

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

June 7, 1962

EXAMINER HEARING

IN THE MATTER OF:

Application of Sinclair Oil & Gas Company for approval of a waterflood project, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval of a waterflood project in the Grayburg-Jackson Pool, Eddy County, New Mexico, with the injection of water to be through seven wells located on the H. E. West "A" and "B" Leases in Sections 3 and 4, Township 17 South, Range 31 East; applicant proposes to operate the waterflood project under the provisions of Rule 701.

CASE NO.

2576

BEFORE: Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. NUTTER: Case 2576.

MR. MORRIS: Application of Sinclair Oil & Gas Company for approval of a waterflood project, Eddy County, New Mexico.

MR. KELLY: William Booker Kelly of Gilbert, White and Gilbert, Santa Fe, appearing on behalf of Sinclair.

I have one witness.

(Witness sworn.)

(Whereupon, Applicant's Exhibits Nos. 1 through 9, Marked for Identification.)

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MR. KELLY: Before we start, I would like to refer the Examiner to the Application. There are a couple of errors in there that we would like to correct now.

In paragraph 1, we have set out the description of the area comprising the proposed injection project which covers H. E. West "A" and "B" leases. That description should include Section 10, Section 10 includes part of the "B" lease.

MR. MORRIS: We may have a problem on our notice here, Mr. Kelly. The case was advertised, notice was given with reference to Section 3 and 4.

MR. KELLY: Well, I would like to bring this to the Commission's attention. In our Application we refer to Section 3 and 4 as just where the injection wells are now, we also referred to the surrounding land.

MR. NUTTER: Where is Section 10, is that this Section directly south of 3 here on the Exhibit that's attached to the Application?

MR. KELLY: Yes. It's not shown, it's right next to 10 and right below 3. I mean, right next to 9.

MR. NUTTER: That's an extension of the West "B" lease down there, all of Section 10?

MR. KELLY: Yes.

MR. MORRIS: I believe the notice in the case was given with respect to where the injection wells would be located on Section 3 and 4, so I believe we are all right.



MR. KELLY: Then, the other error is in paragraph 4. We have a listing of the injection wells and one is listed as H. E. West "B" No. 1; that should be H. E. West "B" No. 11.

DOUGLAS W. CUNNINGHAM,

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

DIRECT EXAMINATION

BY MR. KELLY:

Q Would you state your name, position and employer, please?

A I am Douglas W. Cunningham, I'm a Petroleum Engineer, I work for Sinclair Oil and Gas Company in Midland, Texas.

Q Have you previously testified before the Commission, Mr. Cunningham?

A No, I have not.

Q Could you give the Commission a brief summary of your technical background and training?

A I graduated in 1957 from Texas Technological College in Lubbock with a degree, B.S. in Petroleum Engineering. I went to work for Sinclair in September, 1957, and I have worked for Sinclair ever since in various capacities, as Field Engineer, Reservoir Engineer, Section and Unitization.

Q As part of your professional work, have you made a study of the Grayburg-Jackson field?



A I have.

MR. KELLY: Are the witness's qualifications acceptable?

MR. NUTTER: Yes, sir, please proceed.

Q (By Mr. Kelly) What does Sinclair seek by this application?

A Sinclair Oil and Gas Company is by this application seeking approval of a waterflood project of our H. E. West "A" and "B" leases in the Grayburg-Jackson Pool, Eddy County, New Mexico.

Q I refer you to what has been marked as Exhibit No. 1, would you explain that to the Commission?

A Exhibit 1 is merely a location plat which locates the Grayburg-Jackson Pool in relationship to the surrounding pools on the artesia vacuum trend. Our lease that we plan on flooding, both of these leases, are located within the circle on the location plat, figure number one.

Q I refer you to Exhibit No. 2, will you explain this to the Commission?

A Exhibit 2 shows the area of the H. E. West "A" and H. E. West "B". It shows the 7 injection wells that we plan on using. It further shows a present waterflood which is underway in the Square Lake field by Newmont Oil Company. The red circled wells are, as we understand, the present injection wells in which Newmont is injecting water into the Grayburg-San Andres reservoir. The yellow wells circled, as we understand, have already



been allowed by the Commission to be an expansion of this Newmont flood which will occur on or about July 1st, 1962. Then, the green wells are further expansion that Newmont has requested to be allowed on April 1st, 1963.

The yellow wells on Sinclair's leases are located in cooperation with the already successful Newmont flood. The green line X-X is a cross-section line trace which we will present the cross-section in a minute as another exhibit.

Q Now, the yellow dots represent the proposed Sinclair injection wells?

A On the West "A" and West "B" lease, belong to Sinclair, they are the proposed injection wells.

Q Do you have an exhibit showing the project area?

A Yes, we have defined the project area as set out in paragraph E-2 and we will present that in a later exhibit.

Q You have testified that the Exhibit 2 shows the present Newmont waterflood project?

A That's correct.

Q And its proposed extensions?

A Yes.

Q Would you refer to Exhibit No. 2, and explain that to the Commission?

A Exhibit No. 3 is merely a list of the proposed injection wells. It shows the wells numbers, the lease names, the elevations, the total depths, the completion dates, the size



and depth of the surface casing, the sacks of cement that the cement was set with, the size and depth of the oil string and the sacks of cement that the oil string was set with, and the completion interval of the 7 different injection wells that we plan to use. By the way, the H. E. West "B" 11, is shown on this plat which we corrected and has the correct casing program on this exhibit here.

Q Now, go on to Exhibit 4, the structure map.

A Exhibit 4 is the structure map of the Grayburg-San Andres reservoir contoured on top of the Grayburg, has a contour interval of 25 feet in the vicinity of the pilot project that Sinclair is proposing. The pilot project itself is outlined in red pencil there. The structure shows it in the vicinity of the Sinclair lease, the dip is generally in a southeast direction, dips about 100 feet per mile.

Q Now, go on to Exhibit 5.

A Exhibit No. 5 is the cross-section X-X referred to which was, the trace of which was shown on Exhibit No. 2. We had no logs to submit to the Commission on our proposed injection wells since those wells were never logged. The cross-section has some well logs on it of existing wells in the area, and it also shows a schematic of what we think the Grayburg-San Andres reservoir looks like underneath the injection wells that we propose to use there, at least Number 9 and Number 11. It shows



the different production zones of the Grayburg-San Andres reservoir in this area. It's my opinion that the reservoir configuration shown here on the cross-section is the same as underneath our West "A" and West "B" lease.

Q I refer you to Exhibit No. 6, will you explain that to the Commission?

A Exhibit 6 is just a production tabulation of the monthly oil, water and gas produced from the West "A" and West "B" leases for a 10 year period from 1952 through April of 1962.

Q Now, treating Exhibits 7 and 8 together, would you explain that to the Commission?

A Exhibit 7 and Exhibit 8 are graphs of the production figures which were given in Exhibit 6 there. Exhibit 7 is a graph of the H. E. West "A" production, production history information for the 10 year period, and the Exhibit 8 is a production history of H. E. West "B" lease for that 10 year period.

Q On Exhibit No. 6 your records go back to 1952. When were these leases first drilled?

A The H. E. West "A", the first well completed as a commercial producer was drilled March the 17th, 1939; on the West "B", the first commercial producer was drilled May the 3rd, 1946.

Q Now, your Exhibit 7, showing your curve of your production history on H. E. West "A" shows a jump around the year '55, is that due to new drilling?



A Yes, it is. The number of wells curve there in the bottom, it shows that we developed the lease a little bit more in 1955.

Q Then, on H. E. West "B", shown on Exhibit 8, new drilling is indicated, the jump of 1958?

A 1958, 1959, we had quite a bit of drilling on the West "B" there.

Q In your opinion are both of the leases in advanced stages of depletion?

A Yes, sir. The daily average production for all the wells on the H. E. West "A" lease, there are 10 wells, the average daily production during April was 4.8 barrels per day and H. E. West "B", for 24 wells, the average daily production was 4.3 barrels of oil per day per well.

MR. NUTTER: 4.3?

A Yes.

Q (By Mr. Kelly) Now, go on to Exhibit No. 9 and explain that to the Commission.

A Exhibit 9 is a list of the wells to be in the project area. This is the project area defined in paragraph E-2 of Rule 701. It shows the injection wells and then it shows the producing wells, further, it shows the April, 1962 daily average oil and water production. That average production for the project area for oil is 3.5 barrels of oil per day during April, 1962.

Q Now, the land involved on these two leases, is it



federal land?

A Yes, it is.

Q Have you received any type of approval from the United States Geological Survey?

A We have been in correspondence with United States Geological Survey and we have sent them a copy of this Application. They have informed us they would give us tentative approval, but they haven't given us their final consent at this time. I presume they will send the Commission notification.

Q On your waterflood project, what is the source of your water going to be?

A The source of our water will be the Lea County Underground Water Basin.

Q Do you have wells outside the project area producing into common facilities with wells in the project area?

A Yes, we do.

Q Is Sinclair planning to abide by Order R-1644 requiring monthly reports on the production of the wells outside the area?

A Yes, we will.

Q Is it Sinclair's intention to cooperate with all operators in the area in order to protect correlative rights?

A Yes.

Q How many barrels a day do you plan to inject in each well?

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A We plan to inject from 350 to 400 barrels a day in each injection well.

Q Is this similar to the amounts that Newmont is injecting into their project?

A I understand that they're injecting around 400 barrels per day in their wells.

Q In your opinion would the granting of this Application protect correlative rights and prevent waste?

A Yes, sir, I believe it would.

Q Were Exhibits 1 through 9 prepared by you or under your direction?

A Yes.

MR. KELLY: We move the introduction of Exhibits 1 through 9.

MR. NUTTER: Sinclair's Exhibits 1 through 9 will be introduced in evidence.

(Whereupon, Applicant's Exhibits Nos. 1 through 9 Introduced and Received into Evidence.)

MR. KELLY: That's all I have on Direct.

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

MR. MORRIS: Yes, sir, I do.

MR. NUTTER: Mr. Morris.

CROSS EXAMINATION

BY MR. MORRIS:



Q Mr. Cunningham, you stated that your water source would be the Underground Lea Water Basin?

A Yes.

Q Is that to be derived from wells to be drilled by your company or are you going to purchase water from an independent water company?

A At the present time we have the water lease some 19½ miles east of our lease and up on the cap. We also at this time have applications in for water rights on acreage which is closer to our proposed project. These applications are pending. We don't know the status of them. We don't know whether we'll be granted these water rights or not, but in order that we may cooperate with Newmont's proposed extension, Newmont has offered to sell us water which they get from the Lea County Underground Water Basin. It's possible, if we cannot get our injection lines in in time to cooperate with Newmont, that we may purchase water temporarily from Newmonth.

Q Do you at this time have any intention of expanding this project area in a determined direction?

A No, sir. We don't know actually how it will respond to flooding. We will expand it so far in compliance with Rule 701.

Q Sinclair, I note from Exhibit 2, owns a substantial amount of acreage surrounding this pilot, so if expansion is to be made you won't have many problems with protecting correlative rights in



this area, will you?

A That's right. Sinclair owns 8 sections here, right in the immediate area.

Q Now, your color coding on Exhibit No. 2, everything below the township line are Sinclair wells and everything above the township line are wells operated by others, is that correct?

A That's right, yes.

Q Then, this well No. 1 in the North Half of Section 3 which is colored in green on my exhibit --

A It shouldn't be.

Q Pardon me?

A It should not be green. See, that is Newmont's planned expansion.

Q That's one of Newmont's?

A They hope that we cooperate with them when we get ready, but it's not our plan at the present time. We don't know how we will want to expand our flood.

MR. NUTTER: At any rate this would be in the April, 1963 expansion?

A That's right. It would be in the April expansion, 1963.

What was your question about that well, Mr. Morris?

Q (By Mr. Morris) I was trying to determine who the operator of it was?

A It's our well.



Q And I couldn't tell, really, from my exhibit whether it was colored green or not, but you have answered my question.

A It is not supposed to be colored green. However, that well is a dry hole and we will have to re-enter or re-drill it if we want to use it.

MR. MORRIS: I believe that's all I have.

BY MR. NUTTER:

Q Mr. Cunningham, referring to your Exhibit No. 5, the cross-section. I see quite a few pays here. How many of these various pays are going to be actually under injection?

A We plan to inject into our 7 injection wells in open hole. We don't know right now which of these pays will take water or which won't. We plan on running injectivity profiles at intervals to determine which pays are taking water at which time, we will run liners and perforate preferentially as signified by our history here.

Q At the present time are these wells all completed open hole?

A Yes, sir.

Q In each case is the pipe set above the top of the Loco Hills?

A I'm not familiar with all of the wells on the lease, whether or not the casing on each well is above the Loco Hills, I don't know.



Q So, you are not sure if the Loco Hills would be open in all of them?

A No, sir.

Q Is each well drilled to a depth sufficient to take the Lovington pay?

A No, sir, we can see right here, this A-9 is not drillable to take either the Premier nor the Vacuum nor the Lovington. If we, from injection in other wells, saw that we needed the Premier and Vacuum and to open another whole section, I believe we would go in and deepen that well.

Q Is it an injection well?

A Number 9 will be an injection well.

Q Do you contemplate drilling a well in the Northwest Quarter of the Southwest Quarter of Section 3?

A At this time we don't contemplate drilling any wells. If our information that we gain from our pilot indicates that a well should be drilled for efficient drainage of the acreage, I am sure we will.

Q What about Well No. 27 in the Southeast of the Southwest of Section 4?

A It's shown on Exhibit 2, isn't it?

Q Yes, sir.

A That well is a deep test, it was drilled to the Devonian, it never has been tried in the Grayburg-San Andres or Grayburg-Jackson Pool.



Q Do you at this present time contemplate completing it?

A There again, we will be governed by what we find out. If our production data indicates that well should be perforated we will go in and perforate.

Q But for the time being those two 40-acre tracts will not be completed in the Grayburg-Jackson?

A That's correct. We haven't listed those as in the proposed project area.

Q Evidently on this Exhibit No. 9, you have about 17 wells in your project area, I'm short one but I have enough. No, I still don't have it.

A On the map you mean?

Q Yes, sir.

A Which well, Mr. Nutter?

Q My project area only has 16 wells in it and yours has 17. I must be missing one somewhere.

A Of course, the 7 injection wells are colored in yellow. The West "A" No. 2 is north of our No. 4 injection well.

Q Yes?

A The West 5 "A", 5 is south of injection well No. 4.

Q Yes?

A The West "A" 10 is north of injection well West "A" 8.

Q Yes?

A The West "B" 4 is north of the West "B" 6 injection well. The West "B" 7 is south.



Q Wait a minute. The West "B" 4 is in "D" of Section 4?

A Yes, sir.

Q Okay.

A And the West "B" 7 is south of the injection well No. 6, on the "B" Lease.

Q Yes?

A The H. E. West "B" 9 is then south of the No. 7.

Q Yes?

A The H. E. West "B" 16 is in Section 3.

Q Yes, in the Unit "L"?

A Yes, sir. And the West "B" 23 is diagonally northeast of that well.

Q Right.

A And the Keel "B" 9 is directly west of the injection well 6 on the West "B", and the Keel "B" 16 is directly south of the Keel No. 9.

Q Well, now, I wasn't counting the Keel wells, Mr. Cunningham. Is the lease ownership identical on the Keel lease as on the West leases?

A I believe the ownership is the same, Mr. Nutter. The percentage royalty, I think, is a different scale.

Q The royalty over there is a little different?

A I think so.

Q Is that oil produced with the West "B" lease at the present time?

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A The Keel "B" lease. I think it is.

Q And held in the same tank battery or does each well have its own tank battery, the Keel "B" and the West "B"?

A The Keel is in a separate battery than the West "B".

Q Now, I find that Exhibit 9 is short a well. It doesn't include West "A" No. 6, Mr. Cunningham, as a producing well?

A You are right, it does not.

Q Do you happen to have the production figures for that well?

A Neither does it include the West "B" No. 5. The two center producing wells in both five-spots have been left out. Yes, sir.

Q Now somebody is short a well again.

A We had the West "A" center in there, but we didn't have the West "B" which is in the center there. The West "A" No. 6 produced two barrels of oil per day and no water, and the West "B" No. 5 also produced two barrels of oil per day and no water. That would lower my average oil production figure that I gave you a while ago very slightly.

Q So, you have 7 injection wells and 12 producing wells for a total of 19 wells?

A Yes, sir, that's right.

Q What is the maximum amount of oil that any of the wells on either of these leases makes or do these -- now, these



production decline charts that you have that would be Exhibit No. 8 and Exhibit No. 7, that's the total wells on the lease and not necessarily in the project area?

A That's correct. That is the total wells on the "A" lease and the total wells on the "B" lease. There are 24 on the "B" lease and 10 on the "A" lease.

Q Are all of the wells which are included in these decline charts 7 and 8 pretty much the same as the producing rates reflected on Exhibit 9 for the wells in the project area?

A Pretty much the same, you mean in production?

Q In production.

A Average production, well, the average production for the wells in the project area, as you recall, were about 3.5 and the average for all the wells on the "A" is 4.8 and on the "B" is 4.3.

Q So, there may be some wells outside the project that are a little bit better, but not much?

A They're a little bit better.

Q What's the best well on either lease?

A What the highest well in the area is. There are two wells producing 11 barrels of oil per day, the H. E. West "A" No. 21 and then the H. E. West "B" No. 25 produces 12 barrels per day.

Q Those are the best wells in the area?

A Yes, sir.



MR. NUTTER: Are there any other questions of Mr. Cunningham?

MR. KELLY: I would like to amend Exhibit 9 to show the H. E. West "B" and the H. E. West "A" 5 and 6, with those figures on it.

MR. NUTTER: Does anyone have anything further or any further questions of Mr. Cunningham?

MR. IRBY: Frank Irby. May I ask a few questions?

MR. NUTTER: Yes, sir.

MR. IRBY: Frank Irby, State Engineer's Office.

BY MR. IRBY:

Q Mr. Cunningham, on your Exhibit No. 3, this surface casing is set from 674 to 769 feet. Can you tell me what formation that is in, please? What kind of a formation is it into the salt?

A I think I can find that for you, Mr. Irby. In this area the first four to six hundred feet of formation are composed of caliche and sand; directly underneath this caliche and sand we strike the Rustler formation which consists of anhydrite with interbedded red shale. The Rustler varies from 200 to 500 feet in thickness throughout northern Eddy, so I would say the surface casing is set in the Rustler; the Salido, which is the salt, comes beneath that formation.

Q Don't each of these wells penetrate through anhydrite, are you able to tell me that?



A I don't know.

Q But it would have penetrated either anhydrite or a tight red shale?

A I would think so from the stratigraphy of the area there. It should have struck either anhydrite or red shale in the Rustler where it's set.

Q This hundred sacks of cement which was used along the surface string, in each instance did that circulate to the surface?

A I don't know, Mr. Irby. I didn't read any of the cement surveys on the wells. I don't even know for sure that they made cement surveys. I would say from the data presented from one of the engineers this morning as to the amount of surface casing and the amount of cement he was going to put in his wells there, it should have circulated.

Q I would think it was circulated if the hole wasn't extremely large. I don't know why you would drill a big hole. Would you be able to check that out and furnish me the answer to that question?

A Yes, sir. If we have temperature surveys, I can sure furnish them to you.

MR. IRBY: Thank you.

A I will.

MR. IRBY: Thank you.

BY MR. NUTTER:

Q Mr. Cunningham, what has been the average productivity



on primary from these wells?

A The average cumulative recovery has been right about 30,000 barrels per well. I have actual cumulative from each lease. I'll just read you those figures and we can easily divide by the number of wells.

I find I didn't write it down after all, but from my best recall, the West "A" lease has recovered approximately 230,000 barrels and the West "B" approximately 500,000 barrels.

Q The West "A" has 10 wells, so that would be an average of 20,000?

A That would be about 20,000 per well.

Q And the West "B" has recovered approximately what?

A As I recall, 500,000 barrels. The figure would be in this report if you would like for me to look for it.

Q I would appreciate knowing what the wells averaged on primary.

A That would be approximately 20,000 for both of those leases if those figures were correct. I'm sure I have it in this report. The West "A" and this cumulative figure was as of September 1st, 1961, so it's a little bit better now. The West "A", 264,411, and the West "B", 526,722.

Q Have you made an estimate as to what your secondary recovery will be on this project?

A No, sir, we have not made an estimate of the secondary recovery from the entire leases. We think that it

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will be considerable and based on some of the recoveries from Newmont's flood, it would be about 70,000 barrels per 80 acre five-spot.

Q So where the wells have produced maybe an average of 25 or 26 thousand barrels on primary on a 40 acre tract, then an 80 acre five-spot would produce 70,000?

A Approximately 70,000.

Q Or, 35,000 per 40?

A Yes, sir.

Q So, you do expect secondary recovery to exceed the primary by some percent?

A Either approximate or exceed, I couldn't say which. If it's a real successful, I think it should approximate primary anyway.

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

He may be excused.

(Witness Excused.)

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

MR. KELLY: No, nothing further.

MR. NUTTER: Does anyone have anything they wish to offer in Case 2576?

MR. PORTER: I'm Harold Porter, representing Waterflood Associates; we are a diagonal offset of Sinclair, our leases being Section 35 of 16,31 and we would like to state that we support Sinclair's Application on the understanding that



