BEFORE THE
OIL CONSERVATION COMMISSION
State of New Mexico
July 6, 1961

EXAMINER HEARING

Case 2334, 2335 and 2336 (Consolidated)

TRANSCRIPT OF HEARING

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OIL CONSERVATION COMMISSION
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EXAMINER HEARING

IN THE MATTER OF:

Application of General American Oil Company of Texas for an amendment of Order No. R-1970. Applicant, in the above-styled cause, seeks an amendment of Order No. R-1970 to add the following-described acreage in Eddy County, New Mexico, to the buffer zone established in paragraph (2) of said order:

SECTION 31, TOWNSHIP 17 SOUTH, RANGE 30 EAST
N/2 SW/4 SW/4
N/2 SW/4
W/2 SW/4 NE/4
NE/4 SW/4 NE/4
NW/4 SE/4 NE/4

Case 2334

Application of Ambassador Oil Corporation for an amendment of Order No. R-1971. Applicant, in the above-styled cause, seeks an amendment of Order No. R-1971 to add the following-described acreage in Eddy County, New Mexico, to the buffer zone established in paragraph (2) of said order:

SECTION 31, TOWNSHIP 17 SOUTH, RANGE 30 EAST
NW/4 NW/4 SE/4
S/2 NW/4

Case 2335

Application of Pair Oil Company for an amendment of Order No. R-1972. Applicant, in the above-styled cause, seeks an amendment of Order No. R-1972 to add the following-described acreage in Eddy County, New Mexico, to the buffer zone established in paragraph (2) of said order:

Case 2336

ILLEGIBLE

SECTION 36, TOWNSHIP 17 SOUTH, RANGE 29 EAST)
N/2 N/2 SE/4)

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BEFORE:

Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: We will call Cases Numbers 2334, 2335, and 2336.

MR. MORRIS: Application of General American Oil Company of Texas, Ambassador Oil Corporation, and Fair Oil Company for an amendment of Order Number R-1970, 1971 and 1972.

MR. CAMPBELL: Jack M. Campbell, Campbell and Russell, Roswell, New Mexico, appearing on behalf of the Applicants in each of these three cases. I would like to move that the three cases be consolidated for the purpose of Hearing.

MR. UTZ: Without objection, the three cases will be consolidated for the purpose of Hearing.

MR. CAMPBELL: I would also like to move that the records before the Commission in the three prior cases in which the original orders were involved be made a part of the record in this Hearing for the purpose of consideration by the Examiner and the Commission.

MR. UTZ: If there is no objection to the incorporation of the previous records in these three cases, it will be done.

Are there other appearances to be made in these cases?

You may proceed.

MR. CAMPBELL: Mr. Examiner, I have three witnesses to be sworn.

(Witnesses sworn.)

MR. CAMPBELL: I will call Mr. Westerman.

C A R L W E S T E R M A N, called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A Carl Westerman.

Q Where do you live, Mr. Westerman?

A Fort Worth, Texas.

Q By whom are you employed and in what capacity?

A General American Oil Corporation as Petroleum Engineer.

Q Would you state to the Examiner briefly your educational and professional background?

A I was graduated from the University of Oklahoma with a B. S. degree in Petroleum Engineering in August, 1958. Immediately subsequent to my graduation, I was employed by Ambassador Oil Corporation and worked in the capacity of a petroleum engineer for approximately two and a half years, after which time I left the employ of Ambassador Oil Corporation and became employed by General American Oil Company of Texas in approximately the same capacity.

Q Have you been working with General American Oil Company

of Texas in connection with water flooding of that company?

A Yes.

Q Are you acquainted with the proposed water flood project of that company in the northeast Local Hills area?

A I am.

Q As part of your study of that particular project, have you also acquainted yourself with the status of the water flood project now being conducted by the Newmont Oil Company to the south and east of General American's properties in that area?

A I have.

Q I refer you to what has been identified as Applicant's Exhibit 1 which appears on the left facing the Board. Will you step up there to that Exhibit, please. Referring to that Exhibit, will you show the Examiner the location of the General American properties that are involved in this application.

A The properties specifically involved are a portion of the southwest quarter of Section 31 and the northeast quarter of Section 31. A portion of these properties have already been ruled upon and we are now seeking the remainder of these leases. We have the 40 acres in Section 36. However, that 40 acres has been included under the original order.

Q And it is not covered in any request for amendment in the original order?

A That's right.

Q Will you point out on Exhibit 1, please, the location

of the wells on which you have data to present to the Commission concerning their production history?

A The wells generally are these, without specifically naming them, are these wells that are common to the lease line between the present water flood operation and the lease under which we hope to initiate flooding operations.

Q That is on the zone line of Section 31 Township 17 South, Range 30 East?

A That's correct, and also a portion of the southern boundary of Section 36 in Township 17 South, Range 29 East.

Q I hand you what has been identified Applicant's Exhibit Number 2 and ask you to state what that is.

A This is a reproduction of the producing curve on two of General American's oil wells and two of Newmont Oil Corporation producing wells in the immediate vicinity of the area just described. The curve on the lower portion of the graph represents the injection curves on the two Newmont injection wells which immediately offset this common lease line.

Q Does this Exhibit show that there has been a substantial response to the water flood insofar as the Newmont producing wells are concerned?

A Yes. These curves go down to the oil production curves which are the full curves which are located here on the graph paper. These Newmont wells have responded from less than one hundred barrels per month to over ten thousand barrels per month

in the case of the Ballard A 3, and approximately 6500 barrels per month in the case of the Ballard B 3.

Q And those wells are both offsetting the properties involved?

A One of them is a direct offset. The Ballard B No. 3 is a direct offset.

Q And that well is situated where?

A It's situated directly -- it's in the northwest quarter, northeast quarter of Section 6, Township 17 South, Range 30 East on General American Oil Company's State B No. 3, which is located approximately 666 feet from the north of this well.

Q Do you have any information concerning the injection rates which you are proposing be used in the injection wells offsetting these properties?

A These curves on the lower portion of this graph represent the water injection in barrels per day into the Newmont Oil Company's Ballard B 4 and 5 wells.

Q What is the approximate water injection rate in the Newmont flood as related to barrels per acre foot?

A One barrel per day per acre foot of sand enclosed. That varies throughout the area.

Q Now, based upon information that you have available concerning the Newmont flood, have you made any estimate of the present oil front moving from the Newmont properties to the north?

A Yes. Exhibit 1.

Q Would you step up to Exhibit 1 and point out to the Examiner what that Exhibit reflects in that regard?

A This Exhibit is a map, possibly a response map. I doubt you would be able to see at this distance. Next to these wells, around the lease line, is the date of the initial response to water injection. What I have done, I have connected these points in a manner analagous to any other type of contouring and I arrived at the flood movement, and, possibly at this time -- I mean, the area of oil movement, not necessarily the area of water movement, but the area of oil movement across the sand body.

This well responded in May --

Q When you say "this well" could you identify the well.

A The Ballard B 3, Newmont Oil Company, responded in May of 1960. General American's State B No. 3 responded in April of 1961. The General American's Beeson F No. 2 responded in January of 1961, and the General American Beeson No. F 3 responded in October of 1960, and the Ambassador Oil Corporation Federal M No. 1 responded in January of 1961.

Q Does it appear that the flood front or the oil bank has moved across the lease line and is now somewhere in the general vicinity of the dotted line, that hachured line that appears on Exhibit 1, is that correct?

A That is correct. The final hachured line was my interpretation of the approximate position of the lood front through the 1st of May, 1961. I have no data after that date.

Q This is based upon the date of response in the various wells involved?

A That is correct.

Q Referring you to --

A This shows the Ambassador well on the Federal M lease in the southwest quarter of the southeast quarter of Section 31.

Q Would you explain to the Examiner how you were able to exclude the possibility of that movement having -- not having come from the injection wells to the east rather than from the injection well to the southwest?

A This area around this well in question --

Q Which well?

A Ambassador Federal M 1 is served by two injection wells, the Newmont Yates A 2 and Yates A 11. Both of these wells were included in Newmont's original pattern. The response in this well and this well also have both been the result of injection into the sand body in this well, which is the Newmont Yates A 2 and then from Yates A No. 11, primarily for this reason: These two wells right here, the Ambassador Federal M 1 and the Yates A 3 of Newmont, responded during the same month -- I can't pin them down as to the date -- within the month, but they both responded, had their initial water flood response in January of '51. This produced the possibility that this well responded as a result of injection into this well. The fact that they found at the same time that the water from the well was going out in

some fashion, was going around this well and then coming in --

MR. UTZ: Around what well?

THE WITNESS: 4.

A Response from this well, Federal M 1 from Ambassador was found to have been from injections into the Yates A 11 of Newmont which would have required that the water, by some method, go out in this direction and --

Q Which direction?

A To the north, possibly then turn a rather sharp angle in and approach both Federal M 1 of Ambassador and Newmont Yates A 3 at a constant rate.

Q What about the injection wells shown on the Exhibit, is that a recent injection?

A It was converted during May of this year.

Q Referring to Exhibit 1 only and the work that you have done on that, what conclusions can you draw from your analyses of the situation as reflected in Applicant's Exhibit 1?

A The principal conclusion that I can draw -- well, there are several: The principal one, however, is that presence of the take point does not necessarily restrict the flow of oil through this reservoir. This is exhibited in several cases one of which is the injection into the Newmont Ballard B 5.

Q In Section 1?

A That's correct.

Q At 1830?

A That's right. The offset -- one of the offset producing wells, the Ballard B 3, in the same Section responded in May of 1960 and is located approximately 660 feet to the north of the General America State B 3 which had its initial water flood response approximately eleven months later, in April '61, which indicates that this well - I might add the Ballard B No. 3 is currently producing at the rate of in excess of 200 barrels per day. It does not seem to have had much of an effect in controling the flow of oil to the north and continues on to General American lease. It's impossible to say whether or not it has slowed down.

Q What other conclusions did you draw from this Exhibit?

A I can conclude that the flow of oil from these various injection wells, specifically where the wells do not have any degree of closure -- in other words, where they are outside injection wells -- in the original pilot area have not the flow of oil from this well bore but continues more or less radiant from the well bore and is not affected by these various take points through the reservoir at their take points which have been closed. The reason for this, I believe, is the fact that there is nothing that will form a pressure rating around these various take points for a considerable distance, the least being 660 feet as exhibited between our B 3 and Ballard B 3 of Newmont.

Q Do you have any other comments with regard to Applicant's Exhibit 1?

A No, sir.

Q I refer you now to what has been identified as Applicant's Exhibit No. 2 which appears in the center on the board. Will you explain to the Examiner the circumstances concerning the preparation of that Exhibit, how you prepared it and what it illustrates?

A This Exhibit is basically my interpretation of the final reservoir flow which would occur under the conditions of the previously established order. The yellow portion of the Exhibit represents that portion of the oil productive reservoir which will be swept by injection water. The green portion represents that portion of the production of oil sand which will not be swept by water injection. There are several diagonal lines. This one, the large hachured line toward the bottom of the colored area, is simply a tracing of this flood front as it was developed on Exhibit 1.

The other series of hachured lines which are somewhat more difficult to follow because they are -- most of them represent the flow of oil through the reservoir under injection into the various wells on General American's lease under the conditions which would be permissible under the previously established order.

Q Do your calculations include an estimate of the amount of oil which may be left in unswept areas under your interpretation of the effect of the previous order?

A Yes.

Q What do you conclude in that regard?

A My conclusion is based to a certain extent on the reservoir fill-up and calculations derived from the Newmont endeavor which indicates that oil into the magnitude of 380 barrels per acre foot will remain unrecoverable from the green areas on the Exhibit. The total -- I prepared this, Mr. Campbell, with the difference between these two Exhibits.

Q Explain to the Examiner how you arrived at the conclusion that these green areas will be unswept under the present order.

A Yes. Principally, we have -- this area under here --

Q Identify that for the record.

A We have this area described as the edge of the flood front as defined by Exhibit 1 which has a high degree of saturation, of oil saturation. It's proven by the production of the wells all along this south lease line, Section 31. Now, under the conditions of the existing order, when Ambassador would be able to inject at the equivalent rate into this well, right here --

Q Which well?

A Federal M 1 -- General American would possibly, could possibly inject into our Beeson F 2 well should we find a place to produce the oil and the rates would be somewhat less than -- considerably less than, I should say, that the rates on the property to the south and for the purpose of this Exhibit, this well will be at the rate equivalent to the rate Newmont is using,

in the neighborhood of one barrel of water injection per acre foot of sand enclosed.

These hachured lines which appear faintly about this color contact represent the flow of oil, the progressive flow of oil as a result of moving the flood front by injection into these various wells, and of course by additional injections into the Newmont Yates A No. 2. These hachured lines in the north portion of the southwest quarter, Section 31, represent the flow of oil away from the injection wells, Beeson No. 4 on the northern edge of that quarter section.

Basically, what I am theorizing is going to happen is this: Injection at a higher rate in this area.

Q In the zone area?

A The zone area of the southwest quarter will move the flood front quite rapidly to the north. At the same time, we will be injecting along the north edge of this lease at a considerably lower total rate, and of course that will have the effect of moving the flood front to the north from the south at a considerably less rate than their flood front would be expected to advance. We achieve hydraulic conditions under the reservoir somewhere in this general area. This illustration shows that by -- under this type of procedure, we would have moved a volume of oil past our Beeson F 12 -- for example, we have moved a considerable volume of oil past our Beeson F 3, and in all probability we would resaturate this entire area.

Q In the center of the southwest quarter, Section 31?

A Yes, that's correct. We would then have a hydralic state existing in here after which the various take points would become effective and the oil would begin to flow to them preferentially because at the time of establishing hydrulic communication through the various wells in the reservoir, we would effectively create pressure which is one of the governing factors in secondary operation.

After we have established a pressure sinks around these various wells, then basically we are going to flow through the shortest distance between two points, follow the line of greatest pressure drive which I have attempted to show in the various injection wells in the area. This would result in -- for example, in the case of the Beeson F 4, the majority of the water from that well would preferentially flow to the Ambassador Number 2, M No. 5, General American's Beeson No. 13 and General American's Beeson No. 12. I can visualize no flow from these wells at these rates going into the direction of Beeson 1 or F No. 3.

Q So that an engineering situation could occur in your judgment in the area to the northeast, in the northeast quarter of Section 31?

A It is more critical in this area. It may be of somewhat less significance, however, because this area is somewhat thinner. We are quite rapidly approaching the edge of the reservoir in this area. We have a situation here which is complicated under

the terms of the original order. Our Beeson F 6 was included in the buffer zone which would allow us to produce them. 6 and 7 were included in the original order which would allow us to produce them at the rate equivalent to the offset Newmont producer. Our F 14 and 15, however, which are locations that have yet to be drilled would not be included in that order.

Q Where are they located?

A They are located in the southwest quarter of the southwest quarter of the northeast quarter of Section 31, and the other, that is the Beeson F 14 and Beeson F 15 is at an irregular location which is near the center of the northeast quarter of Section 31 approximately 600 feet north of Beeson F 5.

Q As to the possible hydraulic effects of the present order with regard to the producing rates and injection rates, is it your opinion that the area shown in green will remain unswept and will not ultimately recover oil?

A That is correct, yes, sir. In the situation existing in the northeast quarter of Section 31, our total allowable under the previously established order for these two wells is 56 barrels per day. Our proposed Beeson F 15, located near the center of that northeast quarter is directly offset by two wells, that is Beeson F 11 and Newmont William G 2 which injections will be permitted at the rate equivalent to the remainder of the developed area.

The distance between the proposed Beeson F 15 and

Beeson F 11 is around 1200 feet. Both of these two injection wells will be permitted -- water injection will be permitted at the equivalent rate or maximum allowable. However, from Beeson F 15 under this order it will be 14 barrels per day. We have a total allowable in the unbuffered portion of our lease of 56 barrels.

We are faced here with a competitive situation with the offset operator to produce that well as much as we possibly can under the order and it would be 42 barrels per day which leaves us with 14 barrels per day in our Beeson F 15.

Q Do you believe that in addition to the potential allowable of the ultimate recovery reflected here a situation of that kind would adversely affect the correlative rights of General American?

A Yes, sir. It has been exhibited in the area covered by Exhibit 1 and specifically, the Newmont Brigham and Newmont's Ballard B 3. That oil will bypass this well even when we're producing in excess of 42 barrels per day and flow past that for a considerable distance. This cas has happened -- in this specific case in this instance between the injection into the Newmont Yates 2 and production at General American Beeson F 3 and Ambassador Federal M No. 1. There is very strong evidence that indicates that oil is flowing past our Beeson F 3 and producing into the Ambassador Federal M.

Q Would you refer to Exhibit 3.

MR. UTZ: Let's recess until 1:30, please.

(Noon recess taken.)

(Hearing reconvened at 1:30 p.m.)

MR. UTZ: The Hearing will come to order, please. You may proceed.

MR. CAMPBELL: Just before the luncheon recess, you had finished your testimony with regard to Applicant's Exhibit Number 2 which, as I recall, you indicated was your interpretation of the effect of the present order upon the sweep efficiency of closed water flood in the northeast part of the Local Hills field involved in this Hearing.

Q (By Mr. Campbell) Now, have you made any similar analysis with regard to the possible sweeping effect of the flood in that area, assuming that the application here for an amendment to the order is approved?

A Yes, I have.

Q Will you refer to Exhibit Number 4 and point out to the Examiner whether or not it was based upon the same approach and assumption and what the difference appears to be and what the reason is, in your opinion, for the obvious improved efficiency under the proposed order as amended.

A Exhibit 4 is a plat of the same area and it shows the path of flood movement through the road. Exhibit 4 shows the construction of the path of fluid as it flows through the reservoir which would occur should this amendment be accepted and

should we be permitted to inject an produce at rates that are equivalent to rates in the developed properties.

The injection into these south wells along the southwest quarter in the Ambassador Federal M 1 and General American Beeson F 2 would remain the same as in the previous Exhibits. The principal difference between the two Exhibits would be the injection of high rates into the wells in the northern extremity of specifically General American Beeson F 4, 16, 17 in the southwest quarter of Section 31 and Beeson No. 5, 11, in the northeast quarter, and also in this 11 well located on the common lease line, General American's Beeson lease and Ambassador F. L. lease which has been designated as American Federal M No. 5. The effect we have created here principally is the movement of the flood front to the north as a result of injection in the Newmont existing well and the well which will convert into a northerly direction across the lease.

At the same time, we'll be injecting a high rate in these wells along the northern sections, along the northern area of the quarter section, and we will move this flood front at a rate similar to the rate we moved the front up from the south.

The next overall effect will be that we will establish pressure communication between these two advanced flood fronts in a position which is approximately located near our take points in the area, specifically Beeson F 1, F 3, F 12. The same situation similar to that is existent on our Beeson F lease in

the northeast quarter where we will inject at equivalent rates into Beeson 5, 11 and Ambassador L 5.

Under operations of this sort, we will allow the establishment of a pressure differential around Beeson F 15 and consequently cause sweep of the productive sand into that well bore.

I have calculated the approximate difference in recovery between these two systems of operations.

Q Would you give these figures for the Examiner, please?

A In the southwest quarter of Section 31 the difference in recoveries between the method of operation shown in Exhibit 4 and as shown in Exhibit 3 is approximately 180,000 barrels.

Q If the present order remains in effect without amendment, is it your opinion that 180,000 barrels of oil will not be recovered?

A That is correct, yes.

Q What is the situation with regard to the other?

A In regard to the northeast quarter, that is similar. The area involved is somewhat less, however. The loss would be somewhat less, it would be approximately 120,000 barrels or an overall net loss to General American leases of approximately 300,000 barrels.

Q In addition to your estimate of loss of ultimate recovery of oil from the secondary recovery operations, is it your opinion that the order as amended, if the amendment is approved, would serve better to protect the correlative rights of General

American insofar as their leases are concerned?

A Very definitely, yes. The two most critical areas of correlative rights violation under the existing order would be in the case of Beeson F 13 and 14, both of which are proposed locations. In Exhibit 1, we have -- I have attempted to illustrate that oil will flow past those take points in the absence of a rather great pressure differential around these wells. In this situation, concerning Beeson F 13 and 14, we are offset directly by Ambassador Federal M No. 5. Federal M 5 is classified as being outside out of buffered zone and of course is subject to proration. However, Ambassador Federal M 2 and 4 are within the buffered portion and will be permitted to produce that equivalent rate.

The configuration of the injection around these wells, specifically Ambassador L 1, General American Beeson F 5, proposed Ambassador Federal M 6, and General American Beeson F 4 is basically a five spot pattern considering four injection wells and Ambassador M 5 as a simple producer.

I think that it's very possible that flow caused by injection into this well, Ambassador Federal L 1, could quite readily bypass Beeson 13 and 14, bypass also Ambassador Federal M 5 and be produced at Ambassador Federal 2 and 4. The magnitude of the situation is difficult to pinpoint. I feel, however, that the fact that bypass is presently occuring in other portions of this reservoir, it indicates that bypass could certainly be a

controlling factor in that portion of the reservoir.

Q Now, will you state for the record what is the total amount of additional acreage that the General American Oil Company of Texas is seeking to add to the buffer zone?

A I would have to add it up quickly.

Q Does 140 acres sound right?

A That sounds approximately correct, yes.

MR. CAMPBELL: That's all the questions I have at this time.

I move Applicant's Exhibits 1 through 4 be admitted into evidence.

MR. UTZ: Without objection, Applicant's Exhibits 1 through 4 will be entered into the record.

Are there any questions of the witness?

MR. NUTTER: Yes.

CROSS EXAMINATION

BY MR. NUTTER:

Q In drawing this flower petal design on Exhibits 3 and 4, did you take into consideration the thinning of the sand to the north?

A Yes, I did as well as able. Injection into Ambassador Federal L 5 -- until we established filler in this case up here, I have assumed something other than radial flow, generally a fanning effect of water, more along the reservoir boundary.

Q From the injection well in the southeast of the north-

west of Section 31, number 5 injection well?

A That is correct.

Q You have assumed the fanning effect of the water as it reaches impermeability to the north?

A It's difficult to pinpoint that effect because of the poor definition of the reservoir requirement. We feel this is the edge of the reservoir, but we have one dry hole and that's all; but I have tried to take that into consideration. Also, I have taken that into consideration around Ambassador Federal M 1 which will be an injection well and the sand there is relatively thin. As far as the remainder of this lease is concerned, we have in effect a situation which is pretty close to being a blanket of sand under that quarter section. It thins somewhat to the north of the southwest quarter, but generally it is uniformly thick around twenty feet, plus or minus a few feet.

Q You confine your prediction more or less General American with the exception of in the northwest quarter of the southeast quarter where Ambassador Federal M lease is shown?

A That's correct.

Q You haven't made any prediction in the Ambassador Federal L lease in the northwest quarter?

A No, sir.

Q In drawing these designs both on Exhibits 3 and on Number 4, do you assume that injection wells would have a constant rate of injection throughout the life of the project?

A No. As far as the rate goes, it's extremely difficult to forecast the rate that we are going to be able to use in this northern area, the area that is presently not included in the buffer zone. The rates I have assumed in these southern areas where we are under buffered conditions, I have assumed rates equivalent to Newmont's present injection rate. I ran into this problem: In Exhibit 3, in trying to come upon rates that were low enough to establish a balance of lood withdrawals, it became difficult to foresee rates here in the northern wells of the southwest quarter that would be low enough to permit these wells to produce up here and not exceed their allowables. So far as any specific rates drawn up there, I have not used specific rates. I have just said the rates there will be considerably less than it will be as opposed to --

Q I understand that you did not assume any given rates, but you did assume a constant rate for a given well?

A Yes.

Q Now, the adjustment of injection rates in a given well, at different times throughout the life of the project might tend to alter the shape of the flower petal design on your Exhibit, would it not?

A After we have established hydraulic communication, I think that would be true. The Newmont has varied the rates on their injection wells over the past six or eight months and it has not seemed to have had great effect on the producers over

which we have control. I can't speak for Newmont, of course, but our wells have responded somewhat similarly. We are faced with a problem up here in the north because -- in the north of the southwest quarter -- in that the ideal situation would be to inject the relatively somewhat higher margins during fill-up periods and then possibly attempt to buffer by lowering those rates. However, we are not looking at regular locations. It's going to take a greater volume of injection into these wells.

Q On account of the thinning?

A Because of the thinning sand and also because of the distance involved between the injections and --

Q And decrease in porosity, perhaps?

A That is the reservoir's characteristics. These are things that I can't speak too intelligently of. We have one core in the field, one gamma ray log which, obviously, they are to be desired when trying to predict the pay quality throughout the various portions of the reservoir.

Q Do you have statistics on the amount of saturation present?

A We have that one core, yes, sir.

Q Is that what you mentioned in your direct examination, 380 barrels per acre foot?

A Using those figures from that one core.

Q Is that the present residual saturation in the formation?

A Yes, sir. It was residual saturation at the time of the drilling of that well which was some several years ago. I would say that it is residual saturation of the virgin reservoir prior to commencement of secondary operations. The saturation varied somewhat due to the advance of the flood front northward from Newmont property.

Q What is the actual difference in acre feet that you have in the green area on Exhibit 3 as opposed to Exhibit 4?

A In the green area in the southwest quarter of this Exhibit 3 I have 1084 acre feet as opposed to 614, I believe, acre feet in the same quarter section on Exhibit 4.

Q That is a difference of four hundred some eighty feet?

A That's correct. That is residual saturation of 48% from core analysis. I have also arrived at that, Mr. Nutter, by the injection and production history under portions of the Newmont floods specifically around their Ballard B 5 and I have taken volume of water injected into the Ballard B 5 to the date when response was first noted in the offset producing wells, Ballard A 3, B 3, Yates A 1 and calculated the acre footage within this area enclosed by the three previous mentioned wells.

There is also an injection well, Yates No. 2. The volume of water injected into this well at response was 264,000 barrels. I have added 25% of the water injected into Yates No. 2 at that date which was May, 1960, divided it by the number of acre feet enclosed as previously stated and it came out to be

300 barrels per acre foot. That's the reservoir fill-up volume. In this particular case of the Exhibits, the green area will be largely filled with that volume of fluid as that volume will be principally oil.

Q Now, your original core date, that was 43% of saturation with oil?

A Yes.

Q That was prior to the time of depletion?

A No, sir, that was -- this was in about 1956 or '57. The well was -- I don't know the exact date of the drilling of the well -- it was presented in the original testimony, however, and should be part of the record, but that was after the field was very near its economic limit. The production in the field has not at the time of the drilling of that well -- the deepening of that well, I should say, was significantly greater than it is at the present time.

Q Which well was that?

A I have to look in the previous testimony to recall offhand.

Q Was it in this immediate area?

A It was one of the Beeson wells.

MR. CAMPBELL: B 12 -- I'm not sure.

A State A No. 1 located in Section 36 in the southeast quarter of the southeast quarter.

Q (By Mr. Nutter) That is the only well in which core

data is available?

A Yes.

Q And this core was taken when the well was deepened in '56?

A When it was drilled. I don't have the date. I don't have the date of drilling of that well, Mr. Nutter.

Q Has that well produced oil since?

A Two or three barrels per day.

Q You don't know what the total production has been?

A No, sir. I can tell you the total production from the tract. The total production from that tract was 128,000 barrels.

Q And the figures 380 barrels per acre foot is also from that core?

A It's from that core also. It was substantiated by calculating the fill-up volume around this well. The fill-up volume that I have gotten around that well was 300 barrels per acre foot which ties in quite well with the primary production under our Beeson F lease.

Referring to the figure of 300 -- the figure 382, I have attributed 80 barrels loss due to not sweeping the area by water, 80 barrels of which would normally be secondary oil which is about 30 to 40% of the oil that Newmont expects to recover in their flood. Basically, I used the low figure there because I felt it might be better to be on the low side rather than on the high side.

Q But it's your belief at this time that the saturation commencement of water flood operations in this area is 380 barrels per acre foot?

A Would you repeat the statement?

Q Is it your belief that oil saturation remaining in this area, in Section 31, at the commencement of water flood operations is 380 barrels per acre foot?

A No. It's my contention that the oil left in this green area on both Exhibits after the cessation of water flood operation would be 380 barrels.

Q That wouldn't be swept, so that must be the oil present in the entire area.

A Moved out of this area into this area, plus the oil that was originally recoverable, oil that was originally in place in the unswept areas.

MR. NUTTER: Thank you.

MR. UTZ: Are there any other questions of the witness? The witness may be exucsed.

(Witness excused.)

MR. CAMPBELL: We will call Mr. Riley.

M I K E R I L E Y, called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please.

A Mike Riley.

Q Where do you live, Mr. Riley?

A Fort Worth, Texas.

Q By whom are you employed and in what capacity?

A Ambassador Oil Corporation. I am employed as Superintendent of the Secondary Recovery Division.

Q Have you testified previously before this Commission or Examiners in your professional capacity?

A Yes, I have.

MR. CAMPBELL: Are the witness' qualifications acceptable?

MR. UTZ: Yes, they are. You may proceed.

Q (By Mr. Campbell) Mr. Riley, are you acquainted with the original order which was issued in connection with the application of General American Oil Company and Ambassador Oil Corporation and Fair Oil Company in the Local Hills area?

A I am.

Q Are you acquainted with the application now pending before the Commission for amendments to those orders?

A Yes.

Q Have you made some calculations with regard to the effect of the order on the water flood potential in the northeast area of the Local Hills Pool?

A Yes, I have.

Q I refer you to what has been identified as Applicant's

Exhibit 5 and ask you to step up to the wall there and explain to the Examiner what you have done and where you can -- let me ask you this first: Was your work done independently of the work done by Mr. Westerman who just testified for General American?

A Yes.

Q You have seen his Exhibits, have you not?

A Yes.

Q You have heard his testimony?

A I have.

Q In connection with them?

A Yes.

Q Will you go ahead and explain what you have done and how it is depicted on Exhibit 4 and show any comparative basis or comparison between the two analyses that have been made there, please.

A Mr. Campbell, I refer to -- I think Exhibit 6. I would like to preface my remarks about Exhibit Number 5 by saying that Exhibit 6 depicts the Local sand on the conventional isopac map of the Local Hills sand in the northeast part of the Local Hills field. This map was prepared from a driller sample log on the U. S. G. S. record. You will note that it deviates somewhat from the isopacus map presented by General American in the previous Hearing in that the zero line -- that is, the extent of the cross-section of the Local Hills sand traversed toward, wandered slightly into the northeast quarter of Section 31, Township 17

South, Range 30 East; then traversed back to the north along the northern boundary of Section 31 and then traversed diagonally across the northern one-third of the northwest quarter of Section 31, Township 17 South, Range 30 East.

The control point utilized in constructing this map consists of a dry hole, General American's Beeson F lease, in the northeast quarter of Section 31, Well No. 10 and also it indicated a dry hole of Fair Oil Company's State B No. 5. The information that we studied indicated that that would have been an oil producer if a string of cable tools had not been lost in it during -- when being worked. There is 35 feet of net pay -- gross pay, excuse me, in that well. Utilizing the gross isopacus map exhibited on Exhibit 6, we have constructed and calculated some very interesting information that is exhibited on Exhibit 5.

For the benefit of calculations, we have assumed that the net figure of the section is 80% of the gross sand section. We noted with interest that following the assumption and subsequent calculation that several wells indicate that that was a very valid ratio.

Calculating the injection well up to the point of well interference or response, we have calculated concentric rings that showed the water-oil contact at progressive times emanating from those injection wells. On the map that is calculated in this manner: The inter-ring of the red concentric circle is dated 9-1-60, the date of response in General American's Beeson

F No. 3 well. We calculated the volumetric water-oil contact using radial flow. Again, as to the date, that is theoretical. However, that date is 9-1-61 which we have used for the benefit of proper presentation, the possible date General American first commenced a water injection program in the subject area.

Progressively outward from that ring, we have calculated the approximate front of the water-oil contact -- 4-1-62, which is the outer ring of the yellow circle, 4-1-62, which is the outer ring of the green circle and 4-1-63 which is the outer ring of the grey circle.

Those dates have this significance: 4-1-62 is six months from 9-1-61 and gives us a convenient standardizing time limit. 10-1-62 then is another progressive six months and 4-1-63 is the approximate time that several of the wells will experience entrance of water-oil contact, some of these wells being Ambassador Federal M 3, M 2, and M 4. The other being General American's Beeson Federal 3, Beeson Federal F 14, and Beeson Federal F No. 3.

We have one other depiction on this Exhibit, that being the time calculated that the water-oil contact would approach General American Beeson F No. 12 and No. 1. On that basis, we see a very interesting development: That the area in hachured lines which consists of a thin elongated section across the west central section of the southwest quarter of Section 31 has not been swept by water-oil contact or by water. We know that

this amount of oil contained in this section will be unrecovered because of the fact that once the water front passes a producing well such General American's Beeson F 1, preferential permeability to water is so high that it cannot economically produce enough fluid out of the well to cause the oil front to continue to move from the opposite direction wherein the permeability to water is much lower.

All three injection wells were expanded or projected on the basis of present injection rates. All wells that are in the subject area or proposed injection wells were calculated on the basis of one barrel per day per acre foot, which on inspection, you'll find that the present injection wells are also experiencing an average one barrel per day per acre foot. Therefore, we feel that our use of 80% ratio factor of a net figure of sand to gross sand is valid. The amount of oil contained in the Section that is unswept along the west central sector of the southwest quarter of Section 31, on the basis of our calculations, we have used 170 barrels per acre foot as an average factor.

The entire reservoir is 159,000 barrels. You can see from this type of depiction that there is a considerable amount of oil that will be lost due to injection water not sweeping across that section. This varies somewhat from the previous testimony in that we have used a different net effective section, I think you'll find, but we do not think it contradicts the pre-

vious testimony.

Q What type of comparison did you make between the previous testimony with regard to the present position of the flood front? Yours is based upon the water-contact rather than oil front?

A That is correct.

Q Are they pretty close in that regard?

A We have prepared an overlay similar to the one presented in Exhibit 1 of General American's presentation. That has a small line rather faint, I suppose, to the audience, which would be the present oil bank front approximately along the north of General American's State B 3, the General American's Beeson F No. 2, No. 3, north of the Ambassador Federal N No. 1, and somewhere north, prior to the conversion of the Newmont Brigham C 1 and No. 3.

Q Now, Mr. Riley, you have made application for the addition of 90 acres to the area provided for in the order fixing Ambassador Oil Corporation's property to the so-called upper zone presently provided for in the Commission orders, have you not?

A Yes, I have.

Q Will you explain why you feel that it is essential that you have that additional area in order to obtain the greatest ultimate recovery of oil and in order to protect correlative rights.

A Assuming that the Commission will grant our request at

this hearing so as to allow equivalent rates of production in wells outside of the present buffered area which will lead to the injection of water into the wells along the center of Section 31 and then along the north boundary of General American's State B lease and the Newmont State A lease at rates equivalent to the rates being used by the operations under Newmont's, we feel that the consequence of that will be an oil bank built up and a rate of advance to the north of that, the same as presently existing along the north of the south line, Section 31 and 36. That is fairly well proven.

We feel that it's not reasonable to assume that the same thing will occur in the northwest quarter, Section 31, on our Federal L lease, and if such does occur and we are not allowed to produce the well at equivalent rates or as fast as the fluids enter the well bore, there will be no way for us to prudently interpret how fast or how much oil may be moving by those wells into the area of the reservoir north of these wells, and as such, we could either resaturate and certainly lose any oil that's pushed back into that area -- what we would propose is to allow the buffer zone to exist along the center of the northwest quarter of Section 31 such that we can produce these wells as fast as the oil enters the well bore and make an orderly and timely prudent decision to drill an injection well somewhere in the northwest, to the northwest of Section 31 and commence injection of water into it so as to give back-up to these wells

that do not have back-up at the present time and recover as much oil as we can and not allow it to migrate into the undrilled section to the north of these wells.

Q Have you made any calculations as to the estimate, the amount of additional oil you believe might be recovered from your lease or from the area that you depict there under the rule, order as amended as compared to the present order?

A Yes, I have. Assuming the same secondary recovery figure as given, 170 barrels per acre foot, we calculated that we'll recover under the rules as they presently exist, 64,100 barrels from the Ambassador Federal 1, 2, 3 and 4; and utilizing an experience factor that's empirical but field tested in that well that has a two-way or three-way push can lose up to 50% of oil in a given five spot pattern. You can see if we were allowed to produce these wells under the same equivalent rules as opposed to those opposed, we could produce an additional 64,100 barrels.

Q You believe that the oil or most of it will be ultimately recovered by secondary recovery?

A That, or more.

Q Do you have any other comments with regard to Exhibit 5 or 6?

A I don't believe I do.

Q Would you say that you're in general agreement with the testimony presented by General American Oil Company as to the unswept area of the reservoir under the present order?

A I think we might say we are in almost exact agreement.

MR. CAMPBELL: I would like to offer Applicant's Exhibit 5 and 6 in evidence.

MR. UTZ: Without objection, Applicant's Exhibits 5 and 6 will be entered into the record.

MR. CAMPBELL: That's all I have at this time.

MR. UTZ: Are there any other questions of Mr. Riley?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Riley, in drawing these circles, you didn't give any consideration to thinning of the sand to the north, did you?

A Yes, we did, Mr. Nutter.

Q How did you come up with a radial flow upward from an injection well?

A Well, as I said earlier, we have assumed a radial flow up to the point of into -- well interference and/or oil producer response. Realizing that it might not be exact radial flow, but it approximates beyond that point, we know it definitely does not continue radial flow, but we have presented it as radial flow to facilitate presentation.

Q In other words, the consideration you gave in mentioning the sand to the north was based on a one barrel per day per acre foot?

A Yes.

Q Now, this hachured area that is based on 1165, is that

correct?

A That's the unswept area at 1165 date as calculated on the basis which I have stated on which calculations were made.

Q Which is the status of the field regardless of whether or not it is under the amendment which you propose, is that correct?

A This is the status that will exist if we are granted our request at this time.

Q You indicated 159,000 barrels. What is that?

A Utilizing 170 barrels per acre foot secondary recovery and the area contained in the hachured area in the southwest quarter, Section 31, that is calculated to be that 159,000 barrels.

Q Does that mean enough acre feet to multiply by 170 to come out to 159,000?

A That's correct. The area is essentially twenty feet thick.

Q Would drilling a well help the recovery in that area?

A No, due to the configuration of this area. If you drill a well in the central section of that hachured area, the water from the General American Beeson F 16 and Beeson F 2 would pinch out that well soon after 1165, as you can see. You can't go indiscriminately drilling wells in various areas because you soon reach loss column.

Q How about an injection well in that area?

A I do not think an injection well can be set into that

area and maintain equity that's been set up for the overall pattern of the northwest.

Q It would pay out with oil if you could get it up?

A It would, yes. You will see if an injection well were placed in that hachured area, it would be inequitable as far as oil off General American Beeson 1 in the southwest quarter of Section 31 or to Fair's acreage which would be the south half of the northeast quarter and the north half of the southeast quarter of Section 36.

Q You would not rely on General American's Beeson No. 1 to intercept the oil?

A Only a portion. I don't think the take point is going to alter the overall front for the same reasons as stated by the General American witness.

Q Now, solely upon the basis upon which you estimated a difference in oil recovery under the existing rule and the proposed amendments that you expect to recover 64,100 barrels from your Federal No. 2, 3 and 4, and that you stated that the well which is not backed up on two or three sides may lose 50% of recovery.

A That's correct. However, if I understood you correctly, I have not calculated the difference in production. I have just calculated the production that would result from the conditions that I have used to calculate the map.

Q And you expect 2, 3, and 4 to make 64,000, is that cor-

rect?

A On the basis of the calculations, yes.

Q Have you given consideration to the drilling of this injection well to saturate the sand in the north area prior to any flooding operations from the south?

A We have not because of this reason: At the time that the Ambassador Federal L 2, 3, 4 were drilled, the Local Hills sand was essentially depleted, and only the Federal L 2 was completed in the Local Hill. It was later deepened to the Premier. The Ambassador Federal L 3 and 4 were never completed in the Local Hills sand because at that time the more prolific Premier underlying the Local Hills sand was being developed.

Q What are they producing from at the present time?

A From the Premier at this time.

Q They will be completed in the Local Hills as they are put on projection?

A Yes.

MR. NUTTER: Thank you.

MR. UTZ: Are there any other questions?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Riley, referring to your hachured area in Section 31, southwest quarter, Mr. Nutter mentioned an injection well which your answer was that it disturbed the rights and oil of the General American lease on to the Fair lease. Would an injection

well reduce injection rates?

A I do not think it would. I think it would probably distort the problem even worse. Referring to Exhibit 5, to the hachured area, the southwest portion of 31, an injection well placed in there would tend radially up to the point of interwell interference and as the well responds northward would be to an area which has no producer, no take point, and you would likely only distort the hachured area or unswept area to the north and you can't afford to chase that oil too long if you're going to make money at it.

Q What was your answer to producing wells?

A I can't speak for General American, but I would have to place the producing well at that location and do calculating before I could be able to answer your question on a producing well.

Q It would seem as though an additional producing well could recover at least some of it?

A Well, it wouldn't to me presently looking at it because of the fact that the southeast quarter is injected into the General American Beeson F 16. It would extend this front right across radially southwestward from that well and a well drilled in the area that you have your question posed on would only recover the oil that is immediately around the well. It would not interrupt that oil front other than very locally around the well bore and so you have no appreciable sink around the well unless

you have -- I think the previous witness testified and termed it hydraulic communication -- and when the term hydraulic communication was created I think it would have already been damaged to the extent you wouldn't recover any appreciable amount of oil.

Q Mr. Riley, your testimony has been pointed toward loss of oil by reducing your injection rates in a buffer zone area adjacent to capacity flood. Now, is that peculiar to this area or do you think this would happen to all areas?

A I think it would happen in almost any area but it is peculiar to this area because of the limited extent of the reservoir in the Local Hills area due to configuration of the lease ownership and the fact that we are unable to unitize the area.

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

(Witness excused.

MR. CAMPBELL: We will call Mr. Richard L. Ray.

R I C H A R D L. R A Y, called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q State your name, please.

A Richard L. Ray.

Q Where do you live, Mr. Ray?

A Tyler, Texas.

Q By whom are you employed and in what capacity?

A Fair Oil Company as Vice President and Superintendent of Oil Operations.

Q You have testified previously before an Examiner for this Commission?

A I have.

Q Do you do secondary recovery work for your company?

A I am in charge of about ten secondary recovery projects that we operate.

Q You are acquainted with the order now in existence with regard to the Fair Oil Company properties in the northeast Local Hills area?

A I am.

Q What do you seek to have added to the area that has been designated as a buffer zone?

A 40 acres which would be the north half of the north half of the southeast quarter, Section 36, Township 17 South, 29 East.

Q Will you state for the Examiner the reason that you have asked that that be included in the area?

A Yes, sir. It's our feeling that considerable volumes of oil will be lost if we operate under the terms of the present order. It would be very difficult for us to justify drilling additional wells either injection wells or producing wells. Now, there is a possibility -- in fact, I would in my estimation say that there is a possibility since our wells are both located very

near to injection wells just about 660 feet away -- that there is a great likelihood that there will be movement to the north. As we stated in the first Hearing, we would plan, and it's justified economically, to drill additional wells to the north it would be very difficult to justify drilling these wells on a small increase in allowable. We, of course, stand the possibility of oil moving into our wells, particularly -- I'd like to point out the fact that we do have a situation in the southeast corner of our lease where the best well spacing that we could work out left three producing wells to produce the oil and to endeavor to project lease line equity.

If some of these wells can produce as high rates then others, certainly you're going to distort your flood and reduce oil as well as have loss to some lease owners, and some royalty, the property rights might be jeopardized.

Particularly, we feel like there is a good possibility of water moving rapidly into our producing wells in which case we would want and need to drill either injection wells or producing wells on this additional acreage of ours. Under the present rules, it will be very difficult for us to justify this drilling.

Q Do you have anything further you wish to add?

A I would like to state that we have not presented Exhibits since our analysis of the area is essentially the same as General American's and Ambassador's.

Q You believe that if the amendments sought in the present applications are approved, granted by the Commission, that there will be a great ultimate recovery of oil from this area than provided for under the present order?

A We acknowledge that that spacing pattern is not perfect. However, it is the best that we could arrive at under the cooperative form of operation and with buffer zones allowable the three companies have asked for. We do feel like that the maximum quantity of oil can be produced and correlative rights would be protected.

MR. CAMPBELL: That's all the questions I have, Mr. Examiner.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Riley, what was the area that you seek to have this buffer zone expanded?

A The north half of the north half of the southeast quarter of Section 36. The existing order gives us the south half of the north half of the southeast quarter. We leased both of our wells in the buffer zone which would give us capacity allowables, buffer zone allowables, but the thing that concerns us is the likelihood or possibility of these wells watering out and not being able to justify additional development in the area. In that event, substantial quantities of oil would be lost.

The lease has produced 180,000 barrels from primary.

We feel like that it should from secondary, and as to whether or not we would lose 25%, 30% or 50%, it would depend on the unknown factor that we cannot foresee at this time.

MR. UTZ: Are there any other questions of the witness?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Ray, you said that the small amount of allowable that you would have would not justify drilling injection wells or producing wells. You wouldn't get any allowable in your injection under the expansion of the area as you propose, would you?

A Well, if we drilled a producing well.

Q I said injection well.

A No.

Q If you drilled an injection well that would avoid waste but it wouldn't result in any decrease, increased allowable?

A We wouldn't protect the property lines in case we drilled an injection up in this area here because, you see, we're faced with a problem here in this area here of common take point.

Q To the southeast?

A Which is in the vicinity of our State 1, General American Beeson No. 1, General American State 1 A. This is not an ideal situation so far as secondary operations are concerned and yet, in order to protect correlative rights, this was the best solution that we could come up with. We are all faced with the fact that we can justify drilling only so many wells for recovery

and we figured our lease would justify one and a half wells.

Under the present plan, we are drilling one and one-third wells, so we're crowding the economic limit of the drilling that we can do unless subsequent development indicates that we have better sand conditions, that the sand on our lease is better than we know of at the present time.

Q So that sand and not the allowable will make the determination of whether you drill another well?

A No, sand would make the determination as to whether we drill an additional injection well.

MR. NUTTER: I see.

I believe that's all; thank you.

MR. UTZ: Are there any other questions?

The witness may be excused.

(Witness excused.)

MR. CAMPBELL: That's all the testimony we have, Mr. Examiner.

MR. UTZ: Are there any further questions in this case?

MR. CAMPBELL: I think there may be a couple of statements, here.

MR. LEDBETTER: I am Herman Ledbetter and I'd like to make a statement on behalf of Newmont Oil Company.

Newmond Oil Company operates a one flood to the south of this area which has proven to be successful, and we are pretty directly concerned about this application in that we need co-

operation along our north lease line.

As you can surmise from the testimony given, the problem is becoming very acute and we have done just about all we know to do to protect ourselves and yet there is no doubt that our correlative rights are going to be adversely affected if a water flood is started in the near future to the north, and of course, we feel that an imbalance situation has already occurred along our line and that we'd like to see this situation resolved where some program could be carried out in cooperation with each other.

MR. UTZ: You feel you need some back-up wells in the north?

MR. LEDBETTER: We need them very badly right now, to put it mildly.

MR. UTZ: Thank you very much.

Are there any other statements?

MR. ASTON: I am Roger Aston of Franklin, Aston and Fair, Inc.; Mr. Ledbetter's statement I second. We would like to support the request for an amendment that has been submitted here.

We are the owners of the leases in question that are being flooded by the Newmont property. We have retained oil payments under this acreage and we feel that a movement of oil from the property is certainly affecting correlative rights. We feel that back-up wells to close the withdrawal points are an

absolute must and we strongly urge favorable consideration by the Commission.

MR. UTZ: Thank you.

Are there any other statements?

Is there anything further in these cases?

MR. CAMPBELL: That's all I have.

MR. UTZ: The Hearing is adjourned.

CERTIFICATE

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, THOMAS F. HORNE, 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 in Stenotype and reduced to typewritten transcript under my personal supervision, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal, this, the 11th day of July, 1961, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Thomas F. Horne
NOTARY PUBLIC

My commission expires:

May 4, 1965

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2334, 35, 36 heard by me on July 6, 1961.

Examiner
New Mexico Oil Conservation Commission