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

February 3, 1971

EXAMINER HEARING

IN THE MATTER OF:

Application of BTA Oil Producers for a pressure maintenance project, Lea and Roosevelt Counties, New Mexico.

Case No. 4496

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

MR. NUTTER: We'll call the next case, 4496.

MR. HATCH: Case 4496, Application of BTA Oil Producers for a pressure maintenance project, Lea and Roosevelt Counties, New Mexico.

MR. KELLAHIN: Examiner, please, Jason Kellahin of Kellahin and Fox, Santa Fe, appearing for the Applicant. We have one witness we'd like to have sworn.

(Witness sworn.)

(Whereupon, Applicant's Exhibits 1 through 21 were duly marked for identification.)

JERRY I. MORITZ

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please.

A Jerry Moritz.

Q By whom are you employed and in what position, Mr. Moritz?

A I'm employed by BTA Oil Producers as Secondary Recovery Engineer in Midland, Texas.

Q Have you ever testified before the Oil Conservation Commission and made your qualifications as an engineer a matter of record?

A Yes.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. NUTTER: Yes, they are.

Q Mr. Moritz, briefly, what is proposed by BTA in the application in Case Number 4496?

A Our application is asking that we be allowed to inject water into BTA Oil Producers' 685 Ltd. Bond Well No. 5 which is located in the southwest quarter of Section 4, Township 9 South, Range 36 East.

The reason for this application is that, as exhibits will show later, BTA and many other operators in the Vada Trend, which this area is included in, have noticed that the Bough "C" production has the characteristic of declining at a very rapid rate. In several areas of the field, the production is now below thirty barrels of oil per day, and in this area, we feel, and we hope to show by exhibits, that the production is at the point where it is going to begin this very rapid decline.

BTA would like to conduct this pilot operation so that a secondary recovery method can be proven or disproven for this reservoir. If the pilot is successful, it is anticipated that upward of 300 wells in the Vada Trend will be unitized for secondary recovery operations. However, if this pilot is unsuccessful, it is anticipated that in a short time, the majority of the wells in the Vada Trend will have to

be abandoned.

Q Now, referring to what has been marked as Applicant's Exhibit Number 1, would you identify that exhibit.

A Exhibit Number 1 is a land plat of the so-called project area as we have asked for in this application.

We have shown it with a bordered area. Also, we have shown the initial injection well in a red triangle.

The yellow area is BTA Oil Producer leases. We have actually even shown the ones outside of the project area so that you can have a better idea where all of our properties are.

Q Now, where is this area located in relation to the Vada Pool?

A This is actually the easternmost edge of the Vada Trend or Vada Pool.

Q Now, referring to what has been marked as Exhibit Number 2 through 14, would you identify and discuss the information that is shown on those exhibits.

A Exhibit 2 through 14 are production plots, oil, gas and water of the thirteen leases included in this project area.

I think, thumbing through some of these, I will point out some specific ones, but you can see in general the oil production has been very good, reaching, in some cases, as high as 300 barrels of oil per day. As you can also see,

the water has been equally as good or greater than the oil production in the latter part of '70; in general, you can see that the production has begun to drop, the water production has dropped even more than that, and the gas has begun to increase.

In our mind, indicating that this is a straight depletion drive reservoir. Specifically, I'd like to have the Examiner look at Exhibit Number 4 as an example of the possible decline in this production.

This is BTA's 686 Harris lease which contains two wells. As you can see, the production dropped from approximately a maximum of twenty thousand barrels a month to its present rate of about six thousand barrels a month which represents about a sixty-seven percent decline in production, oil production.

The water production also declined seventy-nine percent during that period.

Now, I will refer you to Exhibit Number 6. Exhibit Number 6 again shows the same characteristic in that the production has dropped off in the last few months, dropping approximately seventy-seven percent.

The water production likewise has dropped ninety-two percent.

There's another characteristic I'd like to show here in June and July of 1970. The production actually picked

up, and this is due to the well being returned to a flowing status. There is, on some of these leases, the unique point whereby the water cut, the bottom hole pressure and the gas/oil ratio simultaneously agree that the wells will actually return to a flowing state. It does not happen on all the wells, but it does happen on some of them and this happens to be one of them.

Q Now, referring to what has been marked as Exhibit 15, would you identify that exhibit.

A Exhibit Number 15 is a plot of all thirteen leases in the project area. The total of all the leases, oil, gas and water.

Again, you can see that the oil production has dropped from a maximum of about a hundred and sixty thousand barrels a month to the present rate of about a hundred and ten thousand or about a thirty percent decline.

Likewise, the water production has dropped some seventy-eight percent and, as you can see, the gas/oil ratio and gas production has increased tremendously.

I might point out the December figures were not available at the time of preparation of these exhibits, but the oil production for December has dropped another thirteen percent.

MR. NUTTER: What would that level be, Mr. Moritz?

THE WITNESS: It would be about ninety thousand

barrels, and the water production dropped on down to about sixty thousand.

Q (Mr. Kellahin continuing) Now, would you discuss the information that is shown on Exhibit Number 16.

A Exhibit Number 16 is a time plot of the bottom hole pressures that BTA has measuredon the wells in the project area only. We do have the practice of drill stem testing most all of our wells on initial completion and, likewise, periodically, when the pumps need changing, the hydraulic pumps, we have run bottom hole pressures on all of the wells and you can see that rather significant decline in pressure here, again indicating that this is a straight forward depletion drive reservoir.

I might also point out that the project area of pressure is nearing a thousand pounds and it has been our experience from the operation of about eighty wells in this Bough "C" Trend that once the bottom hole pressure gets to about twelve hundred pounds, this is the point that the production does start to decline oil and water and the G.O.R. starts to skyrocket.

I have included here Exhibit Number 17 which is of BTA Oil Producers' 673 Limited Vada "C" Number 3. This well is approximately twelve miles west of the project area, in an area that was drilled about one year earlier than the project area, and this area or this curve, as you can see, has

declined tremendously.

The well went from essentially a top allowable, well down to almost an uneconomical state in something like ten months. Again, I might point out that this well has the characteristic of going back to a flowing status approximately in August of '69.

Q Has it continued to flow since then?

A Yes.

Q Now, referring to what has been marked as Exhibit Number 18, would you -- well, prior to that, based on the information that is shown on the preceding exhibits, what is your conclusion of the characteristics and feasibility of the pressure maintenance project in this area?

A My conclusions from these exhibits are that we can expect, or BTA can expect the production in the area to start this rapid decline and we estimate that within six to eight months, most of the wells in the project area will be at the state we have to consider abandoment of these wells.

It is likewise my conclusion that the pressure and the state of the production in this project is at the point where secondary recovery operations should be started. Since the time to form a communitized project would take about six to a year's time, at the minimum, BTA feels compelled to initiate a project of this type in an effort to obtain some data regarding the floodability of this reservoir.

Exhibit Number 17, we feel, is a good example of what can happen to the production and, likewise, this shows what can happen to a lease and how quickly it can be put into jeopardy as regards to losing the lease and, of course, if we lose the leases, we cannot conduct secondary recovery operations on these.

Q Is that one reason you feel it essential that a pilot project be started immediately?

A Yes.

Q Now, referring to Exhibit Number 18, would you discuss that exhibit.

A Exhibit Number 18 is a schematic of the initial well that we propose to inject into, the 685 Limited Bond No. 5. I have marked all the casing strings.

We did cement twelve and three-quarter inch casing at 361 feet and this cement was circulated.

We set eight and five-eighths casing at 4085 and cemented it with four hundred sacks with an estimated top of the cement at 1550 and we set five and a half casing at 9850 with three hundred sacks, with the cement top at 8290.

We perforated the Bough "C" interval from 9221 to -33, and if this application is approved, we will set a Baker Model R packer at 9780 and run two and seven-eighths tubing on it and we will inject below this packer.

We feel that we have adequately protected all of the various formations that we've penetrated in this well. We will load the annulus with an inhibited fluid and have pressure gauges on the annulus for periodic checks to see if pressure is built up on the annulus.

Q Will you use an internally coated tubing?

A We will not use an internally coated tubing in this case. We have looked at the water, and the water is not of the corrosive characteristic and we do not anticipate any problems from this standpoint.

Q Now, in the application, Mr. Mortiz, the Applicant asked for administrative procedure whereby additional injection wells may be included in the project and for injection of gas or air. Will, essentially, the same type of completion as shown on Exhibit 18 be utilized for those additional wells?

A Yes, essentially the same.

Q And is your casing of cementing program on the other wells in the project area essentially the same as shown on this exhibit?

A Yes, sir, it sure is.

Q Now, referring to what has been marked as Exhibit 19, would you identify that exhibit.

A Exhibit Number 19 is a reduced copy of the log on the 685 Limited Bond No. 5 which we propose to use as the initial injection well.

We have marked the normal tops of formations encountered in this well, plus the perforated interval and the packer setting point that we're proposing.

Q Now, would you please explain what is shown on Exhibit Number 20.

A Exhibit Number 20 is a summary of the calculations of the fluid volumes involved in the project area for the Bough "C" Formation.

As can be seen, we are estimating that the project area has approximately nineteen million eight hundred sixty thousand barrels of pore space contained in the Bough "C". Of this nineteen million barrels of pore space, we believe that approximately eleven million nine hundred thousand barrels was oil, and the remaining seven million nine hundred thousand barrels contained water.

Now, we have converted the next two figures, these stock barrels which is approximately six millions six hundred thousand barrels of stock tank oil and approximately seven million nine hundred thousand barrels of water.

The next group of figures are the recoveries to 12/1/70 showing that we recovered approximately three million barrels of oil or about a hundred and fifty-two thousand barrels per well and approximately five million five hundred thousand barrels of water or two hundred twenty-five thousand barrels of water per well.

We estimate that the oil recovery has been forty-six percent of the oil in place at 12/1/70, and approximately sixty-nine percent of it water. We also are estimating that a successful secondary recovery project will recover one million three hundred and eighty-nine thousand barrels of additional oil or approximately seventy thousand barrels per well in the project area.

Q Now, Mr. Moritz, you have discussed, in regard to converting the 685 Bond No. 5 Well to injection and your initial plans to inject water into this well, will you tell the Examiner what fluid you plan to use and where it will come from and the volumes and pressures expected to be used in connection with this project.

A BTA Oil Producers operates an extensive salt water disposal gathering system in this area, collecting Bough "C" water.

We plan to divert part of this water to injection in this Number 5 Well. We presently have about seventy-five hundred barrels of water a day available. Of course, this is rapidly declining.

We expect to initially begin with about fifteen hundred barrels of water a day in the Number 5 and, initially, we expect no pressure at all.

MR. NUTTER: How many barrels a day?

THE WITNESS: Fifteen hundred.

Q Now, in your application, you ask for considerable flexibility in the operation of this project; namely, the ability to change injection wells and to change injection fluids, possibly to gas or air. Would you explain the necessity for this?

A Yes. I have already talked about the time factor involved in this project in that the production from this reservoir is expected to decline very rapidly, expect it in the next few months, and we have already pointed out that we feel that there is sufficient oil left in the reservoir or will be left in the reservoir to justify secondary recovery operations.

Therefore, we are asking for this flexibility so that we can properly evaluate the secondary recovery technique or recover the maximum amount of oil. Flexibility asked in regard to changing wells is tied in with the request for flexibility of injecting different fluids.

BTA has some limited data that indicates possibly that the water is not the fluid to inject into this reservoir. Therefore, since BTA would like to evaluate this reservoir in the best manner, we are requesting that we be allowed to inject different fluids so that in case one fluid does not work, we have the ability to try and change to another.

Since we would probably not want to inject gas into the well that had previously injected water, we therefore need

the flexibility to change wells. BTA, of course, would advise the Commission and the offsets by administrative procedures of its intent to change operations.

Q Now, from your Exhibit Number 1 it would appear that the acreage involved in the project area is federally-owned.

A Yes. Most of the acreage is federal.

Q Have you received approval from the Department of the Interior Geological Survey?

A Yes, we have discussed this project with the federal government, and Exhibit 21 is their letter to us in this regard.

Q Mr. Moritz, do you know of any other efforts directed toward either pressure maintenance or secondary recovery in the Bough "C" reservoir?

A Yes, I know of one project called the Imbe Unit which is approximately sixteen miles south or west of here. This unit was actively engaged in attempt to form a unitized project. However, we have now received word that the operator has given up on attempts to form this unit. We know of no projects now that are attempting or are injecting fluids into the Bough "C" for secondary recovery purposes.

Q This would be a pilot project to determine if it is feasible, is that correct?

A Yes.

Q In your opinion, will the approval of this application result in the prevention of waste or correlative rights protected by the proposal you have made?

A Yes.

Q Were Exhibits 1 through 21, inclusive, prepared by you or under your supervision?

A Yes.

MR. KELLAHIN: I would like to offer Exhibits 1 through 21, inclusively.

MR. NUTTER: BTA's Exhibits 1 through 21 will be admitted.

(Whereupon, Applicant's Exhibits 1 through 21 were duly admitted into evidence.)

MR. KELLAHIN: That completes the direct examination of the witness, Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Moritz, which well other than the well shown on Exhibit 17 was the one that you mentioned that started flowing and increased its production after you removed the pump?

A On Exhibit 17? I believe it is --

Q Was it Exhibit 4?

MR. COOLEY: 6, I believe it was, Mr. Nutter.

THE WITNESS: Yes, 6.

Q Exhibit 6?

A Yes, 6.

Q Now, I notice the same characteristic there on your Vada "C" Number 3 and this Allen Lease here on Exhibit Number 6, that when you took the pump off and the well started flowing, that there was a drastic increase in the amount of gas produced at that time. Did the increase in the production of gas result from putting the well on a flowing status and taking the pump off, or did the well, going on flowing status, result from the increase in gas production?

A It may be a little of both. There is, of course when we have the pumps in there, a certain amount of restriction to this gas production because we actually are having to pump the gas and we feel that this probably is one of the reasons we get a little production increase when we put these back on flowing, in that we are not holding back the fluids back there, that they're freely coming out. We have a slight tendency with the pump to hold the fluid back.

Q Well, if you are holding it back, preventing this dissipation of the gas energy from the gas reservoir, you are actually helping the reservoir by pumping it, aren't you, if it is going to let the gas break up and overproduce gas by putting it on a flowing status?

A I guess we would be.

Q So all this pressure that you have lost, would

have to be pressure you'd have to make up before you can get any response with your water injection program?

A Yes. We think that one of the big questions that we have to answer with this project is: What is the time of breakthrough of this water? This is one of the big problems.

If the time of breakthrough is instantaneous, which we can foresee and some other people have discussed, then I would say the possibilities of secondary recovery with water are almost nil.

However, if this idea that the water breakthrough does not occur and we don't prove it out, then I think we have a much better chance of recovering this oil and, subsequently, if water does break through, I think there's a chance that gas or air injection may be the answer in that case, and this is just an alternate programming case; water breakthrough does like essentially what everybody says it will.

Q Well now, on this recovery, you estimate that you recovered forty-six percent of the stock tank oil in place, up to December of 1970, and that the average in the project area is two hundred and seventy-five thousand barrels a day. This is a rather high recovery factor for solution drive reservoirs, isn't it?

A Yes.

Q So you've had exceptional performance, really?

A Yes, and I personally believe or we believe that the

reason for this was the water contained in the reservoir, that you had a certain period in the reservoir production where you actually were operating by water expansion.

Q And this connate water, there was so much in there under so much pressure, the water expansion helped the flow?

A Right. The water expansion brought about the oil well for a short period of time.

Q But all that is connate water; no edge water or water drive, active water drive?

A We see no evidence of active water encroachment, especially when we covered it with our study of dry holes around this area, we found no place where there could be water encroachment because all the evidence shows it has not been encroaching.

Q Has the Bough "C" of the Pennsylvania been subjected to water injection or other forms of secondary recovery in Lea County or in any other area?

A No, not that I know of.

Q There was no project initiated in the Allison area?

A No. No. There's one slight difference I might point out in the Allison; the Allison prediction is somewhere in the neighborhood of eighty percent and this was their thoughts, that they would not have much left to recovery anyway, so it was not attempted.

Q That area was drilled on eighty-acre spacing?

A Right.

Q As compared to a hundred and sixty here?

A Right.

Q Now, in this estimate of seventy thousand barrels per well, secondary discovery, is that based on any scientific procedure or just a guess?

A No. It is based on an attempt to arrive at what we think the aerial sweep and the vertical displacements will be. It is very difficult to make these predictions in that the evidence of what water, gas or the other fluids are going to do is very contradictory. Some people have shown us evidence that water will not work at all, so you might say in that case, the recovery would be zero.

But we have tried to make some predictions on the basis of the data we can see.

Q What is your estimate of primary recovery without any secondary stimulation per well here?

A I'd say about a hundred and seventy thousand.

Q Well, you've recovered two hundred and seventy-five thousand.

A No. We've recovered, on the oil, a hundred and sixty-two.

Q I beg your pardon. I'm looking at water. Oil is a hundred and fifty-two.

A Right.

Q And you say a hundred and seventy thousand?

A Yes. This is based on this rapid decline point.

Q Now, the secondary recovery would be in addition to the hundred and fifty-two thousand that you recovered or in addition to the hundred and seventy thousand?

A In addition to the hundred and seventy.

Q So you'd get a total of two hundred seventy thousand per well, approximately?

A Right. I might point out one other thing: We are not wanting to enhance this project as an ultimate project. Our ultimate concern is the area in which BTA operates, which as I pointed out before, is about three hundred wells and our ultimate concern is the formation of a unitized project covering these three hundred wells.

I think conceivably if we could prove that this project is successful, whatever we inject, we probably in a short period of time would ask for the dismissal of this project and we would instigate negotiation on unitization, simultaneously, on three different units to unitize the three hundred wells.

Q Well, for the time being -- have you ever examined any of the Commission's rules for pressure maintenance projects that have been promulgated in the past?

A No.

Q Some are rather complex and provide for conversion

of water injection into m.c.f. of gas to apply against high G.O.R.'s and such as that. They are rather complicated. Do you think you need any rules such as have been promulgated by the Commission for other projects for this pilot, or would you just be able to --

A No, we are not asking for this. We do have some spare allowable there. We're going to lose a hundred barrels allowable on production in this well.

Q You will produce this from offsetting wells?

A We think there's a chance. Our production people say that the fluid migrates around enough to where we may make it up, but we are actually not worrying about it one way or another.

Q Would you like to see some of our rules that we put out for other projects to prove --

A No, not at this time.

Q -- offsetting wells? Not at this time; so your authority seeks to inject water into this well, and administrative procedure, converse to other wells, if not successful and if need be in the future, possibly convert to air or gas, is that right?

A Right. The reason we ask for the possibility of area is that we have been negotiating or talking with Warren in this area and the possibility of gas being available for injection is a little in question, it may be available; but at what price is the problem.

We would prefer not to inject air, but if it comes to it and our results are negative on water, we may have to go this way and we want this as an alternate to protect ourselves.

MR. NUTTER: Very good. Are there any further questions of Mr. Moritz?

MR. PORTER: I have one question.

CROSS EXAMINATION

BY MR. PORTER:

Q This well that you said had started flowing again, do you know how long that well flowed initially before it was put on pump, or was it put on pump immediately?

A The first one that I was referring to which is shown as Exhibit 6, I believe?

Q Yes.

A This one, as I remember, it flowed something like two or three weeks. It was a very short -- it was less than a month, and then the water cut, as usual, increased to the point where the well died and we had to put it on pump.

Q At the initial point of the time you put it on pump, about what was the total fluid production per day?

A I'd say, oh, something like eight hundred barrels of total fluid.

Q And now, what is the production? Apparently, I looked at the graph, but --

A Oh, we're looking at, probably there's about seventy barrels of oil and maybe twenty; so about less than a hundred barrels of total fluid now.

Q Your water has declined apparently faster than the oil has.

A Generally, this is the case. The water does decline faster.

MR. PORTER: That's all.

RECROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Moritz, I have one more question with regard to Exhibit 16 which is your bottom hole pressure history. Now, you mentioned that you normally take bottom hole pressures at the time you put pumps on the well. Was that your testimony?

A No. I said when we change pumps, I believe.

Q When you change pumps. So this would be a history of -- that defeats my question, because I thought it was at the time you put pumps on, and that this would be a history of decline of pressure as the need came up for installation of pumping equipment.

A No. No. I'd say the majority of the wells in this area did not flow. There's probably not one out of ten that flows initially.

Q So these wells that are represented here, these twenty wells, had pumps prior to the time of this bottom hole

pressure as well as after the bottom hole pressure, there was a pump change?

A Right.

MR. PORTER: Do you anticipate that some of these wells that didn't flow initially will flow now or will flow at a certain point of decline?

THE WITNESS: Some of them, yes, sir. I think there may be some. There's this three-phase point that has to be reached and, for some unknown reason, I say some of the wells may have the G.O.R., and what we predict to be the right bottom hole pressure, but they may have a cut, something like thirty-five percent, and it seems like if it is thirty-five percent, they won't flow. It takes about a twenty-five percent cut to make it.

MR. NUTTER: If there's no further questions of the witness, he may be excused. Do you have anything further, Mr. Kellahin?

MR. KELLAHIN: Yes. As an owner of royalty under acreage offsetting this project, I am in favor of it.

MR. HATCH: The Commission has received a letter from Blackrock Oil Company supporting the Applicant in this case.

MR. NUTTER: Does anyone else have any questions to ask?

THE WITNESS: You also, hopefully, received one

from Tenneco and I do have a copy of their letter that they sent me, a copy of that.

MR. NUTTER: You'd better give me that, because I had that Tenneco letter and it's plumb disappeared.

If there's nothing further in Case Number 4496, we will take the case under advisement.

STATE OF NEW MEXICO)
) SS
COUNTY OF BERNALILLO)

I, CHARLOTTE J. MACIAS, Court Reporter in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Charlotte J. Macias
Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4496, heard by me on 2/3, 1971.

..... Examiner
New Mexico Oil Conservation Commission