

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
October 10, 1962

EXAMINER HEARING

IN THE MATTER OF:

Application of Cabot Corporation for temporary special rules and regulations, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order promulgating temporary special rules and regulations for the North Bagley-Pennsylvanian Pool, Lea County, New Mexico, including provisions for 80-acre proration units.

CASE 2658

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

MR. NUTTER: The meeting will come to order, please.

The next case is 2658.

MR. DURRETT: Application of Cabot Corporation for temporary special rules and regulations, Lea County, New Mexico.

MR. BRATTON: Howard Bratton, appearing on behalf of the Applicant. We have one witness.

(Witness sworn.)

(Whereupon, Applicant's Exhibit
No. 1 marked for identification.

W. M. SARGENT, JR.

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

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DIRECT EXAMINATION

BY MR. BRATTON:

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

A W. M. Sargent, Junior, employed by Cabot Corporation as a petroleum engineer.

MR. NUTTER: Is that S-a-r-g-e-n-t?

A That's right.

Q (By Mr. Bratton) Are you familiar with the matters in the area involved in Case No. 2658?

A I am.

Q Have you previously testified before this Commission?

A I have not.

Q Please state briefly your educational and professional background.

A I have a B.S. in Petroleum Engineering, Texas A & M, worked two years with Cities Service Oil Company as petroleum engineer and then went to work for Cabot Corporation in the past five and one-half years as a staff petroleum engineer.

Q Have you studied the area in question in this application?

A I have.

MR. BRATTON: Are the witness' qualifications acceptable?

MR. NUTTER: Yes, sir, they are.

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Q (By Mr. Bratton) What is Cabot asking in this case, Mr. Sargent?

A Cabot is asking for establishment of temporary field rules, including 80-acre spacing for the previously designated North Bagley-Upper Penn Field. This was designated by the Commission.

Q That was just last month, wasn't it?

A I believe so, yes.

Q Let's refer to your Exhibit No. 1 and turn to page 1, the land map. Does that show the well in question and the area in question?

A Yes, it does. The arrow points to the well in question.

Q And that's located where?

A In Section 15, 11 South, 33 East, Lea County, New Mexico.

Q Is that the only well completed in this pool at the present time?

A Yes, it is. I beg your pardon, it is not. The Cabot State No. 1 located in the Southwest of the Northwest of Section 23 is also completed in the Upper Penn formation.

Q Let's turn to your next page of your exhibit. Is that the well history of this well?

A This is the well history of the Mary Ellen Dallas No. 1.

Q Would you state briefly off of it the significant factors? I don't believe you need to go into the full drillstem



test data.

A We had two drillstem tests, one in the Wolfcamp formation which recovered free oil, and one in the Upper Penn formation which is, in this case the test covered the Bough C formation, recovered oil flowing; on completion, we perforated a lower zone which is still within the limits of the Upper Penn formation as defined by the Commission. This zone initially potentialized for 200 barrels of oil per day and 36 barrels of water flowing and swabbing. Shortly after being put on production, the zone died because of increased water production and was temporarily abandoned. The well was then completed in the Upper Penn zone of the Upper Penn or the Bough C for a flowing well.

Q And your initial reservoir pressure as reflected there?

A Is 3242 at 9100 feet.

Q Is there anything else you wish to bring out about the well history of this well?

A I don't believe so.

Q Your next item in the exhibit is your log of the well in question?

A Yes, it is. This log, the two zones which have been perforated in this well are indicated on the log, the lower zone being at 9470 and the upper zone at 9138.

MR. NUTTER: This lower section down here at 9470 is the one that has been squeezed?

A It was not squeezed; a bridge plug was set at 9400 feet.



MR. NUTTER: I see.

A The zone is still open below the bridge plug; however, because of the water which was being produced in that zone we elected not to produce it at this time.

Q (By Mr. Bratton) Is there anything else reflected on that log?

A No.

Q Let's turn to your next exhibit, this short cross section. This cross section, the length of it is reflected on your first page, on your land map, is it not?

A Yes, it's reflected by the red line.

Q It starts from the left of the cross section -- it starts to the south down in the Bagley Pool, is that correct?

A That's correct, and runs through Cabot's three wells in the North Bagley Pool and up to the T. P. Collier No. 1 Well, which is also in the North Bagley-Lower Penn Pool.

Q Reflected on here are your three wells in the North Bagley, and the perforations in them and the zone in question, is that correct?

A Yes, sir.

Q What does it reflect with reference to the zone; is it continuous?

A The Bough C zone present in the Dallas Well is not continuous to the south. There is an apparent pinchout of porosity between it and our Humble State Well which is a direct southeast



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offset. The zone apparently does not continue up to the T. P. Well.

Q What about your other stringer in here?

A The lower zone is continuous across our three wells. The three wells located in the center of the cross section.

Q All of these perforations are within the North Bagley-Penn as defined by the Commission?

A The Upper Penn as defined by the Commission.

Q North Bagley-Upper Penn?

A The limits of the Upper Penn are denoted on the cross section.

Q Is there anything else you wish to bring out in connection with this cross section?

A No, sir.

Q Turn now to your next exhibit, Mr. Sargent. Does that reflect the recovery calculations you've made as to this Upper Penn formation?

A It does.

Q First of all, did you have any cores in the area?

A No, we have no cores in this area.

Q So what information are you working off of?

A This information is based upon log calculations.

Q And you reflect two different zones?

A Zones within the Upper Penn, yes, labeled on this exhibit as the 9140-foot zone and the 9470-foot zone.



Q Would you go through briefly your key items in connection with your recovery calculations?

A The first zone is the 9140-foot zone, which is Bough C zone. Porosity from the log was 4 percent, water saturation calculated out to be 24 percent, the net pay from log was 15 percent --

Q 15 feet?

A 15 feet. The 9470-foot zone, porosity from log was 9 percent. Because of the high water production encountered in this zone, the water saturation was assumed to be 50 percent. The net pay from the log is 7 feet. The oil in place, recoverable oil calculations are standard and result in total recoverable oil in barrels per acre of 1,006.5 barrels per acre. Recovery factors used were 25 percent for the Bough C or 9140-foot zone, and 40 percent for the 9470-foot zone. These reflect an assumed depletion or gas solution drive for the 9140 zone, and water drive for the 9470 zone. Total recoverable oil, using these calculations, amounts to 40,260 under 40 acres; 80,520 under 80 acres.

Q That's using a total of 1,006.5 barrels recoverable oil per acre foot?

A Per acre, not per acre foot. Yes.

Q Let's go over to your next page, which is your rock and fluid properties. Here again you've reflected them in the two stringers or two zones here, is that correct?

A Yes, sir. The first portion is strictly a rehash of



the last page.

Q It shows your same net pay and your porosity and water saturation?

A Yes, sir. The next item is permeability calculations. These permeabilities were calculated, one, from a pressure build-up test run after a PI test; and, two, from the PI test itself. They apparently reflect permeabilities from two separate areas of the reservoir, the permeability from the pressure buildup of 46 millidarcys indicates the permeability within the drainage area affected by the buildup; and the permeability from the PI test of 174 millidarcys is calculated the permeability of the area being drained during the PI test, which would be less than the area represented by the buildup test.

Original reservoir pressure was measured with a bottom-hole pressure bomb, also the temperature. The gas in solution was estimated from the PI test. This was the actual ratio on the PI test, 1,450,000 cubic feet per barrel. The remaining factors were calculated from data in the literature. Saturation pressure of 3100 psi, formation volume factor of 1.85, oil viscosity of .18 centerpoises, the tank oil gravity is 48 degrees API.

Q Turning to your next exhibit, this is your productivity index and also the basis upon which you calculated your permeabilities, is that correct?

A Yes, sir, that is correct. This shows a productivity index of 5.72 barrels of oil per day per psi for the Mary Ellen



Dallas Bough C zone. Then the permeability calculations as shown below.

Q That, as you say, results in your permeability calculation of 46 millidarcys and 174?

A Yes, sir.

Q Is there anything further you care to bring out in connection with that, Mr. Sargent?

A I don't believe so.

Q Let's turn to your next page, which is a comparison of your various rock and fluid characteristics between this area and the Allison-Penn Pool. What does that reflect, Mr. Sargent?

A This reflects that the zone, actually this refers to the Bough C zone as being about 500 feet higher than the Allison-Penn; gross pay approximately the same; net pay in the Dallas Well greater than the average in the Allison-Penn Pool. Porosity, however, is possibly a little lower, being 4 percent in the Bough C and 9 percent in the lower zone. Water saturation in the Bough C, approximately the same. The permeability in the Bough C was 107.2, while ours calculated out to be 46 on the buildup test and 174 on the PI test, these are probably comparable; the PI's are comparable, 5.01 and 5.72 for the Dallas Well. Our well, being not as deep, would have a lower reservoir pressure, and this is reflected with the 300-pound difference between the two pools. Saturation pressures are approximately the same, the original solution gas-oil ratios approximately the same, reservoir tempera-



ture approximately the same. Formation volume factors are approximately the same. Oil viscosities, the same, and oil gravities are the same.

Q Basically, the general conclusion is this should be a little better area than the Allison-Penn?

A Based on the Dallas Well, that is correct.

Q And this is very limited information available at this time as to this pool?

A Yes, it is.

Q Your next exhibit reflects actually just the drop in bottomhole pressure in the Allison-Penn, is that correct?

A That is correct. The four wells listed, these are the initial bottomhole pressures versus time for these wells, which indicates that as the pool was produced, the pressure dropped over the area involved and the location of these wells is shown on the next page on the map. This indicates good connection, communication in the reservoir, indicating that the pool will drain 80 acres or more.

Q Actually, Mr. Sargent, you would expect possibly not exactly the same excellent communication, but certainly substantially good communication in this pool, is that correct?

A Yes, I think our permeabilities are comparable and we could expect good pressure communication.

Q I might ask further, is this pool in the same area as the South Lane-Pennsylvanian Pool?



A The Dallas Well is approximately six miles southwest of the discovery well, the South Lane Pool.

Q Is that the same formation there that we're talking about here?

A Yes, the Bough C.

Q Also, where is this located with regard to the recently created Emby Pool?

A It is two miles directly west, if you will refer to the map, the first map, the Emby Pool is in Section 18, 11, 34. There is a well in the upper right-hand corner near, it says Bough C Discovery, that was the discovery well of the South Lane Pool. This gives the relationship of our well to these other two pools.

MR. NUTTER: You mean the discovery well for the Emby Pool?

A The Emby Pool is the French Well located in Section 18.

MR. NUTTER: Oh, I see. This one way up at the top of the page, that's the discovery well for the South Lane?

A Yes.

MR. NUTTER: Oh, I see.

Q (By Mr. Bratton) Then the Emby Pool is directly to the east?

A Directly to the east of our well, three miles.

Q We're talking about the same formation in all three of these pools?



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A Yes.

Q Let's go back to your last page of your exhibit. This is your calculation of your drilling economics?

A Yes, sir.

Q Would you run through that briefly?

A Once again we have the recoverable oils on 40-acre and 80-acre, 40,260 and 80,520. Item number 2 is operator, ⁷/₈th, taking out 1/8th royalty, which gives us 35,228 on 40 and 70,455 barrels on 80. Operator's gross income, we receive \$3.01 per barrel. I have used top price even though at the present time we do not have a pipeline connection in here, we are expecting one momentarily. I have also included in this casinghead gas revenue of seven cents per barrel. Then I have taken out taxes and come up with an operator's net of \$2.98. This multiplied times operator's net oil gives one hundred, approximately \$105,000 for the 40 acres and \$210,000 for the 80 acres.

Our Dallas Well was drilled to the Devonian and the figure reflected here of \$144,930 is corrected back for a total depth of 9550 feet. Our flow line, tank battery for the well cost \$13,158 for the total estimated cost of \$158,000; and as can be seen, we would not get our money back on 40-acre spacing and would have about 1.3 return on 80 acres. Now this once again does not include operating costs or taxes.

Q In connection with calculating these economics, Mr. Sargent, you are certain as to your net pay in this well but that



figure is reasonably optimistic in connection with experience in the other Penn pools in that area, is that correct? In other words, you might actually, throughout this pool, come out with a less net than 22 feet?

A Based upon what was the average in the Allison-Penn, our net is certainly greater here than they had up there, yes.

Q Of course, without cores you are operating on somewhat limited information as to your water saturation and possibly your porosity?

A Yes.

Q But even if your porosity should be substantially greater and your water saturation substantially less, 40 acres still would not be economically feasible in this pool, is that correct?

A That is correct.

Q You are asking for temporary rules in this pool, is that correct?

A Yes, sir.

Q What specifically are you requesting, Mr. Sargent?

A We're requesting 80-acre spacing with flexible well locations to be located with the 80-acre unit located either east-west or north-south within a quarter section, well, to be located within either quarter quarter section of an 80-acre unit within 150 feet of center of the quarter quarter section. Also we're asking for the standard Commission allowable factor of 4.77 depth



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factor, I believe it's 4.77 for this depth.

Q Now you are requesting these rules for one year, is that correct?

A That is correct.

Q During that time you would be able to develop additional information as to the effectiveness of drainage, would you not?

A Yes, sir.

Q By what means?

A We would hope to certainly core these zones in future wells, also by the use of pressure surveys, possibly interference tests and any other means that we deem desirable.

Q Based on the information you have to date, is it your opinion that one well will efficiently and economically drain 80 acres in this pool?

A Yes, sir.

Q Would it be your opinion that the drilling of this pool on 40 acres would result in economic waste?

A I believe it would.

Q Is there anything further you care to put in in connection with this application, Mr. Sargent?

A No, sir.

Q Was Exhibit 1 prepared by you or under your supervision?

A Yes, it was.

MR. BRATTON: We would offer in evidence Applicant's



Exhibit No. 1.

MR. NUTTER: Applicant's Exhibit No. 1 will be admitted in evidence.

(Whereupon, Applicant's Exhibit No. 1 entered in evidence.)

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

CROSS EXAMINATION

BY MR. NUTTER:

Q Now, Mr. Sargent, here on your second page in the brochure where you are giving a history of the Mary Ellen Dallas Well No. 1, this Pennsylvanian drillstem test was 9100 to 9160?

A Yes, sir.

Q Is that the Bough C zone?

A Yes, sir.

Q And then the original completion was 9143 to 55, and 9475 to 9484 both?

A No, sir. The initial completion was 9475 to 9484.

Q Is that a zone of the Bough C?

A No, sir, this is a zone which is, as far as I personally know, was found in this well and does not correlate with any zone producing within the immediate area.

Q You still call it Upper Pennsylvanian, don't you?

A Yes, sir, this was deemed --

Q This is the lower part of the Upper?

A This is the lower part of the Upper, yes, sir.



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Q You would limit the Bough C to this relatively narrow little section from 9143 to 9155?

A Yes, sir.

Q Now on your cross section, just discussing your three wells here in the middle, how many of the wells have the Wolfcamp pay zone present?

A All three of the wells successfully drillstem tested the Wolfcamp section.

Q But only one well has been perforated in the Wolfcamp?

A Yes.

Q The drillstem in the one on the right and the one on the left were successful in the Wolfcamp?

A Yes.

Q Now the lower section of the Upper Penn which was the one that produced water and was subsequently plugged off in the Mary Ellen Dallas No. 1, is this section which is shown -- is that the well on the right?

A Mary Ellen Dallas is the one on the right.

Q It's shown having perforation, but that perforation is presently plugged off?

A That is correct.

Q The other two wells are perforated in that section?

A The Humble State was perforated in this section, and as you can see, 238 barrels of oil, 102 barrels of water per day, was subsequently plugged off and the well was perforated in the



Wolfcamp and is producing only from the Wolfcamp.

Q So it's a single completion in the Wolfcamp?

A All three wells are single completions. The State "L" is currently producing from the lower zone of the Upper Penn. It produces some water. If it acts as the other two wells did, this water will increase and the well will die and we'll be forced to come back up probably to the Wolfcamp zone.

Q But the State "L" and the Humble State neither one had the Bough C present?

A No, sir. The Humble State Well, we actually attempted a completion at 9127 to 38, and this was a very tight zone, would not accept treatment, and we swabbed it dry.

Q Do you anticipate that the lower section in the Humble State, being the perforation that potentialized for 238 and 102, will ever be produced again?

A Yes, sir, I do, some future date. The reason we elected not to produce them now, we would have to put pumping equipment on this at quite a bit of expense. We would rather flow the well for as long a period as we possibly can.

Q Right now you are flowing from the Wolfcamp?

A From the Wolfcamp, yes, sir.

Q The State "L" still is producing with water?

A It was last Monday. In fact, it had died and they were going to try and perforate a zone that apparently had some gas in to try and lift flowing.

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Q Was the Bough C present in the State "L" No. 1 at all?

A To my knowledge, no. It appears that the zone is probably there, but it doesn't look very good on the log.

Q And it never was perforated?

A No, sir.

Q On the next page following the cross section, you show recoverable oil of 478 barrels from the 9140 zone, and 528 from the 9470. Is this what you actually expect to recover from each of these two zones? I mean you've got one of them shut off. It seems to have the most oil.

A It also has water production and will have to be pumped, as I say.

Q Is this well flowing from the Bough C?

A Yes, it is flowing from the Bough C. All three of our completions are flowing wells.

Q From one zone or the other?

A Yes.

Q But no well is presently producing from a second zone?

A No, sir, all of them are single completions.

Q On the next page, your formation volume factor of 1.85, is that from an actual fluid analysis?

A No, sir, this was calculated from Standing's charts.

Q Do you have a fluid analysis?

A No, sir, we don't. I hope we will have one.

Q What's your solution gas estimate based on?



A It was based upon the lowest on the PI test. We had a three point PI test run to determine the optimum or MER of the well, and this was the lowest GOR recorded during that test.

Q Now the PI test, that's in here somewhere?

A It's the next page after the one we were just looking at.

Q Is this from the 9140-foot zone only?

A Yes, sir.

Q Do you have any PI on the lower zone?

A No, sir, we do not. We plugged off maybe a week after we perforated it; when it went to water we plugged it off.

Q So all of these reservoir rock and fluid properties are either estimated or calculated using charts or calculated from the logs?

A That is correct.

Q Here in your economics, which is the last page in this exhibit, these are the costs estimated for a single completion?

A Yes, sir.

Q You took into consideration the possibility that some of these wells may prove productive in two of the three zones that are present in all of them?

A That is correct.

Q And you have taken into consideration the value of the casinghead gas at seven cents per barrel of oil?



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A Yes, sir.

Q That's based on this solution ratio of 1450?

A That is based on the price that we are currently receiving on the Dallas Well. This was our first monthly statement when El Paso came up to seven cents a barrel.

Q How would that compare, if you compared it on the solution ratio?

A I believe that would compare favorably. Possibly it would be high. Possibly our producing ratio is 17, 1800 to 1.

Q At this time?

A This would be on the lower allowable producing rate, which was less than our optimum PI rate.

Q Is the Mary Ellen Dallas Well No. 1 producing top allowable at the present time?

A Yes, sir, to my knowledge it is.

Q Is that well capable at this time for making top allowable for an 80-acre unit?

A Yes, sir. I believe the PI test indicated a productive capacity of about 15,000 barrels per day.

Q That was at a flowing rate of 286 or something like that, wasn't it?

A Yes, it was 356, I believe was the PI rate.

Q The producing rate, 286 barrels per day on six-hour test?

A Yes, 286.



MR. NUTTER: Any further questions of Mr. Sargent?

MR. BRATTON: One further question.

REDIRECT EXAMINATION

BY MR. BRATTON:

Q In line with Mr. Nutter's question, could you estimate what your cost would be to dual complete one of these wells?

A I believe it would probably cost us another \$35,000 to dually complete the well. Now I'm not, I have not dealt with the production and drilling costs. However, I am estimating that based upon some figures I have seen recently submitted to the Commission.

Q So roughly you would be talking about an investment of \$200,000 on a dual completion?

A About \$190,000 or \$200,000, yes, sir.

Q This is actually jumping ahead to the next case, but if you were fortunate enough to get dual completions from your Wolfcamp and from your Upper Penn in all of them, still would your economics be such that you'd recover about 150 percent on your investment?

A I believe this would give us a return of about two and one-half to one, based upon the economics of the Wolfcamp completion.

Q You are talking about on 80 acres?

A Yes, on 80 acres. On 40 acres it would amount to --

Q About one and a half to one?



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A It would amount to one point -- about one and a quarter to one.

Q So that would be the most optimistic that you could now foresee, if you were fortunate enough to be able to dual complete each of these?

A That is correct. However, when I say this return would be one and a quarter to one, you must bear in mind that I have not included operating costs in my economics.

MR. NUTTER: The Devonian was dry in this area?

A The Devonian tested water.

MR. NUTTER: Any further questions? He may be excused.

(Witness excused.)

MR. NUTTER: Do you have anything further?

MR. BRATTON: Not in 2658.

MR. NUTTER: Does anyone have anything they wish to offer in 2658? We'll take the case under advisement.

* * * * *



STATE OF NEW MEXICO)
) ss
 COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing was reported by me in stenotype, and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this 25th day of October, 1962.

Ada Dearnley
 NOTARY PUBLIC

My Commission Expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2658, heard by me on 10/11, 1962.

[Signature], Examiner
 New Mexico Oil Conservation Commission

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