would also have to decrease our injection pressures to keep from the possible migration of oil outside of our five spot into low pressure areas. Hence if we reduced our injection rates, we would not be efficiently forcing water into all zones.

Q Now, the Commission has heretofore in a number of cases had comprehensive testimony with respect to the necessity of permitting adequate production to take care of your injection rate in Cases 1294, 1196, and in 1433. Are you familiar with the testimony presented in those cases?

A I have read most of the transcripts of the cases.

Q You have the transcript and have read that?

A Yes.

Q Is it your opinion that the information disclosed in those three cases are somewhat analogous to your thoughts in this particular case? A Yes.

MR. SELINGER: I believe that's all we have.

MR. NUTTER: Does anyone have any questions of the witness?

MR. PAYNE: Yes, sir.

CROSS-EXAMINATION

BY MR. PAYNE:

Q Does your application include your Number Seven well?

A Yes, it does.

Q That well is reflected on Exhibit Number Two, is that included on the four wells?

A Yes, it is.

Q Have you had any response from this well?

A No, we haven't had any response. However, we do anticipate response in the near future in that well.

MR. NUTTER: Any further questions?

RE-DIRECT EXAMINATION

BY MR. SELINGER:

Q Is Well Number Seven a direct south offset to water injection well Number Eight?

A Yes, it is.

RE-CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Ramey, your lease there, the H. O. Sims lease, is entirely owned by Skelly, is that correct?

A That is correct.

Q Is the royalty interest and any possible overriding royalty interest the same throughout that area?

A Yes, it is the same, about a sixth interest.

Q That comprises 15-40 acre tracts, is that correct?

A That is correct.

Q You have requested a top unit allowable to be assigned to each of the 15-40 acre tracts?

A That is true.

Q With permission to produce the oil in any amount from any well thereon, with the exception that no well could produce six times the top unit allowable?

A That is correct.

MR. SELINGER: I might clarify one additional point with respect to tank batteries. Will you indicate to the Examiner the four tank batteries that are on this lease and which wells go to the tank batteries so they can have that information? Start with the southwest of 34.

A In the southwest of 34, we have, I don't have the exact location of that battery; however, it is in the southwest 34.

MR. SELINGER: Which wells go into which tank battery?

A Wells Six, Ten and 15 go in that battery. Then we have another battery in the southeast of 33, which handles the production from Five, Eleven and Twelve. And in the northeast of Section 4, the battery handles production from Wells One, Two, Three, Four, 13 and 14. Then Number Seven has its own battery.

Q (By Mr. Nutter) Mr. Ramey, do you believe that the influence of the increased injection which you have had in the last year will be felt by the H. O. Sims lease belonging to Skelly?

A I believe it should be, yes.

Q What lease do you feel would be affected by those increased injection rates?

A Well, I think the Gulf Coast Western, Humble State H lease in the southeast of Section 34, and then the Humble State H lease in the northwest of Section 34, and possibly the Gulf Coast Western Glier lease, which is in the northeast of Section 33, north half of the northeast quarter in the northwest of the northeast quarter.

Q Who is the working interest owner in the northeast quarter of Section Three?

A Skelly.

Q Might that lease also be affected by increased injection in Well Number Eight?

A Yes, it could be.

Q So that any leases which may be affected by the increased injection of water are leases owned by operators who are engaged in this pilot project?

A That is correct.

Q Is this water injection project a cooperative type project in any manner?

A Yes, it is.

Q It is. Are the rates of injection in the various wells belonging to the different operators correlated with each other, or are they controlled by mutual agreement?

A They were originally set up to be controlled by mutual agreement. However, we had different dates of initial injection, that is reflected by Exhibit Number Five. On Skelley's two wells,

we started injection in August 1953; Humble followed in December of 1953; and Gulf Coast Western in June of 1954. We originally attempted to balance injection rates by holding ours back, but, however, it appeared that as we lowered injection rates, our partners also lowered injection rates, and then when we received the first indication of increased production, we more or less stepped out on our own to further prove this. I think the time element and the money involved justified this. I can give you those figures on total injection to date if you would like to have them.

Q Yes, sir, I sure would.

A On Skelly H. O. Sims Number Eight, this is up to June the First, 1958, 344,714 barrels; H. O. Sims Number Nine, 275,107; Humble State H, Number Seven, 195,986; Gulf Coast Western, Humble State H, Number One, 205,198.

Q Mr. Ramey, do you believe that water is being injected in these pilot wells in such a manner as to cause drainage across any of these property lines?

A I believe we have more or less balanced injection. In other words, where we are forcing oil from our Number Eight to the east, Gulf Coast Western is in turn forcing oil to the west. And the same applies between the Number Nine and Humble State H, Number Seven.

Q You feel that any drainage that is being caused is being compensated for by counter drainage?

A Yes.

Q Referring to your Exhibit Number Six where you first mentioned the various lenticular sand bodies which had varying degrees of permeability, now, the core data which is presented on the left side of the exhibit is taken from the Humble well, I believe you stated.

A Yes, the Humble State H, Number 7. They drilled an input well and cored a portion of that sand. They did a core from approximately 3570 to 367 or 8.

Q The log which is presented on the exterior portion of the exhibit is from your Sims Well Number Nine?

A No, that is also of the core analysis. That's the actual core.

Q I mean the electric log.

A Yes, that is of the H. O. Sims Number Nine. I might point out that is a shot hole and hence the neutron does not indicate true porosity.

Q Do you have any reason to believe that the permeability and porosity in Humble State Number 7 and your Number Nine are similar?

A I think to a certain degree. There will undoubtedly be different permeabilities within the well bores of these different wells, as is true in any well.

Q Do you have reason to believe that the condition that exists, as evidenced by the core analysis in the Humble well,

that is the lenticular bodies of sand which have variable permeability and porosity, do you have reason to believe that condition exists in your Sims Number Nine Well?

A Yes, I do. I think that existed all over the area when the wells were drilled in. You would have -- each zone would give up oil in differing amounts; cable tool drilling was used predominantly throughout that area; and you would have shows of oil in one zone, where the next zone was too impermeable to give up any free oil as the wells were drilled.

Q So that the evidence which the core analysis presents of varying permeabilities and porosities in the Humble well would apply to the Sims Number Nine Well, to such an extent so that you can testify that if you varied your rate of injection, you would have water going into various zones and not entering the others, is that right?

A I believe that to be true, yes. I will say that the sample log on this H. O. Sims Number Nine reflects essentially the same as the core analysis date indicated, insofar as the lithology is concerned.

Q Do you have the productive capacity of the 13 wells on your H. O. Sims lease at the present time?

A Yes, I have those.

Q Would you read those figures in the record, please?

A Well Number One, two barrels; Well Number Two, two barrels; Well Number Three, three barrels; Well Number Four, two barrels,

Well Number Five, three barrels; Well Number Six, 60 barrels; Well Number Seven, three barrels; Well Number Eight and Nine are injection wells; Well Number Ten, 15 barrels; Eleven, five barrels; Twelve, five barrels; Thirteen, three barrels; Fourteen, four barrels, and Fifteen, twelve barrels.

Q Those are the results of well tests taken on those wells?

A Yes.

Q What were the dates of those tests?

A It was at the last gas-oil ratio. I do not have that, whatever the last required gas-oil ratio was, I believe it was the early part of this year.

Q Do you have the well potentials, as of the most recent G-O. R. test period prior to that?

A I should correct your last question, Mr. Nutter. Those were not, I will say for all but Wells Six, Ten and Eleven, those were as of the gas-oil ratio tests which, I believe, were the earlier part of this year. However, six, ten and eleven, Well Number Six was tested June the 30th, and it produced 60 barrels, also on that same date, we tested Well Number Ten and it produced slightly in excess of 15 barrels, I don't have that, we call the production 15 barrels at this time, and Well Number Eleven was tested earlier in June and was making about five barrels. Those wells, I might point out that Wells Five, Twelve and Eleven, which go into the same battery, are pumped during five different periods of the day, so it is possible to get a production test every day so we can

accurately estimate just what the wells are producing.

Q How about Well Number 15 which is producing 12 barrels a day. Has that experienced any increase,or has it also maintained a relatively high rate?

A We had a little production increase. We recently cleaned that well out. I think it will probably fall down to probably in the neighborhood of four to five barrels.

Q So that it's 12 barrels a day as a result of a clean out rather than water injection?

A Yes, it has not responded to any water injection.

Q What was Well Number Six producing, say, four or five months ago?

A Well, let's take January of 1958, the well produced about 570 barrels for the month. It would be a little in excess of 18 barrels a day.

Q So from January it's gone from 18 to 60?

A Yes.

Q How about Well Number Ten, what was it producing in January?

A About 445 barrels, a little in excess of 14 barrels; however, if you will look at Exhibit Number Four, you will see that that was one of the peak periods. I would say the average was 400 barrels a month, or about 12 barrels a day.

Q So its kick is in the range of about three barrels a day then?

A Yes.

Q You included Well Number Eleven in the wells that had a response didn't you?

A I'll say this, it had during the last month, it has increased from three to five barrels. I don't think we have had sufficient production history; those wells will vary a small amount. I think a three to five barrel increase, I would not definitely say it is getting a response to our injection. However, we can tell more about that within the next few months.

Q Mr. Ramey, you mentioned that you anticipated that you would have approximately 20,000 barrels of secondary recovery?

A Yes.

Q Do you mean from each of the wells in this area?

A I mean from those wells which are completely closed by a five spot. That is what I anticipate for Well Number Six.

Q Its primary was approximately 120,000?

A No, its primary was 75,000, in excess of 75,000; however, I am including one-fourth of the primary of the four injection wells surrounding that.

Q I see. How soon do you think it will be before you have sufficient information on this pilot water flood to know whether you are going to expand it or not?

A Well, that will depend on the response of Well Number Six. I have calculated that we have recovered approximately 9,000 barrels of secondary oil to date. So we'll have to wait for future performance on our Well Number Six.

Q To what degree have wells offsetting the other pilot wells in this project been affected, Mr. Ramey? How about Gulf Coast Western's May Number Three Well?

A The May Number Three hasn't shown any response. As a matter of fact it has shown one-tenth of a barrel decrease. However, they had water break through to that well almost immediately after injection was started in their Humble State H, Number One. They have since gone in and squeezed off some of the formation above the Penrose and have decreased their water production considerably. I might point out that their T. O. May Number Two and Number Five, Number Two has increased from three to 12 barrels and their Number Five --

Q -- Which well was that?

A Their T. O. May Number Two.

Q That would be the well in the northeast of the northeast?

A Northeast of the northeast of Section 34.

Q It has gone from --

A -- Three to 12 barrels. Their Well Number Five, which I believe is also in the same quarter, has increased from five to 12 barrels. Those are production rates as they report them to us.

Q Has Humble State H, Number Six had any change in productivity?

A Not that we have been able to determine. Humble has shown a slight increase on their total lease over what they had when

injection was started. However, they don't show that any one well has increased appreciably. I don't think you could call it a concrete production increase.

Q How about Gulf Coast Western's State Number Two in the southeast of 34?

A They don't report any production increase on their Humble State H lease.

Q So in effect your Well Number Six is the only one that has shown any radical change in productivity to date?

A That's right; however, Well Number Ten, I think it is still increasing, although the increase is gradual. It seems to be more pronounced for the last three months. It's on an upward trend.

MR. NUTTER: Does anyone have any questions of Mr. Ramey?

MR. SELINGER: That's all we have.

MR. NUTTER: If not, he may be excused.

(Witness excused.)

MR. NUTTER: Does anyone have anything further they wish to offer in Case 354? We'll take the case under advisement.

STATE OF NEW MEXICO)
: SS
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission, Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and Notarial seal this 8th day of July, 1958.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:
June 19, 1959

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 354, heard by me on 7-2, 1958.

Examiner
New Mexico Oil Conservation Commission