NEW MEXICO OIL CONSERVATION DIVISION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date MAY 28, 1998 Time 8:15 A.M.

NAME	REPRESENTING	LOCATION
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
PERRY L. HUGHES	SHAMARA OIL	[illegible]
[illegible]	Independent	Midland

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:	)	CASE NO. 11,973
APPLICATION OF SHAHARA OIL, L.L.C., FOR A WATERFLOOD PROJECT AND QUALIFICATION FOR THE RECOVERED OIL TAX RATE PURSUANT TO THE "NEW MEXICO ENHANCED OIL RECOVERY ACT" FOR SAID PROJECT, EDDY COUNTY, NEW MEXICO	)	ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

May 28th, 1998

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, May 28th, 1998, at the New Mexico Energy, Minerals and Natural Resources Department, Porter Hall, 2040 South Pacheco, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

* * *

I N D E X

May 28th, 1998
Examiner Hearing
CASE NO. 11,973

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E X H I B I T S

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* * *

A P P E A R A N C E S

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By: PAUL A. COOTER

* * *

WHEREUPON, the following proceedings were had at 8:18 a.m.:

EXAMINER CATANACH: At this time we'll call Case 11,973.

MR. CARROLL: Application of Shahara Oil, L.L.C., for a waterflood project and qualification for the recovered oil tax rate pursuant to the "New Mexico Enhanced Oil Recovery Act" for said project, Eddy County, New Mexico.

EXAMINER CATANACH: Call for appearances in this case.

MR. COOTER: Paul Cooter appearing on behalf of Shahara Oil.

I have three witnesses, Perry Hughes, H.L. Atnipp and Dave Perrine.

EXAMINER CATANACH: Can I get the witnesses to please stand up and be sworn in at this time?

(Thereupon, the witnesses were sworn.)

MR. COOTER: With the permission of the Examiner, may I have the witness sit here with me? We're going to share exhibits.

EXAMINER CATANACH: Is that okay? Can you hear?

COURT REPORTER: Yes, sir.

EXAMINER CATANACH: Okay.

MR. COOTER: We'll speak up.

EXAMINER CATANACH: That would be fine.

MR. COOTER: Thank you.

PERRY L. HUGHES,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. COOTER:

Q. Would you state your name for the record, please, sir?

A. Perry L. Hughes.

Q. And what is your position with Shahara Oil?

A. I'm President of Shahara Oil, L.L.C.

Q. Have you previously testified before the Oil Conservation Division of New Mexico?

A. Yes, sir, I have.

Q. To assist the Examiner, would you briefly relate your education and professional experience?

A. I graduated from West Virginia University in 1965 with a degree in petroleum engineering. Since then I've been employed in the oil industry as an engineer, manager, domestically and overseas. For the last ten years I've been an independent producer and consulting petroleum engineer.

Q. State what Shahara Oil seeks by this Application, Mr. Hughes.

A. Shahara Oil seeks the approval of a waterflood and tertiary enhanced oil recovery project for the Beeson "F" federal lease within the Queen, Grayburg and San Andres formations of the Loco Hills-Queen-Grayburg-San Andres Pool. This lease is located in Eddy County and is composed of 440 acres.

Secondly, we seek, approval of --

Q. Let me interrupt you right there. On the land that it covers, all of the land is within Federal Oil and Gas Lease LC-060529?

A. That is correct.

Q. Excuse me for interrupting. Go ahead, sir.

A. We also seek approval of five new proposed unorthodox oil well locations within that project, and we seek to qualify the project for the recovered oil tax rate, pursuant to the New Mexico Enhanced Oil Recovery Act.

Q. From whom did Shahara Oil acquire this property?

A. This lease was purchased from Bargo and Coastal Management -- I'm not sure -- and from Riverhill Energy Corporation.

Q. When did it acquire the property?

A. The acquisition was effective August 1, 1995.

Q. At that time was the property or the wells in an advanced state of depletion?

A. Yes, sir, they were. And they were -- they

should be regarded -- They were regarded as stripper wells.

Q. Did Shahara Oil acquire the full working interest, 100 percent, at the time?

A. Shahara Oil did acquire a hundred percent of the working interest at the time.

Q. Since then has it assigned out some interest to others?

A. Yes, sir. Shahara Oil currently is the general partner of Mountainair Limited Partnership, which owns a majority, or 74.5 percent, of the working interest in the operating rights.

Q. Have the other owners of operating rights entered into an operating agreement with Shahara Oil?

A. Yes, sir, they have.

Q. And Shahara Oil was designated the operator in that document?

A. That is correct.

Q. At the time Shahara Oil acquired this property, the same was subject to certain orders of this Division or Commission, the Oil Conservation Commission, relating to injection wells within the unit; is that correct?

A. That is correct.

Q. And those orders were attached to the Application filed?

A. They were.

Q. At this point, before I forget it, we filed an Application, and then we filed an amended Application in this case. What was the reason for filing the amended Application?

A. The amended Application included the request for the project to be considered a waterflood and a tertiary oil recovery project.

Q. Let's go back to these orders that were in effect at the time Shahara Oil purchased the property. The first was Order Number R-2031, a copy of which is attached to the Application, is it not?

A. And designated Exhibit A.

Q. Under the terms of that order, certain wells were authorized to be injection wells. Those were the -- Describe those wells. Not necessarily the locations, but give their names.

A. The Beeson "F" Federal Numbers 2, 4, 5 and 11.

Q. And there were two additional wells that the then operator was authorized to drill as injection wells. Those were Wells Numbers --

A. -- 16 and 17.

Q. To your knowledge, were those wells drilled?

A. Yes, sir, they were.

Q. So there were six injection wells authorized by that Order R-2031?

A. That is correct.

Q. That was followed by Order Number R-2031-A, was it not?

A. In October of 1962.

Q. And there was another well, authorized to be an injection well for the waterflood, then existing?

A. The Number 10 well.

Q. There were three other administrative orders. Would you give those numbers and -- well numbers that were authorized to be converted to injection wells?

A. Those were WFX Numbers 155, which authorized the Beeson "F" Number 13; WFX-165, which authorized the injection of water into the Beeson "F" Number 7; and WFX-186, which authorized injection in the Beeson "F" Number 6.

MR. COOTER: Mr. Examiner, we would ask that you take administrative notice of those five orders.

EXAMINER CATANACH: Administrative notice will be taken of those orders, Mr. Cooter.

Q. (By Mr. Cooter) At the time Shahara Oil acquired the property, what was the status of injection wells Numbers 2, 7 and 11?

A. Numbers 2, 7 and 11 were producing wells at the time that we acquired the acreage, were in an advanced stage of depletion and were regarded as stripper wells.

Q. They were not being used as injection wells?

A. There was no injection ongoing on the lease at the time of our acquisition.

Q. Two other wells that you mentioned, Wells Numbers 4 and 5, had been authorized as injection wells by the original Order 2031. What was the status of those wells?

A. Those wells were temporarily abandoned.

Q. And the other wells, Numbers 6, 10, 13, 16 and 17, what was the status of those wells?

A. Those were all plugged and abandoned and will remain so, except possibly Numbers 6 and 13, where an effort may be made to re-enter those.

Q. So when Shahara Oil acquired the property -- and I want to place emphasis on this -- the waterflood had ceased?

A. There was no injection; that is correct.

Q. And the producing wells that were on the property were in an advanced stage of depletion?

A. Yes, sir, they were.

Q. Truly regarded as stripper wells?

A. Yes, sir.

Q. Let's look at the documents which we have marked as exhibits -- and I've given each one of you a packet of those -- at Exhibit Number 1. Identify that and explain it, please, sir.

A. Exhibit Number 1 is a structure map contoured on the top of the middle Grayburg, which would correspond to the top of the Premier sand interval of the Grayburg, the lower Grayburg.

The Beeson "F" lease is that which is highlighted in the left-hand portion of the map. The highlighted area on the right-hand portion of the map is a lease in which we also have operatorship and ownership, but is not a part of this hearing today.

The structure, as can be seen, is a part of the west-to-east-dipping Artesia-Vacuum trend. We are on the south portion of the structure, and thus we have a south-southeast dip off into the Delaware Basin.

Q. All right, let's go to Exhibit Number 2, which is a cross-section. Let's talk about that, what it shows, the lands involved, the wells involved and the like.

A. Exhibit 2 is cross-section A-A', which was prepared during an evaluation of not only the Beeson "F", which is in the left-hand portion of the map, as can be seen down in the lower right-hand corner of this cross-section. The Beeson "F" lease is in Sections 29 and 31.

The cross-section indicates a general structural trend and indicates that the zones are generally contiguous wellbore to wellbore.

The completions -- method of completion intervals

and wellbore status and cumulative production is given with the individual log strips.

Q. While the Beeson "F" property is shown in the left-hand corner, it does appear that when we get to the next one, B-B' does start on the Beeson property?

A. Yes, it does. Exhibit 3, which is cross-section -- stratigraphic cross-section B-B', does incorporate the wells and does cross not only the northeast quarter of Section 31 but crosses the south portion of Section 29, which is included in the Beeson "F" lease.

Q. Are there any faults or other geologic conditions which would give any evidence that the generality of the structure is constant throughout that area?

A. There is no evidence that I have seen of any faulting. Everything seems to be continuous, generally, from a stratigraphic point of view.

There are -- As has been noted in many hearings before, the various members, particularly of the Grayburg formation, may not be continuous over long intervals. There will be stratigraphic changes. And these changes are what makes it attractive to infill drill and to waterflood on a closer spacing.

Q. Let's fold this up and go to the next one.

Next, let me direct your attention to a cross-section which has been marked as Exhibit Number 3. Let's

talk about that, if you would, Mr. Hughes.

A. Cross-section B-B', Exhibit Number 3, is a cross-section further south than A-A', in general showing on the west the Beeson "F" Number 11 across the -- to the east, to show -- actually showing some of the other wells on other Shahara leases to the east in the Grayburg-Jackson area.

Again, the comments made on A-A' are relevant to B-B'.

Q. Is the information shown on Exhibits 2 and 3, being the cross-sections, supportive of your structure map, which was Exhibit Number 1?

A. Yes, sir, they are.

Q. Next, direct your attention to Exhibit Number 4. Identify that and explain what it is.

A. Exhibit Number 4 indicates the cumulative production and injection from wells on the Beeson "F" lease, as highlighted, in addition to certain wells in the immediate vicinity, off of the Beeson "F" lease.

The cumulative oil production in thousands of barrels is shown -- is highlighted in green, and the cumulative injection in thousands of barrels is highlighted by the blue shading.

The original orders, that we spoke of earlier, referred only to that area in Section 31, and we want to incorporate not only Section 31 but the 120 acres in

Section 29, as is shown on this map, in the top right-hand portion of this map, the areas around Wells Number 8 and 9, which have not been a part of that injection program in the past.

Q. Before you put that one aside -- we could do it with the next one, but let's do it with this one -- the lands included in your proposed waterflood tertiary project follow the structure as shown on Exhibit Number 1, do they not?

A. They do. And the portions in 31 and 29 are -- shown on the structure map are generally on strike across the three portions of the Beeson "F" lease.

Q. Before we continue with the named -- or numbered exhibits, let's go to the Form C-108 which was filed in this case. Was that form prepared by you or your office, under your direction and supervision?

A. Yes, sir, it was.

Q. What -- Which wells do you propose to use as injection wells?

A. We propose to use Wells Number 2, 3, 5, 6, 7, 8, 9, 11, 12, 13, 26 and 27.

Q. Explain your proposed operations.

A. We anticipate that the average daily injection per injection well will be 250 barrels of water per day, with a maximum anticipated daily injection rate of 500

barrels of water per day, per well.

A closed injection system will be maintained. An average injection pressure of approximately 2000 p.s.i. is anticipated. Of course, these maximum injection pressures will be subject to those pressures authorized by the Division.

The proposed injection fluid will be produced water from this lease, and make-up water will be obtained from other produced water in the area, from other operators.

Q. Turn to what is attached as Exhibit A to that form. What is it?

A. Exhibit A is a small-scale map showing the Beeson "F" lease and the area of review around the Beeson "F" lease.

Q. Turn to Exhibit A-1 attached, and what is that?

A. Exhibit A-1 is an expanded scale, showing the Beeson "F" lease, and the cloud diagram showing the area of review of all wells within one-half mile radius of any of our proposed injection wells.

Q. And turn to Exhibit B. What is that?

A. Exhibit B is -- provides well data and schematic diagrams of each of our proposed injection wells, as we noted previously.

Q. There are some 12 injection wells, are there not?

A. That is correct.

Q. So the first part of that exhibit is a tabulation, followed by the schematics for each of those injection wells?

A. That is correct.

Q. All right. Turn to Exhibit C, if you would. What is it?

A. Exhibit C provides, again, well data for all of the wells within the area of review, within the half-mile area of review as was shown on Exhibit A-1.

Q. There are numerous wells?

A. Yes, sir, there are.

Q. All right. Turn to Exhibit D, and at this point let me hand you what has been marked as "Revised Exhibit 'D'", copies of which I have furnished. Why the revised Exhibit D, first?

A. While reviewing the data that was in the original Exhibit D, we noted that certain information had been omitted from certain wells, an oversight in the preparation and typing of the Exhibit D. Revised Exhibit D incorporates all of the information available to us.

MR. COOTER: In a moment, Mr. Catanach, I'm going to ask you to take administrative notice, but first I would ask to substitute the Revised Exhibit D for the Exhibit D which was attached to the Form C-108.

EXAMINER CATANACH: Okay, we'll substitute that, Mr. Cooter.

THE WITNESS: Exhibit D provides the well data and schematic diagrams of all plugged and abandoned wells within the area of review.

Q. (By Mr. Cooter) And I think some -- The schematics in the original Exhibit D remain unchanged; it's just the tabulation of those wells which was revised?

A. That is correct.

Q. So all the schematics in the original Exhibit D, which I believe cover some 46 wells --

A. That is correct.

Q. -- are correct?

A. That is correct.

Q. Were copies of that form C-108 mailed to all offset operators within the area of review?

A. They were.

Q. Those are the operators shown on Exhibit A-1?

A. That's correct.

Q. And the final attachment to that Form C-108 is your affidavit of mailing to the operators?

A. That is correct. It's shown as Exhibit E.

Q. Is that true and correct?

A. That is.

Q. And the form -- copies of the form were so mailed

by you on that date, or by your office?

A. That is correct, and all receipts were received back from all the other operators, and we received no comments.

MR. COOTER: At this time, Mr. Catanach, I would ask that you take administrative notice of the Form C-108, with the substituted portion of Exhibit D.

We did not prepare new copies to be marked as additional exhibits. This file is rather voluminous.

EXAMINER CATANACH: Okay, Mr. Cooter, administrative notice will be taken of the C-108 filed in your Application.

Q. (By Mr. Cooter) Let's go, now, back to the exhibits, and let me direct your attention to what has been marked as Exhibit Number 5. Does that also show the Beeson "F" property that's the subject matter of this Application?

A. Yes, it does.

Q. Explain that.

A. Exhibit 5 shows the proposed redevelopment of the Beeson "F" federal lease. The blue-shaded triangles are the 12 proposed injection wells, and the green-shaded wells, Numbers 18, 19, 20, 21, 22, 23, 24 and 25, are the eight proposed producing wells within this redevelopment project.

Q. Now, I think in the Application it's stated that

there may be a maximum of 11 producing wells?

A. There may be as many as 11. The additional three wells will -- or could be in the northeast quarter of Section 31 and in that portion of the lease in Section 29.

Q. Explain your proposed tertiary operation.

A. The proposed tertiary operation will involve the injection of a microemulsion, or micro-organisms, into the injection stream of the injected water to -- with the objective of removing the scale which is formed in these wellbores as a result of previous injection and production operations.

And with the micro-organisms eating the scale, a by-product of this process is the formation of an emulsion which should provide for greater sweep efficiency and greater recovery of oil from the reservoir as well as, with the removal of the scale, result in lower injection pressures in the producing wells.

Q. Mr. Atnipp will talk about that further, as will Mr. Perrine, but which of your proposed new injection -- which -- not injection wells. Which of your new producing wells, producers, will be at unorthodox locations?

A. These will be Numbers 18, 19, 22 and 24, which are within Section 31 and a part of the original waterflood area, and Number 23, which is in Section 29, which was not a part of the original or subsequent orders for injection

during the original waterflood operations.

Q. Has the BLM given its preliminary approval to those producing wells located at unorthodox locations?

A. Yes, they have.

Q. And those are combined and filed or marked as Exhibit Number 6, is it not?

A. That is correct.

Q. And those cover each one of the -- well, all five of those proposed wells?

A. That is correct.

Q. Let's go now to Exhibit Number 7, the exhibit which has been marked as Number 7, and have you talk about what that shows.

A. Exhibit 7 is a -- provides a summary of the redevelopment cost, a financial summary of the anticipated revenues and costs, and the projected net value of the additional production to be obtained from the redevelopment project involving the drilling of the infill wells and the waterflood only.

Mr. Atnipp will speak to additional costs, anticipated costs, and reserves later.

Exhibit 7 shows that the anticipated proceeds from the future production of approximately 800,000 barrels of additional oil is about $17.6 million, with capital expenditures anticipated of $2.8 million, operating

expenses anticipated of $4.2 million. This would provide a projected net value of additional production of about $10.6 million.

The breakdown of redevelopment cost of the infill drilling and waterflooding for the drilling of eight new producers, the drilling of two new injectors, the conversion of old wellbores to injectors and the reconditioning of three existing producers, plus the expansion of production and injection facilities, totaled $2.85 million of anticipated capital expenditures.

MR. COOTER: At this time, Mr. Catanach, we would tender Exhibits 1 through 7.

EXAMINER CATANACH: Exhibits 1 through 7 will be admitted as evidence.

MR. COOTER: That's all the questions I have of this witness.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Hughes, what pool are we in? I've got three different pool names here.

A. We're in the Loco Hills-Queen-Grayburg-San Andres Pool.

Q. And that includes -- I mean, that covers the entire acreage?

A. Yes, it does.

Q. Okay. Your project area is 260 acres, quarter sections in Section 31 and 120 acres in Section 29; is that correct?

A. It's nominally 320 acres in Section 31 and 120 acres in Section 29.

Q. Okay. Is the interest ownership common in that lease?

A. Yes, it is.

Q. Okay. And there is an operating agreement in place?

A. Yes, there is.

Q. Does the operating agreement provide for secondary recovery operations?

A. Yes, it does.

Q. Okay, and everybody's signed up?

A. Yes, they have.

Q. Okay.

A. And we can certainly provide all the -- copies of the operating agreement and ratifications, if you so desire.

MR. COOTER: I have those with me if you'd like them.

EXAMINER CATANACH: It might be good, just to have a copy of that in the file.

Q. (By Examiner Catanach) Okay, this area has

been -- at least the area in Section 31 has been subject to waterflood operations previously?

A. Yes, sir.

Q. That was back in the Sixties?

A. Back in the -- authorized in the early Sixties, 1962 through 1964.

Q. Okay. Whose was that, do you remember?

A. General American.

Q. General American. And they essentially conducted operations in the same intervals that you're proposing to?

A. Initially -- The first order, 2031, spoke only to the Loco Hills member of the Grayburg. Subsequent orders and the WFX orders expanded it to include the entire Grayburg, and they spoke to the San Andres, which presumably was the upper member of the San Andres, the Vacuum formation.

Q. Okay. Now, you're actually proposing to inject into the Penrose member of the Queen?

A. Probably the Queen and the Penrose member. While down in Section 31 I'm not sure that the Queen and Penrose are productive, we certainly have seen that they are up in 29, so that while we're not exactly sure what we have in 31, we do know that the Queen interval is productive in 29 and would be subject to secondary recovery operations and tertiary recovery operations.

Q. Okay. So definitely you will be injecting into the Grayburg, into what, the Loco Hills, Metex --

A. And Metex, and the Premiere interval.

Q. Okay.

A. Premiere being right at the base of the Grayburg, top of the San Andres.

Q. How about the San Andres? Anything in there?

A. Possibly. There is some indication of Vacuum porosity development in Section 29, so I think that there's -- And the Lovington interval below the Vacuum section was indicated by tests to be productive in Section -- the northeast part of Section 31 and in 29.

They certainly will be subject to flood. I'm not sure how well that the Lovington will flood. My experience along the trend has indicated that the Lovington is not a very good candidate for getting water into, because it's a very tight sand member of the San Andres. But we will attempt to flood it where it is found to be productive.

So this Application for the secondary and tertiary includes the Queen, the entire Grayburg, and the upper San Andres, as we have seen thus far.

Whether there's anything lower in the San Andres, we don't know. My experience, again, has been that the middle and lower San Andres does not flood well.

Q. Okay. Mr. Hughes, do you know how long the

previous operator conducted secondary recovery operations?

A. Mr. Catanach, I really don't know. I would estimate that it was into the Seventies, maybe mid-Seventies, but I do not know.

Q. Do you know if the waterflood they conducted was very effective?

A. It was effective, particularly in the Loco Hills member of the Grayburg. I think this is evidenced by the -- by Exhibit 4 and some of the very high recoveries in Section 31, oil recoveries that we see some of the wells -- several of the wells cum'd 200,000 to 300,000 barrels of oil.

Q. So what you're doing differently than what they did is specifically the injection of micro-organisms; is that fair to say?

A. I think what we're doing differently is downspacing --

Q. Uh-huh.

A. -- through infill drilling, in essence, changing the pattern of injection and production, and the introduction of micro-organisms.

And then, of course, in Section 29 we're starting from day 1, because there has been no injection either on the Beeson "F" in Section 29 or in the immediate area of that portion of the lease.

Q. On the five unorthodox locations, are any of those closer than 330 feet to the outer boundary of the proposed project area?

A. No, sir.

Q. They're not. They're not on --

A. None of them are closer than 330 feet.

Q. Okay, so there wasn't any need to provide notice to any offset operators?

A. That's as I understand it.

Q. Okay. Mr. Hughes, are you aware of the presence of any fresh water in this area?

A. I'm not, Mr. Catanach.

Q. So you've examined that and --

A. We have not found in examining the records of our leases and in our study of the area of review any indication of fresh water.

One of the things that I usually do when I go into an area and onto a lease is look to see if there's any windmills, and there are none.

Q. Mr. Hughes, does Exhibit D, the Revised Exhibit D that you guys submitted, does that just cover data on P-and-A'd wells?

A. Yes, it does.

Q. Okay.

A. It provides the data on the plugged-and-abandoned

wells, plus the sketches, and Exhibit C provides data on all of the rest of the wells in the area of review, all wellbores that are not plugged and abandoned.

Q. Okay. Just looking briefly at Part C here, on the first page I notice that there's a lot of information that is not here with, say for example, regards to casing depth. Do you have any comments on that or...

A. I would comment one of two things, and I don't know the answer. Either we didn't have the -- couldn't get the information, or in the transposition from our handwritten sheets to the typed sheets, we did not get all the information transposed.

Q. That's going to be a problem. Probably need for you guys to try and supplement that information as best you can.

Also, if you -- I've noticed that you've not calculated any cement tops for these wells. Is that something that you think you'd be able to do?

A. We calculated cement tops on all of the plugged and abandoned wells. But yes, we could certainly calculate cement tops in the producing wells.

Q. Okay, I would suggest that you work on Exhibit C to try and supplement cement-top calculations and casing depth and whatever information -- what other information is missing. That would certainly expedite the process of

getting your order approved.

A. I'm sure we can get that to you in a very timely manner.

Q. Okay. Have you, in fact, Mr. Hughes, looked at the area-of-review wells and satisfied yourself that none of them would provide an avenue of escape for the injected fluid?

A. Yes, I have.

Q. And that's your opinion?

A. That is my opinion.

Q. How about the P-and-A'd wells? Are you satisfied that they're all plugged adequately?

A. They're plugged according to what was the requirements at the time they were plugged.

There's a couple wells that were plugged back in the Forties that would not, probably, be the method of plugging that we would utilize now, but they seem to be plugged adequately in terms of the utilization of wooden plugs, long intervals of crushed rock, capped with cement.

These were wells that were drilled and were dry and abandoned, no shows of oil, gas or water, and were plugged.

I believe that the wells in the area of review offsetting the Beeson "F" lease are plugged adequately.

I think another thing that -- You know, with the

exception of the area in Section 29, injection operations have been conducted since the early 1960s. Recent drilling has not indicated any water flows or abnormal drilling conditions indicative of injection water being out of zone. We have done some drilling. Obviously, as you know, that's an area of high interest for deeper drilling, for Morrow drilling.

In fact, on the same -- on the Beeson "F" lease there have been deeper wells drilled, by Enron particularly, and they have not indicated to us in conversations with their drilling personnel that they've had any shallow problems with water flows or lost circulation zones or anything like that.

Q. Uh-huh. Do you know if there's -- Is there still active operations, active waterflood operations in this area at this time?

A. I think the only active injection in the area is of a disposal nature.

Certainly, to the east of these leases, further to the east in the Grayburg-Jackson Pool, Devon Energy and Weiser are conducting waterflood operations, but those operations are three or four or five miles east of these floods, proposed floods.

Q. Your expected recovery is 800,000 barrels?

A. Yes, sir.

Q. Over what period of time, do you know?

A. About 15 years.

Q. Your costs, $2.85 million, is that over -- over what period of time, do you think?

A. Between a year and a year and a half. I think we'll be somewhat governed by oil prices.

EXAMINER CATANACH: I believe that's all I have, Mr. Hughes. Thank you.

MR. COOTER: I have a couple more questions, if I may.

FURTHER EXAMINATION

BY MR. COOTER:

Q. Let me redirect your attention to Order R-2031, dated July 13, 1961, which was the original order requested by General American for the initial waterflood.

In addition to the two quarter sections in Section 31, that also covered 40 acres in adjacent Section 36 to the west. That would have been Section 36 of 17 South, 29 East, and that is not included in what you seek by this Application?

A. That is correct.

Q. So there are two differences. You include a 120 acres up in Section 29, and you eliminate that 40 acres in Section 36?

A. That is correct.

MR. COOTER: Even though no wells are located closer than 330 feet to the exterior boundaries, we did mail to all offsetting operators, and I have an affidavit of mailing, if the Division would so like it. That's in addition to the mailing of the C-108 on the waterflood, which describes. What I mailed to them was a copy of the amended Application.

And we received return receipts from everyone with the exception of MNA Enterprises in Hobbs, and we're trying to locate that. It didn't get to my office, I don't know what happened to it. But they were mailed. And we have the mailing slips where, you know, the post office stamps and acknowledges.

So it went out and hasn't come back, but neither has the return receipt. So I hate to say that the government fouled up, but we just don't have that one back. Everyone else has returned theirs.

EXAMINER CATANACH: Do you think they got it?

MR. COOTER: They -- We tried to locate it, and they don't check until so much time has elapsed. They won't even commence looking for it. But we have -- This is a separate part from the C-108 which they -- Mr. Hughes mailed to them. I mailed them a copy of the amended Application which is before you today. And the one we don't have back is this MNA Enterprises, but we have the

mailing as with everyone else.

Now, whether or not something happened to it, or something happened to the return receipt in our office, I don't know. All I know is, I don't have it.

The C-108 --

MR. HUGHES: The C-108?

MR. COOTER: Yeah. Yeah, okay. They apparently received the C-108, and Perry has the return receipt on that. But what happened to the amended application is a mystery.

EXAMINER CATANACH: They did get the C-108?

MR. COOTER: Yes. I didn't know whether or not -- This is off the record.

(Off the record)

MR. COOTER: None of these unorthodox -- They're only unorthodox because of interior lines --

EXAMINER CATANACH: Uh-huh.

MR. COOTER: -- not the boundaries. But just for the heck of it, I mailed them the amended Application.

EXAMINER CATANACH: The amended Application didn't change any of the injection operations?

MR. COOTER: No, the only thing the amended -- And we highlighted that so you wouldn't have to read and compare. We added the tertiary portion of the -- of prayer to the amended Application, and in the amended Application

we recited that the Form C-108 had been filed.

EXAMINER CATANACH: Well, this case is actually going to be continued for two weeks; is that right? Isn't it on the --

MR. CARROLL: Yeah, it's going to be readvertised due to the amended Application.

MR. COOTER: Okay.

MR. CARROLL: So the amended -- The case will also be called -- Is that in two weeks?

EXAMINER CATANACH: Yeah, I believe it's two weeks.

Why don't you just provide -- Check into that, maybe, some more, Mr. Cooter, and see if you can find out whether or not they got it.

MR. COOTER: MNA?

EXAMINER CATANACH: Yeah.

MR. COOTER: We will run that down. I think that we're, in a few more days, entitled to have the post office work on it. When we tried this week, they said their hands are tied until some later date. But we will.

EXAMINER CATANACH: Okay. At the hearing two weeks from now, you might just send in a letter or something saying what the status of that is.

MR. COOTER: Okay.

EXAMINER CATANACH: Anything else from this

witness?

MR. COOTER: I have nothing else from this witness.

EXAMINER CATANACH: Okay, this witness may be excused.

MR. COOTER: Next, Mr. Perrine -- No, I think I'll take Mr. Atnipp.

H.L. ATNIPP,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. COOTER:

Q. Would you state your name for the record, please, sir?

A. My name is H.L. Atnipp.

Q. And what is your present business association, Mr. Atnipp?

A. I'm an independent oil and gas producer, State of Texas.

Q. And where is your place of business?

A. Midland, Texas.

Q. Would you relate your education and professional experience for this hearing?

A. Yes, I have a bachelor of science in petroleum engineering from the University of Texas. I'm a registered

professional engineer in the State of Texas.

I worked for seven years for Texaco in various engineering assignments; seven years as president of Great Plains Land Company, a privately owned corporation; ten years as executive vice president of Texas American Oil Corporation, an American Stock Exchange company; and have for the last 18 years been an independent oil and gas producer.

Q. You heard -- Have you previously testified before the --

A. Yes, I have.

Q. -- Oil Conservation Division here in Santa Fe?

You heard Perry Hughes explain his plans for this proposed waterflood and tertiary oil recovery project --

A. Yes, I did.

Q. -- which concerns, the tertiary part of it, the microemulsion flooding of the Queen, Grayburg and San Andres formations, underlying some 440 acres in Eddy County.

Explain that, if you would.

A. Are you talking about what the microemulsion flood is?

Q. Yes, the microemulsion flooding.

A. Okay. With the microemulsion flood, we have an option of -- We're trying to create a surfactant to reduce

the surface tension and change the residual oil saturation. There's a lot of literature on that. You have the option of either, one, using a commercial surfactant or, two, you can create a surfactant downhole.

We are going to create the surfactant downhole by utilizing naturally occurring micro-organisms who will use, as their food source, scale. And a by-product of their emissions is a surfactant.

And so we should actually get two effects. One is, we should be able to change the residual oil saturation, because what we're doing is kind of like you get oil on your hands and you run water over it, and you still have a scum of oil. You put a little soap on it or -- and remove the rest. That's what we're trying to accomplish with that particular phase.

The second thing is the sweep efficiency or the portion of the reservoir that the liquid actually affects. A lot of scale in these projects, particularly where you have a combination of waters, probably compounds the problem.

But the micro-organisms that we have selected utilize or are designed to remove the scale. So that will be the combination that we utilize.

I personally think that you're going to be amazed at what happens with the sweep efficiency, which is the

number we all use to get back to what we actually got.

And how we're going to do it --

Q. First, let me ask you -- Pardon me for interrupting you.

A. Okay.

Q. Where do these micro-organisms come from? What's the source?

A. They are naturally occurring, and the ones that we have, we acquire, are packed in a nutrient. And we actually acquire these naturally. Ours come from Austin, Texas, is where they come from.

And I'll tell you where they got them. They got the from the limestone formations outside of Austin. That was their original source. They have growth facilities.

And you require -- There's a lot of work with the naturally occurring micro-organisms because you have no hazards to health if you spill them on the ground, get them in fresh water. In fact, there are a lot of micro-organisms that are used in water purification, and they have a lot of different uses. They are different strains of micro-organisms, each designed for specific purposes.

For example, we have those that are designed for paraffin problems, but they are not the same ones that we would utilize in this particular instance.

Q. Fine, go ahead. I'm sorry I interrupted.

A. And so you say, What results do you hope that you will have? And there's quite a bit of literature relative to microbial enhanced oil recovery. I've been to at least one microbial enhanced recovery conference, which there were representatives from 20 countries: the Russians, the Japanese, the Chinese, Australia, England. And strangely enough, one of the first efforts was in Hungary for enhanced recovery.

The Department of Energy has actually been involved in some -- providing funds for some research and development projects in microbial enhanced oil recovery.

But in this particular project, or in the projects that we have looked at, we think it is possible to recover somewhere between four and eight percent more of the original oil in place, as the result of the tertiary efforts.

Q. While you're talking about that -- and if I don't ask you now, I'll forget it --

A. Okay.

Q. -- do you have an estimate of what that additional recovery might be in this proposed project?

A. Yes. If we are able to recover four percent more of the oil originally in place, that number would be approximately 270,000 barrels, in addition to the 800,000 barrels that Perry referred to previously. The numbers

that he gave you were just from the waterflood anticipated recovery.

Q. That's as shown on Exhibit 7, which you have seen?

A. Yes, I have a copy of that.

What we will do, or what they will do, they have selected a slug size of the initial 330,000 barrels to be injected. In that water, they will have 150 parts per million of the naturally occurring micro-organisms, which is six gallons per thousand barrels of water to be injected.

At the end of the injection of the 330,000 barrels, it will just be water, although they can at any time come back if they begin to have scale problems in their injection system. We use them a lot of times just to clean out injection systems. So we don't anticipate that, but you could pick up the use of additional micro-organisms at a later date.

I think that the time framework will be essentially the same as with just a waterflood. And the reason for that is that I think you will either -- It depends on how you do it. If you go steady-state-rate injection, I think it will reduce the pressures that you go at. If you go to your maximum injection pressure and go that route, I think you will get about 20 percent more

water in the ground as a result.

Those numbers tie in with what we've done with -- In one project we had 900 barrels a day, and it was in the latter stages, and the people were only interested in reducing their injection pressure. And within 30 days we had reduced the injection pressure by 20 percent, and it stayed down for a very protracted period of time.

So I think either way, I think you'll end up with about the same time framework for your project.

Q. Let me interrupt you once more, Mr. Atnipp, and refer you to what has been marked as Exhibit 4, which is the cumulative production map. That four-percent figure of initial production --

A. No, four percent of the original oil in place.

Q. Oil in place.

A. Yes.

Q. Okay.

A. Which -- I calculated it about 6.7 million barrels, original oil in place.

Q. Why do you use the four-percent figure? Is there anything magical in it?

A. No, there's not anything magical about it. If you go to some of the literature, you will find that they talk in the range of four to eight percent, additional.

And by the way, that's the same number that some

of the CO_2 people talk about, somewhere in that range of increased recovery.

Q. What cost are you talking about by doing this?

A. The additional cost to the project will probably be about $125,000. That really is a misnomer in the concept that the micro-organisms will replace some of what they would have had to use for chemicals to cover the same problems, scale problems, the iron-sulfide problems.

So there will be a reduction from this number, or it's not a complete additive to the whole thing. If I had to guess, I would guess that the additional cost over and above would be $75,000. The total is $125,000, but I think you will reduce your cost in some other areas.

Q. Would you then classify your estimate of additional recovery of 270,000 barrels as a conservative figure?

A. I think so, yes. The Texas Petroleum Research Institute and other people have done some work, and if you had the right set of circumstances, they believe that it's possible to recover, just from the surfactant flooding, somewhere in the 50- to 60-percent range, if you end up with the proper surfactant and probably reduced spacing.

And I think this number would probably -- that we're projecting a waterflood, primary waterflood and the addition from enhanced recovery would equate to about 44

percent of the oil originally in place.

Q. Have we covered everything?

A. Well, the only thing that we have not covered is that on Perry's financial summary, if what we have said is correct using the same number -- a composite number for the price of crude, you should -- or he should recover an additional $5 million from this project, gross, from the numbers he has submitted to you.

In other words, the $17 million would be $22 million if you get the additional 270,000 barrels that we're talking about.

Q. And you mentioned that the proceeds from future production, that's 100 percent of production?

A. Yes, it is, and that's what I think that his is. We're talking about a hundred percent, not a break back to net revenue.

Q. Yeah, working interest or net revenue interest.

A. Yeah.

Q. Okay. Does that cover it?

A. Yes.

MR. COOTER: That's all the questions I have, Mr. Catanach.

EXAMINATION

BY EXAMINER CATANACH:

Q. The initial 330,000 barrels of water, how did you

determine that would be the slug, the initial slug?

A. Well, I wish I could tell you that I had an exact number for that. But that is a percentage of the original oil in place. To be exact, it's five percent of the original oil in place.

Q. So there's no -- I mean, there's no science to that, as to --

A. No, if you search the literature, I think, you'll find some ranges in there, from three percent -- And it could be addressed in many ways.

It could be addressed that this is approximately three percent of the total pore space, or five percent of the original oil in place. The literature that I've seen recommends somewhere between three and ten percent of four slug sizes.

There's no definitive thing, but they all bring to one thing where they've done it in the lab, and that is that any slug size above ten does you absolutely no good. You're just wasting your money if you go beyond that point.

But what is the optimum in this particular instance -- and I haven't been involved in any CO_2 projects, but there is nothing that precludes this number, and they probably will utilize more, maybe not for what we're trying to accomplish here but just to preclude the scale forming at some later date.

So I don't know that we have the optimum. That's what you want me to tell you. I don't know that we have the optimum.

Q. Okay. Do you know how long it would take to inject that amount --

A. Yeah, about --

Q. -- at your rate?

A. If Perry's numbers are correct, you'll be injecting for about 110 days, a little over -- about four months.

In another project that we did -- We appeared a couple of months before, and utilizing the same set of circumstances, it was about 200 and some days, a little bit -- you know, it's based on -- we select our slug size, and then the anticipated rate. It can be -- If it got the 500 barrels a day instead of 250, then obviously it will be a shorter period of time.

Q. Well doesn't the effectiveness of this wear off after a certain amount of time?

A. Well, not in the flood front itself, because the naturally occurring micro-organisms are seeking the scale that's in the formation at all times. That is their food source, and that's where they're going to go.

If you had a tremendous amount of scale right at the wellbore --

Q. Uh-huh.

A. -- it's a little easier to interpret in production operations. We use it quite a bit in production operations. The worse the problem, the longer it is before you see a presence count at the surface.

If you have no problems -- I mean, if you -- If we put them in a producing well and there was no scale, we would see the microbes appear at the surface in very short order. I've had them be, even in shallow wells, three, four weeks. I begin to think, well, is nothing going to happen?, in the producing wells.

So their movement is predicated on the number of micro-organisms and their food source. The minute they have eaten what they're going to eat there, they start seeking.

We've actually had the micro-organisms in producing operations appear in adjacent wells, that they had gone that far to continue to search for their food source. Not always, but we have actually seen them transgress.

And that's what we would like to see them do here, is just stay out in front of the flood front, and they will reproduce as long as there is a food source for them.

You could obviously kill them at any time. They

are not compatible with chemicals. Chemicals will kill them, all the things that you utilize, oxygen scavenger and those things.

We have found the micro-organisms compatible with corrosion inhibitors, by the way. But the basic chemicals that you use for scale and paraffin will kill these micro-organisms. So you have to be careful about what you inject along with them.

There are a number of projects that have been approved in the State of Texas. I happen to have one, a microbial -- or a micro-emulsion flood.

Q. You do have one?

A. Yes, I do. It's in south Texas. And a number have been filed. There have been a number of upgrades. I don't have any results from that.

In other words, very similar to this, an older flood that was to be rejuvenated by additional development and a re-establishment of the injection. I don't have any results.

And actually, we're not going to know whether we've been right or wrong until the very end, as far as the ultimate recovery coming out from this point. But that's true of the waterflood also.

Q. So what kind of medium are these micro-organisms in? Is it a liquid-type?

A. They are packed in a nutrient, that's what starts them. You can actually see them under a microscope. You know, they're present. You can physically see them under a microscope.

And we can't do it here, but in our producing wells we actually look for a presence count to tell us how frequently we should be re-treating. In other words, there are numbers, but it's millions of those things, and -- where I utilize them.

And I utilize them in my production too, instead of chemicals, primarily because of the fact that they do not create a problem with their spill or if they get on somebody or anything like that.

And a lot of the micro-organisms are also used for bioremediation. So -- I use them exclusively on the producing side also. I don't use any chemicals.

And in my producing wells, I have a number which we call presence count, and I can take a sample of the oil and send it to the lab, and when the presence count gets so low, then I re-treat the wells.

I won't be able to -- You won't be able to do that with the flood, obviously, because it's building a bank going the other way.

But there's a lot of use. We talk about the oil and gas industry, but water purification is one of the big

things.

Grease traps is another big thing. And strangely enough, in South America, the same source that I have, their biggest deal down there is in the meat industry, utilization of microbes in the meat industry. I don't have anything to do with that, but that was a surprise to me too. But there's a lot of uses for these. There are others.

Your septic system, those are micro-organisms. They're the freeze-dried variety, but that's actually what it is when you put Rid-X in your septic system.

I prefer the ones packed in a nutrient because I know how many of them are alive. I never have been able to figure out the freeze-dried variety, how many of those are activated in, say -- here in this project, if you were to try them.

And you must select the right strains for whatever. I have no idea what strains they use for -- And I don't know what the strains are here, actually. That's a proprietary thing with the people who provide them. But they are specifically designed for scale and iron sulfide.

EXAMINER CATANACH: I think that's all I have of this witness.

If you have anything else, Mr. Cooter?

MR. COOTER: Just a couple of questions. I think

they may have been covered.

FURTHER EXAMINATION

BY MR. COOTER:

Q. Would the use of micro-organisms and this micro-emulsion flooding present any danger or problems to offsetting operators?

A. No, none.

Q. Would it present any environmental problems?

A. None. USDA sheets have no requirements for the handling of the micro-organisms.

Q. Has it been considered by the USDA?

A. Yeah, I have the sheets. I don't know that I have them with me in my briefcase, but they've been prepared for all strains of this, and they all come out to be the same thing. They're not harmful.

And I would say this off the record. There's a guy that works in the lab that used to decide he would cleanse himself a little bit and drink a little bit. I'm not that strong in favor of the neutrality, but he was still around.

Q. You certainly wouldn't want to do that with oil?

A. Well, no, I wouldn't want to do it with the micro-organisms either, but...

MR. COOTER: That concludes our case.

EXAMINER CATANACH: You're not going to put your

third witness on?

MR. COOTER: No.

MR. ATNIPP: But we sure got his face red.

MR. PERRINE: I'll tell you what. I'm their bodyguard.

EXAMINER CATANACH: Okay, so I guess pending the -- You're going to submit some additional well data --

MR. COOTER: Yes, sir.

EXAMINER CATANACH: -- check into the notice again and get back to us --

MR. COOTER: Yes, sir.

EXAMINER CATANACH: -- in a couple weeks. We'll go ahead and leave the record open till the June -- What is it? -- to the June 11th hearing, we'll leave the record open, Mr. Cooter.

MR. COOTER: June 11th?

EXAMINER CATANACH: Yes, that's the next hearing date. And I think it's on that docket, as a matter of fact, the case is on that docket. It's just --

MR. COOTER: I've got a commitment on June 11th which necessitates my being in Houston, so I will not be here for the 11th.

MR. CARROLL: Well, you've already presented your case. We're just going to call for appearances and --

MR. COOTER: And you'll have the additional

information before then. So if there's a problem, I might touch base with you the early part of that week and see.

MR. CARROLL: As long as we have the information, we'll just call the case, and -- Nobody objected or appeared today in opposition, and in all likelihood nobody will do that on the 11th, so...

And if somebody does show up, then I'll just continue the case for two weeks to allow you to be here.

(Thereupon, these proceedings were concluded at 9:45 a.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 11973, heard on May 21, 1998.

David R. Catanach, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

I, Steven T. Brenner, Certified Court Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I transcribed my notes; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL May 31st, 1998.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1998