

EXAMINER HEARING

CASE NO. 5505

A P P E A R A N C E S

Clarence Hinkle, Esq.
HINKLE, BONDURANT, COX
& EATON
Hinkle Building
Roswell, New Mexico

I N D E X

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CHRISTIANSON-DIRECT

MR. NUTTER: Case 5505.

MR. CARR: Case 5505. Application of the Atlantic Richfield Company for pressure maintenance project expansion, Eddy County, New Mexico.

MR. HINKLE: Clarence Hinkle of Hinkle, Bondurant, Cox and Eaton. We have one witness that we would like to have sworn.

(Witness sworn)

S. HUGH CHRISTIANSON

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, residence and by whom you are employed?

A Hugh Christianson. I reside in Midland, Texas. I am employed by the Atlantic Richfield Company.

Q What is your position with the Company?

A I am an area engineer in Midland.

Q You have previously testified before the Commission a number of times and qualified as a petroleum engineer?

A Yes, sir, I have.

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Q And you have been a witness in several cases that have involved the Empire-Abo Unit, have you not?

A Yes, sir.

Q In pressure maintenance?

A Yes, sir.

Q Have you prepared or has there been prepared under your direction certain exhibits in this case?

A Yes, sir, there have been.

Q Do you have the ones that have been marked 1 through 6?

A That is correct.

MR. NUTTER: For the record, Mr. Hinkle, let me interrupt for one second. When we prepared the legal notice for this, we actually made a slight error here. We said, "Applicant further seeks an increase in the base allowable project from 40,555 to 41,041 barrels per day. This is not the base allowable. This is the maximum allowable. I think the base allowable is something like 33,000 barrels.

THE WITNESS: Yes, that's right, and as you will find when we get into testimony, we are going to ask for the base also, a slight increase there, simply based on the increased project area.

MR. NUTTER: But the notice here saying the base allowable would be 41,000 is in error?

THE WITNESS: That is correct. I don't believe we had that in our Application.

MR. NUTTER: Go ahead, Mr. Hinkle.

BY MR. HINKLE:

Q Since you last appeared in connection with the pressure maintenance project, have you continued to make a study of the project?

A Yes, sir, I have.

MR. HINKLE: Are his qualifications sufficient?

MR. NUTTER: Yes, they are.

BY MR. HINKLE:

Q Explain briefly what Atlantic Richfield is seeking in this case?

A Atlantic Richfield seeks to increase the size of the unit project area by 120.03 acres which would result in a new area size of 10,814.44 acres in the unitized project area. We also seek an increase in the maximum project allowable from the 40,555 barrels of oil per day granted in Order R-4549-B to 41,041 barrels of oil per day, or an increase of 486 barrels of oil per day.

Q Have you continued to make studies of the areas

since the last hearing?

A Yes, I sure have.

Q Have you completed those studies, and what are the results?

A Well, they continue to show that the unitized area is performing very much as our predictions made in earlier testimony or testified to in earlier hearings, I should say.

Q Now, refer to Exhibit 1 and explain what this is and what it shows?

A Exhibit 1 is a map of the entire Empire-Abo Unit area. It is a similar map to the one the Commission has seen before. The heavy dashed blue lines is the outline of the entire area approved for potential unitization by the U.S.G.S., the State Land Commission and the N.M.O.C.C. at the original hearing. The white tracts or uncolored tracts if you want to call them that are those tracts which are in the present unitized project area of the Arco-Empire-Abo Unit at this time.

Q They are committed to the unit?

A They are committed to the Arco-Empire-Abo Unit at this time. Those red tracts in the northwest portion of the area, that is, Tracts Nos. 2, 6, 42 and 46 comprise

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Sitco-Empire-Abo Unit area which has been unitized and plans are underway at this time, as I understand, to inject gas into a gas injection well that has been recently completed there. The other red colored tracts are those tracts which continue to remain outside the -- any unit area at this time. The three green colored tracts are the tracts that are the subject of this hearing today. On these three tracts Arco has submitted to the remainder of the unit owners in the unit, the request made by the operators of these green tracts that they be admitted to Arco-Empire-Abo Unit.

I might identify these tracts a little bit more carefully. That is, Tract 41 on Exhibit 1 is your unit designation I-32, and it comprises 40.03 acres. It is Lot 1 of the northeast quarter northeast quarter Section 4, Township 18 South, Range 28 East. Tract 79 is unit designated D-34, and it is the southeast quarter of the southwest quarter of Section 27, Township 17 South, Range 28 East and it comprises 40.00 acres. Tract 84 is unit designation J-26, and it is the southeast quarter of the northwest quarter, Section 5, Township 18 South, Range 28 East, and it contains 40.00 acres for the total added acreage of 120.03 acres that we are proposing to be included

in the new expanded area.

I might add that the State owns the full royalty on all three of these State tracts. They are all three State tracts.

Q Now refer to Exhibit 2 and explain what this is and what it shows?

A Exhibit 2 is a table which illustrates the Empire-Abo Pool total-daily-oil-production rate with Tracts 41, 79 and 84 which are the green tracts in Exhibit 1, taken into the unitized project area, and with several representative actual producing rates postulated for the Sitgo Unit and for the remainder of the non-unit wells within the Empire-Abo Pool. I might just run down Column 1 as an explanation: Column 1, for example, Line A, the daily oil rate for the Arco-Empire-Abo Unit including these three new tracts that we are asking today, 41,041 barrels of oil per day. If we assume the Sitgo-Empire-Abo Unit as producing as the asterisk indicates at its average oil rate for the seven-month period, the Sitgo Unit itself went to maximum allowable, and that seven-month period is from September, 1974 through March, 1975, that rate is 350 barrels a day for the Sitgo-Empire-Abo Unit. The average rate for that same seven-month period in Line C for all

non-unit Empire-Abo pool production is 477 barrels per day. We add those numbers in A, B and C, and we get total production for the Empire-Abo Pool at 41,868 barrels per day. The same operation performed in Columns 2 and 3 for two other types of assumptions, which I think are pretty obvious, so I won't go into them unless you want to question me on them later.

Q Refer to Exhibit 3 and explain that?

A Exhibit 3 is a brief exhibit which simply shows the effective benefits to the reservoir voidage rates and the voidage efficiency of Tracts 79 and 84. Now, these are the two tracts that actually have production.

Q 41 does not have production?

A 41 does not have production. It has original oil-in-place and receives its equity in the unit on that basis. But, at any rate, I am making a comparison here to show the benefits gained by bringing these two producing wells into the Arco-Empire-Abo Unit and gain the advantage of the gas injection that is going on within the unit at the present time. The Column 1 oil rate indicates that Tracts 79 and 84 combined, prior to joining the Arco Unit produced 290 barrels per day. I believe this is the average — for the first quarter of this year. After joining the

Arco Unit with the proposed increase we are talking about, the proposed increase would be 486 barrels a day, but there would be an improvement in net voidage rate shown in Column 2. These two tracts combined are now voiding at the oil rate of 290 barrels per day or voiding 370 reservoir barrels per day, but the voidage credited to those tracts would drop from 370 reservoir barrels per day to 224 reservoir barrels per day even though the production would increase from 290 a day to 486 a day.

Then, Column 3 is simply Column 2 divided by Column 1 and it is what we call the voidage efficiency factor, reservoir barrels per stock tank barrel and it has been brought to the Commission's attention at previous hearings, and you can see the improvement from the current approximately 1.28 reservoir barrels voided per stock tank barrel produced to a factor of about .46 reservoir barrels voided per stock tank barrels produced after the rate increase and after the joined unit.

Q Now, refer to Exhibit 4 and explain that?

A Exhibit 4, again, is a -- let me first lead into this by saying that Exhibits 4 and 5 are going to have the intent and the suggested changes we will be making in conjunction with Exhibits 4 and 5, are going to have

the intent of simply setting up the voidage and allowable calculations for the expanded project area on the same basis as they now are for the somewhat smaller project area. Exhibit 4 -- and I want to really direct your attention mainly to the top line of data on Exhibit 4 -- is the voidage formula that has been approved by the Commission for use in calculating voidage. We have submitted forms of this type to the Commission before, and I want to particularly point out that this calculation is the unit area voidage including Tracts 41, 79 and 84, and the calculated voidage up here is 56,912 reservoir barrels per day. This is calculated on the same basis as the figure that you are familiar with of 56,513 reservoir barrels per day which applied to the current unit area. We would be asking that the 56,912 reservoir barrels per day apply to the expanded project area and it is based on 1972 average rates for the project area including these three tracts that we would just now be posing to take in. That covers Exhibit 4.

Q How about Exhibit 5?

A Exhibit 5, then, simply takes the new daily average, 1972 voidage figure from Exhibit 4, using the same form, but starting over here on the righthand side in

Column 13 with the 56,912 figure back calculates a new base allowable over here in Column 1 of 33,242 barrels per day. This would be the base allowable we would have calculated had these three tracts 41, 79 and 84 been in the unit at the time we first applied for and got the basic allowable of 33,000 barrels a day in there.

Q Based on these exhibits, Nos. 4 and 5, what are you requesting?

A What we would like to ask, if the Commission please, that in Rules 3 and 4 of last adjusted in Order R-4549-B, that Rules 3 and 4, wherever the figure 56,513 reservoir barrels appears, change that to 56,912 reservoir barrels. Where ever the figure 33,000 barrels of oil per day appears, change that to 33,242 barrels of oil per day. And in Rule 4, the additional allowable formula, change 33,000 to 33,242, and change the factor of 39.76 to a factor of 41.05. And in the Rule for Discussion, change 7,555 barrels per day to 7,799 barrels per day.

As I mentioned before, these changes are simply to set up the voidage and allowable calculations on the same basis for the expanded project area as they already are from the smaller project area.

Q Now, refer to Exhibit 6 and explain that?

A Exhibit 6 compares production and reservoir efficiency from the current project area before the unitization and after unitization and after gas injection. It also compares voidage situation as it is now with the current allowable with -- under the same conditions if we are allowed to include Tracts 41, 79 and 84 and get the allowable increase that we are asking to 41,041 barrels of oil per day from 40,555. I might just say that this is voidage type calculations as you have seen before, but under sub-heading "A", Arco-Empire-Abo Unit Area, which is the current project area, Line A-1, before the unit, September, 1973, the month immediately preceeding the unitization, the current project area would produce 23,252 barrels of oil per day and was voiding 61,812 reservoir barrels per day at a voidage efficiency factor of 2.66 reservoir-barrels-per-stock-tank barrel. By June of '75, with an oil rate of 40,555, we are calculating a net voidage rate after credit for gas injection of 22,106. In other words, the oil rate is increased from 23,252 to 40,555 barrels of oil per day, but the net reservoir voidage has been reduced from 61,802 reservoir barrels a day down to 22,106 reservoir barrels per day. This, of course, has

the familiar effect of slackening the pressure decline and aiding in recovery, and this efficiency factor reflects this increase in efficiency, dropping from 2.66 to 0.545. Then, the comparison between A and B here in Exhibit 6, simply indicates Line B-1, for example, shows the rate of 41,041 barrels per day after taking in these three new tracts, but essentially the same net voidage rate 22,103 reservoir barrels per day, and essentially the same efficiency factor after taking in these three tracts and after going up on the allowable, we will, in effect, have the same net voidage and the same efficiency as we do now.

Q Will any of the proposals or requests you are making of the Commission have an effect on the increased recovery from pressure maintenance as previously testified by you?

A No. In my opinion, that is to say there will certainly be no negative effect on recovery. There will be, in my opinion, a positive effect. I think the inclusion of these tracts should result in potential increased recovery because we will be able to operate more efficiently under the expanded project area.

Q In your opinion, will the approval of this Application be in the interest of conservation, prevention

of waste and protect correlative rights?

A Yes, it certainly will.

Q Will this increased rate be in line with Governmental policies of increasing domestic rates to help alleviate the current domestic shortage?

A Yes, sir, it will.

Q Who is running the oil at the present time?

A At the present time, only Amoco pipeline to my knowledge.

Q Is there any question about the capacity of the line to take this additional allowable?

A No, it definitely has sufficient capacity. There is no question. The answer is, yes, it does have sufficient capacity.

Q And all of your service facilities are adequate to handle that?

A Yes, they are.

MR. HINKLE: We would like to offer in evidence Exhibits 1 through 6.

MR. NUTTER: Exhibits 1 through 6 will be admitted in evidence.

(Whereupon, Applicant's Exhibits Nos. 1 through 6 were marked for identification, and were offered and admitted into evidence.)

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Christiaanson, you are going from a current reservoir voidage of 56,513 up to 56,912, and yet on your Exhibit 3 you show that these wells have, prior to joining the unit, a current voidage of 370 reservoir barrels per day, but the change from 56,513 up to 56,912 would be 399 barrels per day. How would you explain that discrepancy?

A Only that it is figured on the overall unit. That is, the change in voidage is figured on the overall unit where these numbers on the individual tracts are just on those tracts. There may be a little difference there.

Q Well, if we take the overall unit as it is without the tracts and added the voidage from the tracts that should give us the voidage for the overall unit with the tracts, shouldn't it?

A Well, you would think it would, yes. I can only say that each of these calculations made on the separate -- just the individual wells and the other made on the total unit as of '72 --

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

A The unit area voidage, as calculated in Exhibit 4, is based on the average of 1972 as it was when we asked for it originally, and this particular individual calculation is based on current conditions.

Q On Exhibit No. 3?

A Right, Exhibit 3. So, you have different factors. You have different pressures and different production.

Q In other words, I assume that based on the 1972 calculations, Tracts 79 and 84 were voiding 399 barrels per day?

A Yes.

Q But based on current conditions, they are voiding only 370 barrels per day?

A That is right. You can make that assumption.

Q Now, you mentioned all those various numbers that would have to be changed in Rules 3 and 4 and then the allowable formula and everything. I tried to take them down, but do you have those summarized so that you can leave them with us?

A I can give you a Xerox copy of the revised R-4549-B where I have crossed out each of those numbers
— I talked about and added in the number that I gave you there

very rapidly.

Q If you could leave that for convenience in preparing an order on this, Mr. Christianson, I would appreciate it.

A I would be happy to.

MR. NUTTER: Are there any other questions of Mr. Christianson? He may be excused.

(Witness dismissed.)

MR. NUTTER: Do you have anything further, Mr. Hinkle?

MR. HINKLE: That's all.

MR. NUTTER: Does anyone have anything they wish to offer in Case No. 5505?

MR. KELLAHIN: If the Examiner please, I am Jason Kellahin of Kellahin and Fox, Santa Fe, appearing for C and K Petroleum, Inc. C and K is the operator of Tract No. 79, being the southeast of the southwest, Section 27, Township 17 South, Range 28 East, supports the Application of Atlantic Richfield in this case. The well on this particular unit is capable of making the allowable that would be assigned to it and all of the owners have agreed to join the unit.

MR. CARR: Mr. Examiner, the Commission has

received a letter from Tenneco Oil Company in support of the Application of Atlantic Richfield in this case.

BY MR. NUTTER:

Q Mr. Christianson, when should an order on the allowable provision go into effect? I realize that the joinder is being circulated to the unit members, but when is the proposed effective date on that?

A Well, of course, we don't know. It depends on they come in. It is a little difficult to estimate, but probably we should be in touch with you -- there is quite a bit of paper work we will have to go through, you know, getting some approvals from the U.S.G.S.

MR. HINKLE: Would it be possible to make the order effective the first of the month following the time when they advise you that all of the paper work has been completed committing this acreage?

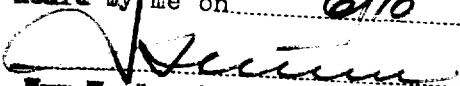
(Whereupon, a discussion was held off the record.)

MR. NUTTER: Does anyone have anything they wish to offer in Case 5505? We will take the case under advisement.

STATE OF NEW MEXICO)
) SS.
COUNTY OF SANTA FE)

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

COURT REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 5505 heard by me on 6/10, 1975.
 Examiner
New Mexico Oil Conservation Commission