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:	
APPLICATION OF SHAHARA OIL, L.L.C., FOR A UNIT AGREEMENT, LEA COUNTY, NEW MEXICO	CASE NOS. 11,923
APPLICATION OF SHAHARA OIL, L.L.C., FOR A WATERFLOOD RECOVERY/TERTIARY RECOVERY PROJECT, QUALIFICATION FOR THE RECOVERED OIL TAX RATE PURSUANT TO THE "NEW MEXICO ENHANCED OIL RECOVERY ACT" FOR SAID PROJECT, AND FOR TWO UNORTHODOX OIL WELL LOCATIONS, LEA COUNTY, NEW MEXICO	and 11,924 (Consolidated)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: MICHAEL E. STOGNER, Hearing Examiner

February 19, 1998

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, MICHAEL E. STOGNER, Hearing Examiner, on Thursday, February 19th, 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

February 19th, 1998
Examiner Hearing
CASE NOS. 11,923 and 11,924 (Consolidated)

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* * *

A P P E A R A N C E S

FOR THE DIVISION:

RAND L. CARROLL
Attorney at Law
Legal Counsel to the Division
2040 South Pacheco
Santa Fe, New Mexico 87505

FOR THE APPLICANT:

KEMP, SMITH, DUNCAN & HAMMOND, P.C.
500 Marquette, NW, Suite 1200
P.O. Box 1276
Albuquerque, New Mexico 87103-1276
By: PAUL A. COOTER

* * *

WHEREUPON, the following proceedings were had at 8:19 a.m.:

EXAMINER STOGNER: Call the hearing to order for Docket Number 4-98. Please note today's date, Thursday, February 19th, 1998. I'm Michael Stogner, appointed Hearing Examiner for today's cases.

At this time I'll call Case Number 11,923.

MR. CARROLL: Application of Shahara Oil, L.L.C., for a Unit Agreement, Lea County, New Mexico.

EXAMINER STOGNER: Call for appearances.

MR. JON P. TATE (Southwest Royalties, Inc.): They asked me to tell you they were on their way over. Mr. Cooter had to run and pick them up. He said he'll be here any minute.

EXAMINER STOGNER: We'll put that at the end of the docket then.

* * *

(Thereupon, the following proceedings were had at 1:25 p.m.)

EXAMINER STOGNER: This hearing will come to order.

I will at this time call and consolidate both Cases 11,923 and 11,924.

MR. CARROLL: Application of Shahara Oil, L.L.C.,

for a Unit Agreement, Lea County, New Mexico.

Application of Shahara Oil, L.L.C., for a waterflood/tertiary recovery project, qualification for the recovered oil tax rate pursuant to the "New Mexico Enhanced Oil Recovery Act", for said project, and for two unorthodox oil well locations, Lea County, New Mexico.

EXAMINER STOGNER: Call for appearances.

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

I have two witnesses, Mr. Stogner, Perry Hughes and H.L. Atnipp.

EXAMINER STOGNER: Are there any other appearances?

Will the witnesses please stand to be sworn?

(Thereupon, the witnesses were sworn.)

MR. COOTER: Mr. Stogner, if I may have a preliminary comment, I think we might shorten the whole hearing.

By this Application, Shahara Oil seeks approval of what is called the Shahara State Unit, which comprises 320 acres in Lea County, described as the west half of Section 16 in Township 17 South, Range 33 East, for the depths from 4100 feet to 5500 feet beneath the surface. That encompasses the Grayburg and the San Andres formations.

The second purpose of the Application is to create a secondary waterflood and tertiary recovery project using micro-organisms for enhanced recovery. They will convert the seven present producers into injection wells and use the present injection well, which is known as the Phillips State Number 2 well. That injection well was authorized by Division Order R-3155.

The third thing sought by Shahara Oil is to drill a maximum of 12 new producers, and the reason we're here on that is, that includes two at an unorthodox location: the Phillips Number 100 well, which is located 1330 feet from the north line and 140 feet from the west line, and the Phillips State Number 101 well, which is located 2630 feet from the north line and 140 feet from the west line.

Those locations differ from the locations originally requested in the Application, which is paragraph number 7 of our Application.

The reason for the change in those two locations is a power line, which necessitated that that be done.

We would, in connection with this particular part of our Application, move to amend it to change those unorthodox locations to the locations as I stated.

The last part of our Application seeks to qualify this microemulsion flooding on the waterflood, to qualify it for the recovered oil tax rate under the New Mexico

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The last part of our Application seeks to qualify this microemulsion flooding on the waterflood, to qualify it for the recovered oil tax rate under the New Mexico

Enhanced Oil Recovery Act.

Because our exhibits are a little voluminous, we would first ask you to take administrative notice of Exhibits Number 1 through 4, attached to the Application. We will discuss those, but I did not duplicate them and file them again.

They're the unit agreement, the unit operating agreement, the Form C-108, and an agreement with Wiser Oil for the development of the common boundary line which includes the two wells which Shahara Oil seeks authority to drill at the unorthodox locations.

We also are limited in the number of the copies of these exhibits, and for that reason may I ask the Examiner, for the purpose of this hearing, if I may keep Mr. Hughes and the other witness at the table with me so that we may share those exhibits.

EXAMINER STOGNER: Sure, if that's all right with the reporter.

COURT REPORTER: Yes, sir.

MR. COOTER: Can you hear us all right?

COURT REPORTER: Yes, sir.

MR. COOTER: I know you don't have any trouble with me, but if the witnesses start to mumble, you just raise your hand and I'll kick them.

First witness is Mr. Perry Hughes.

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, L.L.C.?

A. I am President of Shahara Oil, L.L.C.

Q. And where is that company situated?

A. In Carlsbad, New Mexico.

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

A. Yes, sir, I have.

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

A. I graduated from West Virginia University with a BS in petroleum engineering in 1965. I spent 14 years with Amoco working both domestically and internationally. My final position with Amoco was Chief Engineer with Amoco, UK, exploration company in England. I spent three years with Kerr-McGee as manager of international drilling production and engineering, and for the last 15 years I've

been an independent oil operator and consulting engineer in west Texas and New Mexico.

Q. When did Shahara Oil acquire its leasehold interest in the west half of Section 16?

A. In 1993, from Lynx Petroleum.

Q. And what were those rights at that time?

A. There were three separate depth rights within the 320-acre lease, part of which was 4600 feet, part of which was 4800 feet, and another part was 5200 feet, surface to those depths.

Q. And after you acquired it, did you acquire deeper rights?

A. We went to Phillips Petroleum and put a level floor of 5500 feet under our Phillips state lease.

Q. The west half of Section 16, that 320 acres, is included in State Lease B-2148, is it not?

A. That is correct.

Q. And that lease covers much more land besides the west half of 16?

A. That's correct.

Q. At the time you acquired those rights -- and I'm leading the witness up to a certain part; I think we can make better progress -- the rights you acquired were subject to an informal working interest unit agreement?

A. That's correct, it was put into place in the

early 1980s by Lynx Petroleum.

Q. But a formal unit had never been effected?

A. That's correct.

Q. Were those wells -- How would you classify them? Were they in an advanced state of depletion?

A. Yes, they were. When we acquired the property, the seven producing wells on the lease were producing nine -- a total of nine barrels of oil per day.

Q. They therefore could be classified, correctly classified, as stripper wells?

A. Yes, sir.

Q. Let me direct your attention to the unit agreement which is marked Exhibit A. That was one that was attached to the Application, was Exhibit 1 in the Application. Place that before you.

What is the unitized formation under that proposed agreement?

A. The unitized formations are the Grayburg and San Andres from a depth of 4100 feet to a depth of 5500 feet.

Q. Let me ask you to turn to Section 12, which relates to the tract participation. Do you find that?

A. I have.

Q. All right. That sets forth the different tracts and their number of acres and the tract participation in the whole unit?

A. That is correct.

Q. The first one, that north half southwest quarter and southeast southwest quarter, under the Lynx agreement those rights were to 4600 feet.

A. (Nods)

Q. Under the northwest quarter, which I think is the last one --

A. Uh-huh.

Q. -- those were to 4800 feet. And the other ones, the southwest of the southwest, was to 5200 feet?

A. That's correct.

Q. Now, how -- We've referred to this informal letter unit agreement. Are those tract participation figures the same as were set forth in that prior document?

A. We have utilized the same tract participation formula as utilized in the informal operating agreement that Lynx developed in 1985. And those tract participations were agreed and ratified by all working interest owners at that time, as well as currently.

Q. Has that unit agreement been ratified by all working interest owners?

A. Yes, it has.

Q. Not included in that -- with that, was the ratification of Dale McCarter, who was a working interest owner -- who is a working interest owner, and that

ratification has been received subsequent to the filing of our Application and is marked as Exhibit 5. Mr. McCarter's ratifications of both the unit and unit operating agreement. Should be two pages stapled together.

Has that unit agreement been ratified by all overriding royalty interest owners?

A. There is one royalty interest owner owning .8 of 1 percent, represented by Norwest Bank, who has not ratified the agreement. We have been unable to obtain any correspondence from them.

Q. As an aside, I might add that they were notified of this hearing, they've been notified of all happenings. We assume Norwest Bank, Texas, is still a viable institution, but we can't prove it.

Let me ask you to turn to Exhibit -- one of the exhibits to that unit agreement, which is a listing of all interest owners, including the State of New Mexico.

A. Yes, sir.

Q. In your opinion, does that division of proceeds, based upon the tract participation, protect the correlative rights of all interest owners?

A. Yes, sir, it does.

Q. Let me turn next, if I may, to the unit operating agreement, which is Exhibit 4 that was attached to on our Application. That operating agreement has been ratified --

or has it been ratified by all working interest owners?

A. Yes, it has.

Q. In your opinion, Mr. Hughes -- and I'm being a little repetitious here, but will the produced hydrocarbons be allocated among the three tracts and all working interest overriding royalty owners on a fair, reasonable and equitable basis?

A. Yes, it will.

Q. Now, let me turn to Exhibit 6 and ask you to identify that.

A. Exhibit 6 is a structure map contoured on the top of the San Andres formation --

Q. That's this one.

A. -- indicating general west-to-east dip consistent with the west and east dip seen along the entire Artesia-Vacuum trend. The dip is roughly one degree, which results in a dip of about a hundred feet per mile.

Q. Let me next direct your attention to two exhibits, two cross-sections, which have been marked as Exhibits 7 and 8. Explain what those are, if you would, Mr. Hughes.

A. Exhibit 7 is indicated as A-A', is a west-to-east cross-section encompassing not only the Phillips State wells, the Shahara Phillips State wells, but the Wiser Oil Company wells in Section 17 to the west and the Phillips

Petroleum wells in Sections 15 and 16 to the east. Basically show the consistent geologic nature of the Grayburg and San Andres formations across this part of the trend.

Similarly, the B-B' cross-section, Exhibit 8, looks at a north-south -- north-to-south cross-section encompassing Phillips Petroleum wells to the north, the entire north-to-south portion of the Shahara State lease, and the Wiser Oil Company lease in Section 21 to the south of the Phillips State lease.

Q. As you mentioned, when you acquired this property, the wells in the west half of Section 17 were -- 16, were stripper wells?

A. That is correct.

Q. And is the information shown on Exhibits 7 and 8, the two cross-sections, utilized in preparing the structure map, Exhibit 6?

A. Yes, sir, I used the same information to prepare Exhibits 6, 7 and 8.

Q. In your opinion, has the unitized formation, insofar as it underlies the west half of Section 16, been reasonably defined?

A. Yes, sir.

Q. Under your proposed development plan, would that unitized acreage be adequately controlled by unit

operations?

A. Yes, it would.

Q. Let's turn to Exhibit Number 2 -- again, this was attached to the Application -- which appears to be the Division Order Form C-108, Application to Inject Water for Secondary Recovery. Let's turn to Exhibit A attached to that. What is Exhibit A?

A. Exhibit A is a map which shows the area of review around the Phillips State lease, and the cloud formation indicates the half-mile radius from all proposed injection wells within the area of review.

Q. Let's start at the north and go clockwise, perhaps, around it. That area of review covers some small tract of land in the southeast corner of Section 8?

A. That is correct, and that is Phillips Petroleum E State Lease.

Q. Go on further east, in the south half of Section 9. Who's the operator?

A. Phillips Petroleum is the operator in the entire south half of Section 9.

Q. Let's go down the east half of Section 16. Who's the operator there?

A. Phillips Petroleum is the operator of the east half of Section 16.

Q. Now, let's go down into the section below Section

21. Who is the operator in that portion within the area of review?

A. Phillips Petroleum is the operator of the southeast portion inside the area of review, and the Wiser Oil Company is the operator of the Caprock Maljamar Unit in the southwest portion of that area of review, as well as in this northeast corner of Section 20 and the east half of Section 16, to the west of the Phillips State lease.

Q. Section 16 or 17?

A. Excuse me, Section 17, to the west of the Phillips State lease.

Q. Both companies were given notice of this hearing?

A. Yes, sir.

Q. And Phillips has, in fact, ratified the unit agreement as an owner of an overriding royalty interest, has it not?

A. That is correct.

Q. At this time, let me tender an affidavit of mailing. It seems the logical time to do it.

We've looked at Exhibit A. Now let's turn to Exhibit A-1 attached to that C-108 form. What does that show?

A. Exhibit A-1 is an expanded scale which indicates the proposed development plan for the Shahara State Unit.

The eight wells with the arrow through them are

the existing wells which will become the injectors.

The large-diameter dots are the proposed development wells.

The two wells to the northwest on the section line between Section 16 and 17 to the north are the two wells in which Shahara Oil is requesting approval of unorthodox location.

The two wells to the south of those two wells in the southwest portion of the proposed Shahara State Unit are the lease-line wells shared with the Wiser Oil Company under a cooperative lease line agreement.

The four wells, two by Shahara, two by Wiser, are a part of the agreed lease -- cooperative lease line agreement.

MR. COOTER: I must apologize. Exhibit A-1 attached to the Form C-108 was originally color-coded, and when my secretary copied them, everything came out in beautiful black and white. I don't know if you have a color code or not.

EXAMINER STOGNER: Yeah, I have a color code. You've got the green wells that's your proposed new drills, the two red ones that's sharing with Wiser to be operated by Shahara, and the two blue ones down to the south along the line of 16 and 17 are the two Wiser wells, and then the existing wells to be injectors are just marked with an

arrow; is that true?

THE WITNESS: That's correct.

MR. COOTER: I'm glad we located a color copy, coded --

EXAMINER STOGNER: That's okay, when we microfiche them we'll lose the color too.

MR. COOTER: At this point I would like to ask the Examiner to take administrative notice of its Order R-3155, which relates to that Phillips State Number 2 well. That authorizes -- I think it was Shenendoah that accomplished that and got it as an injector.

Q. (By Mr. Cooter) Turning on to the exhibits that still are attached to the Form C-108, look at Exhibit B, if you would, and explain that.

A. Exhibit B provides well data and schematic diagrams of the proposed Shahara injection wells.

Q. It consists of some 4 pages, I believe.

A. Probably -- About 9 pages.

Q. Okay. Next, Exhibit C. What is that?

A. Exhibit C provides the well data for all wells within the area of review, which was the area as shown on the map, Exhibit A.

Q. Then Exhibit D is attached to that also. What is it?

A. Exhibit D provides well data and schematic

diagrams of all wells which were plugged and abandoned within the area of review. And there's a summary of those wells and then a schematic diagram of all of the wells, there being eight, which have been plugged and abandoned, within the area of review. It turns out that all of these wells were operated and plugged by Phillips Petroleum.

Q. Let's set that exhibit aside and go to Exhibit Number 3. Again, one that was attached to the Application. Identify that, if you would.

A. Exhibit 3 is the Cooperative Unit Line Injection Well and Unit Line Infill Drilling Agreement between the Wiser Oil Company and their Caprock Maljamar Unit and Shahara Oil, L.L.C., and their Phillips State lease, as proposed, the Shahara State Unit.

This provides for the drilling and operation of the four lease line producing wells, as well as the operation of the adjoining injection wells on each of the respective properties.

Q. Attached to that agreement is a form operating agreement, is it not?

A. That is correct.

Q. Turning back to the prior exhibit, the Form C-108, will the conversion of the proposed injection wells, which I think was Exhibit B to that -- Maybe just explain a little bit about what you contemplated -- what the

mechanics will be in that.

A. The injection wells, seven of the eight have production casing set and cemented through the entire pay section, the interval to be injected into. The remaining well had casing set midway through the Grayburg formation.

Each well will be -- injection will be through perforations, with a packer set within 100 feet of the uppermost perforation, 2-3/8-inch coated tubing will be utilized as the injection string, and a casing integrity test will be conducted to -- per the rules and regulations of the OCD.

All of the wells are indicated to have sufficient cement to take cement behind the casing to the point several hundred feet above the uppermost perforation.

Q. In your opinion, Mr. Hughes, will those operations, as you've described them, ensure that the injected water enters only the proposed injection interval?

A. Yes, sir.

Q. Skip over and go to Exhibit 10, which is one of the new exhibits. Review that and explain it, please, sir.

A. Exhibit 10 are the Applications to drill the Phillips State, the Shahara Phillips State 9, 10, 11, 13, 14 and 15 wells.

Q. I also think the unorthodox location wells.

A. As well as the Phillips State Numbers 100 and

101, which are the unorthodox locations on the shared lease line with the Wiser Oil Company.

Q. While the Cooperative Unit Line Injection Well and Unit Line Infill Drilling Agreement, which is Exhibit 3, lists those two unorthodox locations as originally set forth in the Application, Wiser Oil has approved the drilling of those wells at the revised locations, has it not?

A. That is correct, and is shown by Exhibit 11.

Q. Let's go back to the Form C-108 once more. That's the Application to Inject. Explain, if you would, your proposed operations and particularly as set forth in paragraph 7.

A. We anticipate that the average daily injection per well will be about 250 barrels of water per day. We think that a maximum amount that could be injected could be as much as 500 barrels of water per day during the initial fill-up period.

We anticipate that during the life of the project, we may reach an average or a maximum injection pressure of 2500 p.s.i.

The injection fluid that will be utilized will be produced water, plus make-up water obtained in an agreement with the Wiser Oil Company. As a part of that agreement Wiser agrees to take and pressurize the produced water from

the Shahara State and provide sufficient make-up volumes of water from their supply, as required to fill the reservoir and then to conduct the waterflood.

The proposed injection interval is the Grayburg and San Andres formations from a depth of about 4100 feet to 5500 feet. Each well, as it's prepared for injection, may be acidized or may be treated with Mr. Atnipp's emulsion that he will speak to a little bit later.

Q. The -- You mentioned the water agreement with Wiser Oil. Let me hand you what has been marked as Exhibit Number 12, and that's one of the new exhibits. Is that a copy of the agreement with Wiser?

A. Exhibit 12 is a copy of the pressurized water agreement with -- between the Wiser Oil Company and Shahara Oil, L.L.C.

Q. Before we get away from Exhibit 12 -- and we'll tie this in later, but the micro-organisms will be injected or placed in the water where?

A. They will be placed into the water upstream of the initial well in which injection water will be placed into, and will be, therefore, in the stream that goes to each injection well.

Q. And this, I think, will be explained in further detail, but as that water goes into the formation it has these micro-organisms, assuming that the Commission grants

the Application, and in the water that's produced there will be some of those little critters that come out?

A. In time, it's possible that the micro-organisms will pass through the formation from injector to producer and will become a part of the produced water stream.

Q. Wiser has recognized that fact and consented to it, have they not?

A. Yes, they have, in the pressurized water sale agreement, Exhibit 12.

MR. COOTER: I would direct your attention, Mr. Stogner, to paragraph 3 of that pressured water sale agreement where that possibility is certainly recognized.

Q. (By Mr. Cooter) Let's go back to the pressure a little bit. Let me ask you next to take a look at Exhibit 9. What is that?

A. As we talked about, we think that based on our analysis of injection pressures in the area of the Phillips State Lease and along the Artesia Vacuum trend and injecting into the Grayburg and San Andres formations, we believe that the maximum surface injection pressure may reach 2500 p.s.i.

Exhibit 9 is an indication of the surface injection pressures that are being encountered on the Wiser Oil Company Caprock Maljamar Unit.

This data is as of May of 1997 and shows ranges

of injection: the orange, up to 1999 p.s.i.; blue between 2000 and 2499 p.s.i.; and then above 2500 p.s.i.

And as you can see, almost all of the wells' surface injection pressure is greater than 2000 pounds, and several are at 2900 pounds or above. Hence, in our attachment to the C-108 we indicated that we anticipated the possibility of a maximum surface injection pressure of 2500 p.s.i.

Q. Your request authority for -- if this Application is approved -- for administrative approval of the higher pressures --

A. That is correct.

Q. -- with possible step-rate testing being limited to two or three or four of the wells in your unit?

A. We would like to request that we be allowed to conduct step-rate tests on two or three of the eight wells that will be injectors on the Phillips State.

Q. Let me turn next to Exhibit 13 and ask you to explain that.

A. Exhibit 13 summarizes the additional reserves that we think we'll recover, a financial summary of the project as we view it, and a summary of the costs to accomplish this redevelopment.

Shahara had two independent engineering -- reservoir engineering reports conducted on the property,

among others that Shahara owns and operates. These are the results. Both of the reports came out remarkably close in terms of their findings.

We have detailed here the information as obtained from the Colley Gillespie report, independent petroleum engineers, in Dallas, and work was performed by one of the principals, Aaron Colley, indicates that additional oil reserves of 843,900 barrels can be expected to be recovered through infill drilling and waterflood operations.

The proceeds from future production may result in future revenue of $14.4 million, capital expenditure to accomplish the recovery of the reserves is estimated at $3.7 million, and an additional $2.5 million will be spent in lease operating expenses, giving a net value of additional production before taxes of $8.1 million.

The development plan envisions the drilling of as many as 15 new producing wells, including shared wells, the conversion of seven old producers to injection, plus the current Phillips State Number 2 injector, as -- continuing as an injector, and an additional expenditure of $220,000 production and injection facilities, giving a total of $3.7 million for the capital expenditures for redevelopment costs.

Q. You mentioned one of those studies done by Colley Gillespie and Associates. Who performed the other?

A. LaRoche and Associates, also independent petroleum consultants in Dallas, performed the other report.

Q. And both of those reports were dated as of June 1, 1997?

A. That is correct.

Q. The LaRoche report gave a substantially similar estimate of the future of production and income resulting from the proposed waterflood. How close in dollar volume?

A. The proceeds were within about $100,000 over the life of the project.

I will point out that each of those reports used an initial oil price of $20 a barrel. If we were to do a report at this point, I don't believe that we would start at $20 a barrel.

Q. But as far as volume is concerned too, both reports were substantially similar?

A. Both reports indicated recoverable reserves on a 100-percent gross basis between 840,000 and 850,000 barrels.

Q. The figures that you've quoted do not include the additional recovery of the tertiary project with microemulsion flooding?

A. That is correct.

Q. That's strictly waterflood?

A. And infill drilling, that is correct.

Q. What has been the total production to date from the wells on the west half of 16?

A. Current cumulative production from the eight wells on the west half of Section 16 is about 700,000 barrels of oil.

Q. And so by simple -- or not by simple, but by waterflooding and your infill drilling, anticipate an additional 844,000 barrels?

A. That is correct, giving a sum of approximately 1.544 million barrels of oil to be recovered through waterflood operations.

Q. In your opinion, Mr. Hughes, would the proposed project result in the recovery of otherwise unrecoverable oil?

A. Very definitely?

Q. And prevent waste, both economic and physical?

A. Yes, sir.

MR. COOTER: Mr. Examiner, we would offer Exhibits Numbers 1 through 13. As I said, the first four exhibits were attached to the Application. You were furnished copies of Exhibits 5 through 13, together with my affidavit of mailing.

EXAMINER STOGNER: Exhibits 1 through 13 will be admitted into evidence at this time.

MR. COOTER: That concludes my examination of Mr. Hughes. I'm ready to proceed with Mr. Atnipp.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Hughes, before I let you go, on this last exhibit, what production figure would be attributed to waterflood, did you say? You had 700,000 barrels to date, and then you expected an additional 843,900 barrels?

A. That is correct.

Q. And you mentioned another figure attributed to waterflood, I thought.

A. I just said that the total of 843,900 will be recovered through -- as a result of the infill drilling and waterflood.

Q. Oh, okay. I couldn't tell if there was another figure.

Okay. Going back to this Exhibit Number 13, you show "Drill 15 New Producers, 9 at 100 percent..." working -- is that working interest or water injection?

A. That's working interest.

Q. Working interest, okay. Those are the nine -- are those the -- Identify those nine wells.

MR. COOTER: Give you the C-108, that map.

Q. (By Examiner Stogner) Are those nine additional wells, other than the ones that you're showing on Exhibit

1-A?

A. If we look at Exhibit A-1, those are -- There's a total of 15 locations which can be drilled.

At this point Exhibit A-1 indicates 14; it does not show a well in the northwest of the northwest. That is a location that may be drilled and may be drilled as a co-op with Wiser, but we have deferred that location for the moment.

But what we have said in our development plan and have costed is the possibility of 15 total wells, some shared, some 100 percent.

The -- Does that answer your question, or --

Q. Well, I count 10 of those green wells, which I figured would all be a -- all 100 percent of Shahara wells.

A. The well in the center of the south portion of the Shahara State lease, down by the Number 57 dryhole, right at the bottom --

Q. Okay.

A. -- that is another well which may be drilled and is being held in abeyance as a cooperative well with Wiser.

Q. Okay. So that's how come the numbers didn't add up?

A. That's right.

Q. Okay, I thought I might be missing something.

Okay. Now, the unitized formation is from 4200

to 5500, right?

A. 4100 --

Q. 4100 --

A. -- to 5500.

Q. -- to 5500.

Is that the injection interval?

A. The -- What we have seen in the drilling of the wells thus far in the area indicates that the productive interval and the injection interval will be between, based on what we know now, 4100 feet and approximately 5000 feet, which is all of the Grayburg section, plus the upper part of the San Andres.

The reason that we have styled this 5500 is that that is the base of our depth rights. There has been some indication in the area of hydrocarbons between 5000 and 5500 feet, but at this point we do not know whether those hydrocarbons can be commercially developed and/or waterflooded.

Q. Which leads up to my review of some of the plugged-and-abandoned well, especially the deep ones that extend down into the 10,000-foot range. I guess the only way to do is go by those one by one.

If you go to Exhibit 3 and then back up one page, you have a diagram of the old Leamex Well Number 57.

A. Yes, sir.

Q. Okay. It's my understanding that that 8 5/8 is down at 4640, down into the injection interval.

A. Yes, sir.

Q. And then you have an open interval underneath there, down to 5800, and that's outside of your unitized area, isn't it?

A. Yes.

Q. Okay. Now, what's to keep this fluid from migrating out from the unitized interval? That appears to be an avenue of possible escape. That's what I'm trying to alleviate here.

A. I understand what you're saying. This is a recently plugged well. Phillips just drilled this and plugged it in early 1997.

What we have to go on is only what they have -- you know, what they've provided to the Commission as to their plugging report, and they've set the plug between -- plug in and out of the 8 5/8 at 4420 to 4700, and then apparently another plug at 5800 down.

Q. What's the geology underneath that 5500-feet interval?

A. You remain within the San Andres for several hundred more feet. The San Andres in this area is about 1500 feet thick. The top in our area is probably -- is about 4500 feet. So we would have San Andres down to

approximately 6000 feet in this area.

Q. And this pool is the Maljamar-Grayburg-San Andres; is that correct?

A. That is correct.

Q. And it takes in both formations, essentially?

A. Yes, sir.

Q. Okay. Go to the next page up, Leamex Well Number 25. Now, you show that the 5-1/2-inch casing was set down to 11,499 feet and cemented with 900 sacks. Now, you show that cement coming back up inside the 8 5/8. Was that -- How was that top of cement determined? It looks like you have it at 3220; is that correct?

A. What we know is that they pulled -- they cut and pulled the 5-1/2-inch from 3200 feet and set a plug inside, in and out of that 5 1/2 stub sticking up.

Q. I was just wondering if that top of cement was reported somewhere, or did you calculate it or --

A. These were taken from the OCD records in Hobbs.

Q. Okay.

A. I do not -- there was no -- What we know, I think, is on this sheet.

Q. Okay. And if you go the next one up, Leamex Well Number 11, I don't have a top of cement in the 5-1/2-inch there, but you show it to be all the way back up. Is that reported anywhere?

A. This was what was reported in the Commission records.

Q. Okay.

A. And we transferred it directly to a diagram.

Q. Could you do me a calculation on that subsequent to today's hearing?

A. Sure.

Q. Maybe re-check those records and see if there's a top-of-cement report and, if not, then do a calculation for me --

A. Sure.

Q. -- on that Number 11?

Let's see. I'm mainly interested -- and there again, I'm going back to those wells that penetrate below it, because it looks like the 8 5/8 or an intermediate string was set right there in that injection interval, which leads -- could lead to some -- even in producing wells. They don't necessarily have to be the plugged and abandoned wells.

And I don't know if I've covered them all, but I'm looking at Exhibit Number D of that particular -- Now, this is your plugged-and-abandoned wells, and I only talked about -- what? Three of them or -- no -- Three, yeah, there was three, right? The Phillips Leamex 25, 57 and 11.

A. Yes, sir.

Q. Okay. So you're going to get me -- Those bottom two look all right. The Number 11, if you can do some figuring for me.

Now I want to go back to the Exhibit C, area-of-review wells.

The Leamex Number 9, the top of that Exhibit Number -- Exhibit C, I'm kind of confused where the top of cement would be on the production interval, on the production string on that one. You show that 635 sacks was used on that, but I don't show a top.

A. I think, again, we'll have to do a calculation.

Q. Okay. So let's mark that one, the Leamex Number 9.

And the last on this list, the Leamex Number 24, could you double-check that one for me? There again, the 8-5/8-inch was set at 47- -- oh, it's -- Okay, that's circulated. Do you concur with that one?

A. I'm not sure where we are.

Q. Okay, I'm on the last page, Exhibit C, the Phillips Petroleum Leamex Well Number 24. That one TD'd at 11,000 feet?

A. Oh, yes.

Q. But all strings, it appears to be circulated.

A. Right.

Q. So I'm satisfied with that one, okay. So we've

got the Number 11 and the Number 9, if you can do some calculating on that one to make sure that there's no inadequate cementing behind any of those pipes, or that one plugged-and-abandoned well that's still in the Grayburg portion.

There's another well here. If you go to Exhibit C and then go one page back, Phillips State Number 11, is this well producing, plugged and abandoned? What's the intent of this particular well? Have you found that one yet?

A. No, sir.

Q. Okay. There's a diagram --

A. Yes.

Q. -- the Phillips Well Number 8 --

A. Yes, sir.

Q. -- 660 foot from the south and west line, Unit M of Section --

A. Uh-huh.

Q. -- 16. And it looks like it was junked --

A. Yes, sir.

Q. -- and it looks like it was sidetracked.

A. Yes, sir.

Q. Is that going to be one of your producers or injectors?

A. That will become an injector. It's currently a

producer. It's an active well.

Q. Will that be an open-hole completion, or what's the -- What's the make-up of that particular well as far as the tubing and casing requirements?

A. Well, the 5 1/2 is set near the top of the Grayburg interval, just below the initial pays in the Grayburg. The rest of it's open-hole, 4-3/4-inch. The anticipation would be to inject that open hole.

The sidetrack -- The original hole extended just into the top of the San Andres and encountered the uppermost pay zone in the San Andres, being the Vacuum.

When they sidetracked it because of junk in the hole, they did not take it back down to the Vacuum interval.

We would like to inject into the Vacuum, but I'm not sure that this wellbore will allow that. Our intent would be to inject with the packer set right at the base of the 5 1/2 casing.

Q. And then just inject into the open hole?

A. That's correct.

Q. The -- re-enter it and -- Or do you have plans on re-entering and deepening it any?

A. They -- Reading the well file records, they had -- they indicated that they had taken the hole as far as they could. Now, granted this was back in the 1950s,

and we might be able to deepen it. It's a decision that we haven't made to this point.

Q. If an order is issued on this particular well at this time, it will be as it stands now. Please understand that if you do deepen it, that you'll need to come in and ask for -- or get whatever permit is necessary --

A. Certainly.

Q. -- for that kind of amendment.

A. Okay.

Q. And all of your wells are going to have 2-3/8-inch tubing; is that correct?

A. Coated. It will all be brand-new tubing with either Tubascope or similar plastic coating.

Q. That particular overriding royalty interest, were they involved in the -- Is that common throughout the whole west half, or just as to a particular tract?

MR. COOTER: I think just as to that particular tract. Schwartz -- Where's the unit agreement? Let me take a look at that.

EXAMINER STOGNER: Now, we're talking about that Norwest --

MR. COOTER: Yes, sir.

EXAMINER STOGNER: -- the Norwest Bank.

MR. COOTER: Yes, sir. That was under the 120 acres of the north half, southwest and southeast of

southwest.

They -- And I've forgotten whether it was -- I think it was Schwartz that signed the original working interest unit agreement, ratified that, that Lynx did.

EXAMINER STOGNER: Now, that's the only outstanding --

MR. COOTER: Yes sir.

EXAMINER STOGNER: -- interest of any kind?

MR. COOTER: Yes, sir.

EXAMINER STOGNER: So they will just be carried -- That's an override, so they'll --

MR. COOTER: Yes, sir, just --

EXAMINER STOGNER: -- they're not a cost-bearing --

MR. COOTER: No, sir.

EXAMINER STOGNER: -- interest?

MR. COOTER: No, sir.

EXAMINER STOGNER: And they will only be -- What is that? Tract 1, which consists of 120 acres?

MR. COOTER: Yes, sir, it's Tract 1.

EXAMINER STOGNER: Okay.

THE WITNESS: Nothing will change with regard to their interest as it's been being paid over the last 13 or 14 years under the voluntary agreement.

MR. COOTER: And I might add on that while it's

not really relevant, I guess, that that Tract Number 1, 120 acres, has the lion's share of participation. It has 59 percent of the unit.

EXAMINER STOGNER: Yeah.

MR. COOTER: Yes, it's not relevant.

EXAMINER STOGNER: Okay. So if you're going to do anything, you're going to do it there because you have the bigger interest; is that what you're telling me?

MR. COOTER: Well, if anything happened to their interest, it would probably be reduced. But they're -- given the benefit of the Lynx document.

EXAMINER STOGNER: Okay. And everybody else has signed and everybody else's interest is taken care of in this area?

MR. COOTER: The State, of course, as you'll notice in the letter attached to the affidavit of mailing, it makes no difference to them. They get their royalty under the 320 acres.

But everyone -- all -- Everyone that has any interest at all, financial interest, has ratified both -- the unit agreement.

EXAMINER STOGNER: Have we got a preliminary approval from the Land Office yet? Has that been done?

MR. COOTER: No, sir. But let me, if I may, direct your attention to the letter from the --

EXAMINER STOGNER: Oh, Mr. Rand Carroll has just handed me the letter I think you're referring to. Okay. Well, we -- That pretty muchly clears it up as far as the Land Office.

And your next witness, are we going to talk about the little -- the bugs a little more in detail?

MR. COOTER: Yes, sir.

EXAMINER STOGNER: Okay.

MR. COOTER: We are.

EXAMINER STOGNER: Is there anything else of this witness at this time?

I don't have anything.

Thank you, sir.

THE WITNESS: Thank you.

MR. COOTER: Sit right there, and let me bring up a chair.

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. State your name for the record, please, sir.

A. H.L. Atnipp.

Q. And what is your present business association?

A. I'm an independent oil and gas producer.

Q. And what's the -- Where do you conduct that business --

A. Midland --

Q. -- I mean your office?

A. My office is in Midland, Texas.

Q. Would you relate your education and your professional experience?

A. I have a BS in petroleum engineering from the University of Texas. I am a registered professional engineer in the State of Texas.

Work history, seven years with Texaco, primarily in reservoir engineering.

Seven years a private company, Great Plains Land Company, in the capacity of vice president and subsequently president of the company. We were primarily involved in producing property acquisitions.

Ten years as executive vice president of Texamerican Oil Corporation, a public corporation. We drilled 200 wells the last year I was there and were very active in acquisition.

For the last 17 years I've been an independent oil and gas producer.

Q. Do you have an association with a company called Microbac International?

A. Yes, I do. I have a distributorship for their

products, which are the naturally occurring micro-organisms, to distribute oilfield products for them.

Q. I know this is contrary to normal practice. When you answer a question, you look at who asks you the question, but in this case would you direct your answers to those that count --

A. Sure, be happy to do that.

Q. -- and the reporter?

Tell me a little bit about Microbac International.

A. Microbac International is very active in bioremediation and the use of naturally occurring -- and I emphasize the word "naturally occurring" -- micro-organisms in a number of areas. They have a growth facility in South America which is primarily dedicated to the meat industry. They have a growth facility in England, and they have growth facility in Round Rock, Texas, and they have been able to isolate various micro-organisms for different set of circumstances.

For example, the meat-processing business is not necessarily the same strain of micro-organisms as we have in the oil industry. And they have been able to expand even from that to micro-organisms that handle the various hydrocarbon chain ranges. They have micro-organisms designed specifically for the removal or dissolving of

scale.

So they actually have been able to isolate micro-organisms for various things. Quite a few of the micro-organisms are utilized in bioremediation. And again, we emphasize naturally occurring, because the naturally occurring micro-organisms are very good for the environment. Their material safety data sheets do not require any special handling, do not require any reporting if you spill it or if you get it on you. So -- And as a matter of fact, certain micro-organisms have been used in water purification facilities.

So there are no hazardous conditions interrelating to the naturally occurring micro-organisms.

Q. You heard Perry Hughes explain his plans for the proposed Shahara State Unit, did you not? You were sitting here?

A. Yes, I did.

Q. And the use of microemulsion flooding of the Grayburg-San Andres formations underlying some 320 acres in Lea County, New Mexico?

A. That's correct.

Q. Are you familiar with such an activity?

A. Yes.

Q. Perhaps you covered it some already, but explain just what we're talking about with microemulsion.

A. What we will do is, we will inject the naturally occurring micro-organisms along with the water as the carrier fluid. And we should be able to achieve two objectives.

Number one, the removal of the scale. And if we're able to remove the scale, we should be able to have a better sweep efficiency. In other words, affect portions of the reservoir that would not have been affected simply by the use of the water. And removal of the scale should enable us to improve the sweep efficiency.

Secondly, the by-product of the micro-organisms, after they have dissolved the scale, is a surfactant. Now, what should occur with that is that the residual oil saturation should be reduced as the result of that.

Best example I can give you about that is, you spill oil on your hands, you put it under the water, and you have still a coating of oil. You take the soap or a surfactant and you place it on your hands, and that's gone. That's the same effect.

And that is not a new, necessarily, situation. That's been known for a long time. And you have an option of utilizing commercial surfactant or creating a surfactant downhole. What this will do is create the surfactant downhole.

Q. Now, as these micro-organisms go into the

injection well, which are the oil producers --

A. Yes, sir, that's what this program calls for, oil producers to be converted.

Q. -- and the -- through the hears as that production has continued all that time, the scale has built up closer to those wellbores of those old producers?

A. Correct.

Q. And what these micro-organisms will do when they go in, then, will act on that scale which is maybe --

A. Not only close to the wellbore, but extended beyond the wellbore.

Q. Right.

A. That's what we're really trying to accomplish, not just around the wellbore, but out in the formation.

Q. Well, what I'm getting at here is, if I understand it correctly, then, that would permit the water injection pressures to be reduced as those micro-organisms did their work?

A. That is correct. We have done some programs where they were simply trying to clean up the system, and they were not trying to improve the injectivity.

One we did was 900 barrels a day. We were able to -- When the system was cleaned up, the injection pressure was reduced by 20 percent.

Q. What volume of these micro-organisms are we

talking about or looking at?

A. We are proposing a slug size in the first 250,000 barrels of water that is to be injected, that it will be 150 parts per million, which is six gallons per thousand barrels of water. And that will go until we have completed the slug. It turns out to be a total of 1500 gallons of the naturally occurring micro-organisms in the first 250,000 barrels.

Thereafter, go back to just injecting the water, it is possible that down the line, if a new scale problem is created in and around the wellbore, that the naturally occurring micro-organisms may be used just to clear up that problem. They are a replacement for the chemicals that you would normally use in any waterflood system.

Q. Now, let me ask you again. I asked you this stupid question yesterday afternoon when we were talking, and I told you I was going to ask you gain today because I'm not sure I understand.

But you have this water, pressurized water, coming from -- being furnished by Wiser --

A. Yes.

Q. -- and that's under pressure.

A. That's correct.

Q. Now, when that gets to the unit, after it reaches the unit, that's when these micro-organisms are going to be

inserted into that water stream.

A. That is correct.

Q. Does that have any adverse effect on those little critters?

A. No. It will be a high-pressure pump adjusted to the rate of six gallons of the naturally occurring micro-organisms for each thousand barrels of water that passes through the system.

Q. Well, they're alive up here when we put them in. Are they going to be alive when they get down --

A. Yes, they will be alive when they get down.

Q. Okay. I told you I was going to ask you again. Does this present any kind of danger to others?

A. No. As I stated before, this is environmentally favorable, because you do not have any problems if you get it on the ground, they're there. They're just in a more concentrated form in this particular instance.

Q. Let me give you some figures that Mr. Hughes testified. Mr. Hughes stated that production to date had been some 700,000 barrels.

A. Yes.

Q. And if the waterflood goes as anticipated -- and, from the reports, reasonably anticipated -- an additional 844,000 barrels, that makes a total of 1.5-million-plus barrels of oil that will be recovered just through the

primary and the secondary waterflood.

A. Yes.

Q. Is there some way for an engineer to reasonably calculate from that figure what was the original amount of oil in place under this tract?

A. Yes, the data that Perry has indicates that approximately 31 percent of the oil originally in place will be produced as the result of primary and the waterflooding.

If you back that up, that places about 5 million barrels of oil in place originally.

Q. Is there some way, from your experience with the product and with all the literature that you've read in your company activities, of what amount, if any, of additional oil may be recovered from the use of this microemulsion flooding?

A. I think that the microemulsion flooding -- And first, let's say that 31 percent of the oil in place is really a fairly small number as compared to what you've seen in some projects.

But I think it's possible, if we are effectively able to create a surfactant that is optimum, and to get the additional sweep efficiency, that you could conceivably be looking at somewhere between five and 10 percent additional of the original oil in place.

Q. Take a mid figure, say eight percent, and convert that to barrels, if you would, please, sir.

A. If you got eight percent additional of the oil in place, you would recover an additional 400,000 barrels.

Q. And that's in addition to the 844,000 barrels anticipated by just the waterflood alone?

A. That is correct.

Q. Oh yeah, could you give us a cost estimate for the use of the insertion of micro-organisms?

A. Yes, the slug size that has been selected would cost approximately $100,000. And if you translate that back and you are successful in getting the additional recoveries outlined, you've got it for 25 cents a barrel.

But I'd like to point something out to you, that you are using the micro-organisms to replace chemicals that you would normally have had to utilize in your injection system. And I don't know exactly what number would be, but it certainly is not an insignificant number.

So the overall additional cost to the project is minimal.

And if you create a flood front that carries that additional oil to start with, you should be able to complete the end of the project -- which they have projected for the waterflood alone of about 15 years -- in that similar time work, or only slightly less, whereas if

you ran the waterflood and came back and had to build a new bank, you're talking about significant costs associated with it, prior to the time that you begin to do it. You will save a tremendous amount of money.

And I think what you're going to see, not only in microemulsion flooding but also in the CO_2 projects in the future, is that they are going to jump from primary production to the enhanced recovery portion and eliminate that intermediate step. It just makes good sense from a dollar-and-cents standpoint to do that. If you're going to do that, get on with it.

Q. And my last question, just because I want to re-emphasize it, is that there are no environmental problems resulting from this activity?

A. No, that is correct.

MR. COOTER: That concludes my direct examination of Mr. Atnipp.

EXAMINER STOGNER: Thank you.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Atnipp, you said that a slug of six gallons per 1000 barrels of water, with the initial 250,000 barrels; is that correct?

A. That is correct.

Q. And will that be done prior to any water

injection?

A. No, no. It will be mixed in the water. In other words, the high-pressure pump that we put there will be adjusted to provide six gallons of micro-organisms for every 1000 barrels of water that come by.

It's an unusual circumstance in that they do not have their own plant. They're buying the pressured water.

But that's the way it will be adjusted to come into the system.

Q. Will that be with the initial 250,000 barrels --

A. That is correct.

Q. -- injected? Okay.

A. It will be 250,000 barrels. One of the numbers that they had in there was a possible 2000 barrels a day injected, so you're looking at -- what? About four months, something like that, of continuous injection.

Now, if the injection rate were to be something less than that, it would still be injected until you had injected 250,000 barrels of the product -- I mean water with the product.

Q. And that's just for the initial -- No other treatments after that?

A. Not any planned treatments.

Q. Okay.

A. It's possible that if the scaling begins to happen again, that they will use, but it will only be sporadic as needed to keep their system clean and the injection pressures down.

EXAMINER STOGNER: I'll throw this question out. Was that $100,000 covered in Exhibit 13?

MR. HUGHES: No, sir.

EXAMINER STOGNER: It was not. So this is an additional sum?

MR. HUGHES: That's correct.

Q. (By Examiner Stogner) Now, it's my understanding that this mixture will be initiated in produced water or fresh water?

A. (By Mr. Atnipp) Whatever water comes across to be injected.

Q. Okay. So that doesn't matter as far as the chemical make-up?

A. No, no. It does matter as to what you're trying to accomplish, as to which of the strains of the micro-organism that's used.

Q. So if your water was fresh, you'd use a different type than if it was --

A. No, no, the strain would not change. What you're trying to accomplish is to preclude -- to remove any scale or iron sulfide and to preclude the formation of scale and

scale and iron sulfide, which in this case, whether it's fresh water or salt water, the answer would be the same as far as the product.

Q. Okay. And the sulfur content of the oil, does that make a difference?

A. Not really, because the two things that you're doing, the surfactant -- I mean -- yeah, the surfactant really has nothing to do with it.

Now, if you're looking on the other side, on the production side, then yes, the answer is different, because you have separate micro-organisms for paraffin control, if you're working on the producing side, which they may well do, because the only thing that the micro-organisms are compatible with is corrosion inhibitor.

If you take any of the normal chemicals that you utilize, they will kill the micro-organisms. So you have to be very careful in that particular context, you -- as far as corrosion is concerned. And we always check it, but all the corrosion inhibitors that we have run across are compatible.

But for example, if you were treating a producing system and you had naturally occurring micro-organisms and you put a paraffin solvent in there, you've killed them.

Q. So it's imperative that no other chemical is mixed?

A. Yes, sir.

EXAMINER STOGNER: Okay. Any other questions of this witness?

You may be excused.

Anything further?

MR. COOTER: That concludes our case, Mr. Stogner.

EXAMINER STOGNER: Okay, does anybody else have anything further in Case Numbers 11,925 or 11,926 (*sic*)?

Then this matter will be taken under advisement.

(Thereupon, these proceedings were concluded at 2:52 p.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case Nos. 11923 and 11924 heard by me on 19 February 1998.

, 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 February 23rd, 1998.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1998