STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

15 March 1989

EXAMINER HEARING

IN THE MATTER OF:

Application of Read & Stevens, Inc. for statutory unitization, Eddy County, New Mexico, and	CASE 9606
Application of Read & Stevens, Inc. for a waterflood project, Eddy County, New Mexico.	9607

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division:	Robert G. Stovall Attorney at Law Legal Counsel to the Division State Land Office Bldg. Santa Fe, New Mexico
For Read & Stevens, Inc.: Company:	William F. Carr Attorney at Law CAMPBELL and BLACK, P. A. P. O. Box 2208 Santa Fe, New Mexico 87501

MR. STOGNER: At this time we'll call consolidated Cases 9606 and 9607.

MR. STOVALL: Application of Read & Stevens, Inc., for statutory unitization, Eddy County, New Mexico, and the application of Read & Stevens, Inc., for a waterflood project, Eddy County, New Mexico.

MR. STOGNER: This case was originally heard four weeks ago in February and at that time it was continued and readvertised?

MR. CARR: It was continued until this date, Mr. Examiner, because of at the time of the hearing H & S Oil Company appeared in opposition to the case and requested a continuance.

I can advise the Examiner that an agreement has been reached with H & S Oil Company. They were the only opposition to the application in this matter.

We would request therefor that at this time you take the matter under advisement and enter an order based on the record made four weeks ago, including an order granting the application, approving the waterflood project and approving a 200 percent risk penalty.

MR. STOGNER: Are there any additional comments or appearances?

Thank you, Mr. Carr. Cases Numbers 9606 and 9607 will be taken under advisement.

C E R T I F I C A T E

I, SALLY W. BOYD, C. S. R. DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case Nos. 9606 and 9607 heard by me on 15 March 1989.

Michael E. Stogner, Examiner
Oil Conservation Division

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Application of Read & Stevens, Inc. for a waterflood project, Eddy County, New Mexico. — 9607

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Robert G. Stovall
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico

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I N D E X

E X H I B I T S

E X H I B I T S Cont'd

MR. STOGNER: Call next Case Number 9606, which is the application of Read & Stevens, Inc. for statutory unitization , Eddy County, New Mexico.

Call for appearances in this case.

MR. RICHARDSON: Randolph M. Richardson, Roswell, New Mexico, P. O. Box 2423, appearing on behalf of applicant.

I have two witnesses who need to be sworn.

MR. STOGNER: Any other appearances?

MR. CARROLL: Yes. I'm Ernest Carroll of the law firm of Losee, Carson, Haas and Carroll of Artesia, New Mexico, and I'm here appearing on behalf of H & S Oil Company.

I have no witnesses. I suppose I should bring this to the Examiner's attention at this time. We had planned on behalf of H & S Oil to present witnesses today; in particular Rupe Heinsch and Raymond Lamb.

Last week when we began to put the case together, Mr. Heinsch has been under -- had some problems for the last two months, in particular a leg problem that was causing him considerable pain. We broke out

of a meeting, I think on Wednesday or Thursday, he went to Carlsbad and never returned. The doctor put him in the hospital and performed an emergency operation on his leg and he is still in the hospital. I hope he will be out this week. He was in a sedated situation and we just were unable to prepare or adequately prepare our -- of course he was just totally unavailable, and I could not get Mr. Lamb prepared because Mr. Heinsch was not available to work with us.

I am going to make a motion now, and I will renew it. What I would like to do, I would ask the Examiner then at the close of the applicant's case, I would ask that we continue this hearing until the next available Examiner's date and I'm not trying to delay it any more than is just necessary, and that is up to whatever Mr. Richardson and his -- what he might have to say and you, Mr. Stogner, but allow us to at the next hearing present my two witnesses, if we feel it's necessary.

I can tell the Commission that there are negotiations going on. We have made a couple of offers back and forth. Part of the problem, I'm not sure that one of the offers is totally understood, but it's because Mr. Heinsch was -- was in a situation where I'm not sure he knew what he was talking about. There is a possibility that we could settle this and then all we'd have to

do is notify the Commission that we rest and could take the case under advisement.

So that's procedurally what I'm asking, just to continue the case until the next available time so that we can then present our evidence.

I have also advised Mr. Richardson that should -- I don't want to cause too many unnecessary returns before the Commission, but should there be a necessity for additional, say, rebuttal evidence, I would make this representation, that I would work with Mr. Richardson in any manner and would not make any objection to how he wanted to present that evidence, whether by affidavit, deposition, whatever form, just written form or what have you, I would allow that under the circumstances because I know I'm coming here and it is an imposition. It's just something that was totally beyond our control; Mr. Heinsch's health, it's something that was just unforeseen, but whatever way it takes, it's just -- Mr. Heinsch should be out of the hospital this week, so any time after that we should -- we should be able to, and even if he's not out of the hospital I can at least prepare Ray Lamb because he would be able to meet -- I have been talking with him, talked with him yesterday at the hospital and his mind is at least clear now and is not (unclear).

MR. STOGNER: Mr. Richardson?

MR. RICHARDSON: I would like to wait until after the testimony and all the hearing is in and determine of possibly there's enough in the entry in the hearing that we could forego having a continuance.

MR. STOVALL: Let me do this on the record, Mr. Examiner, if I might.

My advice, we're talking about a legal procedural issue and I will tell you now how I will advise the Examiner to -- to conduct this. I think the request for a continuance under the circumstances is very appropriate. Our objective here is that all parties have a fair opportunity to be heard. It's a legal procedure; it's an adjudicatory proceeding; and under the circumstances I would advise the Examiner to grant such continuance as is necessary to enable Mr. Carroll's client and witnesses to be present, given the circumstances that it is not a dilatory tactic and was necessitated by a true medical situation.

And the question I would raise for the parties at this time is given that information, you know, think for a moment, if you will, as to whether you wish to present your direct case now anticipating that you will be back for a hearing in two weeks, or whether you would prefer to have the entire hearing conducted at one time.

MR. RICHARDSON: I had rather go ahead and proceed today.

MR. STOVALL: Mr. Carroll, apparently is --

MR. CARROLL: I don't feel right making an objection to that because I know he was brought witnesses in from as far away as Wichita Falls and I think he should be allowed to go ahead and put them on.

MR. STOVALL: If you don't have any objection to that, then that's, you know, certainly I would advise the Examiner to continue with it, but I want you to be aware, particularly, Mr. Richardson, that I am going to advise him that the continuance should be granted, that they have the opportunity to -- and you know, it avoids also, it avoids the risk of a de novo hearing, too, so in the long run, ultimately it's expeditious for everybody to make sure we've had full and proper hearing at this level.

MR. RICHARDSON: Fair enough.

MR. DAMON RICHARDS: Could the continuance be limited to just the witnesses of H & S Oil Company being, what, Rupe Heinsch and Ray Lamb, and any rebuttal by Read & Stevens?

MR. STOVALL: As opposed to what? What are you thinking, Mr. Richards?

MR. RICHARDS: Well, I'm assuming to limit it down. I don't want anybody else coming in at later times saying, hey, since that whole thing was continued, I think I'm going want to --

MR. STOVALL: You mean another party appearing in the case?

MR. RICHARDS: Yeah.

MR. STOVALL: Quite frankly, I'm not sure whether we could deny another party appearance if they showed up at the continued hearing.

MR. RICHARDS: That's the reason I'd like to have it limited just to Mr. Carroll representing the H & S Oil Company and the two witnesses that he's named today.

MR. STOVALL: Well, I think his -- I think his representations would, you know, he has made a representation as a lawyer to you and to the Examiner, and I expect him to honor that. I'm not sure I necessarily would limit his witnesses, if he had to rearrange and come up with some other witnesses on the issue. That would be fine.

As far as other parties who are not presently in this room appearing at a continued hearing, I'd have some real questions as to whether we could permit them at hearings.

MR. RICHARDSON: This case will not be readvertised.

MR. STOVALL: It will appear on the next -- I don't know if we'll advertise in the paper or not.

MR. STOGNER: It will not be advertised, but it will appear on the next docket.

MR. STOVALL: It will appear on the next docket, so it will be noticed in that manner.

My concern as a procedural matter is that these hearings be -- we have a full, full blown hearing opportunity to be heard, cross examination, the entire --

MR. RICHARDS: That's fine but I feel like a party not showing up today has waived their right to appear later. Mr. Carroll and his client are appearing. There are certain circumstances beyond our control why they couldn't be here, and I can understand the continuance as to that one party.

I really don't see any reason to continue it for anybody else.

MR. STOVALL: I'm not passing on the question. I don't know, I mean, quite frankly I have to just look into it and do a little research. I understand your point and I will not make a recommendation

at this point to the Examiner.

MR. RICHARDS: Okay.

MR. STOVALL: But that's my recommendation so that's --

MR. CARROLL: When would the next Examiner Hearing be that you would call this on?

MR. STOGNER: March 1st.

MR. CARROLL: It would be March 1st.

MR. STOGNER: And I will be here also. I'm not the scheduled hearing officer, I'm an alternate hearing officer, but I will be here that day and will be present in the room and maybe even co-chair this --

MR. STOVALL: Or you can come in as alternate examiner and hear this case so you can determining --

MR. STOGNER: It's sometimes difficult to have two hearing officers hearing the same testimony and --

MR. RICHARDS: I agree.

MR. CARROLL: That will be fine. That will be fine.

MR. STOGNER: I think for the -- for the sake of the record, let's go ahead and rule on this motion and grant your continuance for two weeks.

Mr. Richards, your question brought up about limiting it, as Mr. Stovall has mentioned in the record, I -- there's some question about whether -- legalities of what we'll do, and let's just cross that bridge when we get to it, is about the only thing I can say at this point.

Anything further, Mr. Carroll?

MR. CARROLL: I have nothing else.

MR. STOGNER: Mr. Richards?

MR. STOVALL: Now let me go off the record for just a second, Sally.

(Thereupon a discussion was had off the record.)

MR. RICHARDSON: Randolph M. Richardson would like to make a motion that Cases 9607 and 9606 be combined, consolidated, since they are both connected to the Bunker Hill Unit secondary recovery.

MR. STOGNER: Thank you, Mr. Richardson. We'll call next Case Number 9607 at this point.

MR. STOVALL: Application of Read & Stevens, Inc., for a waterflood project, Eddy County, New Mexico.

MR. STOGNER: Mr. Richardson has made his presentation in 9607, is that correct?

MR. RICHARDSON: No, I've --

MR. STOVALL: Entered your appearance.

MR. RICHARDSON: Entered an appearance, yes.

MR. CARROLL: And I would enter my appearance in both cases, too, consolidated, on behalf of H & S Oil Company.

MR. STOVALL: I think, to address the attorneys again in this case, we've had a motion in 9606 with respect to a continuance and I assume that would apply to 9607.

MR. CARROLL: That's correct.

MR. STOVALL: Is there any concern of having that motion apply to both cases?

MR. RICHARDSON: They do tie together.

MR. STOVALL: Mr. Richards, are you entering an appearance in this case, as well?

MR. RICHARDS: I'm just sitting around.

MR. STOVALL: Okay.

MR. STOGNER: Well, since

you're on the record, why don't you go ahead and --

MR. RICHARDS: Okay, I'm Damon Richards of the law firm of Sanders, Bruin, Coll & Worley, of Roswell, and I'm just sitting here next to Mr. Richardson.

MR. RICHARDSON: Mr. Examiner, could I ask, if we combine the cases for testimony, will you have two orders or will there be a combined order?

MR. STOGNER: It will be two orders.

MR. RICHARDSON: Two orders.

MR. STOGNER: And in the order there will be a finding that they were consolidated for purposes of testimony. It is customary and usually beneficial in matters such as statutory unitization and waterflood, since they do go hand in hand, to hear both cases at the same time but an order will -- there will be two separate -- two separate orders issued.

Are there any other appearances at this time in either case?

MR. RICHARDSON: For all three cases, yes, or two cases.

MR. STOGNER: Two cases. I wanted to give everybody in the room a chance to appear if they please.

MR. RICHARDSON: Three witnesses to be sworn.

Would you all stand and be sworn.

MR. STOVALL: You don't have any witnesses at this time, Mr. Carroll, is that correct?

MR. CARROLL: No, I do not.

(Witnesses sworn.)

MR. RICHARDSON: The first witness will be Mr. Bud Newton.

I would like to submit Exhibits One through Eleven.

GEORGE "BUD" NEWTON,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. RICHARDSON:

Q Mr. Newton, would you please state your name, address, together with your educational and professional background which would enable you to testify as an expert witness in this case?

A My name is Bud Newton. I'm with the firm of Stephens Engineering in Wichita Falls, Consulting Petroleum Engineers.

I received a Bachelor of Science degree from the University of Texas at Austin. I've been with Stephens Engineering in the capacity of petroleum engineer since that time.

Q Has Stephens Engineering conducted many waterfloods or has had much experience in the State of New Mexico?

A Yes, we have. Stephens Engineering installed and supervised the very first secondary recovery project in the State of New Mexico back in the fifties and successfully completed that project, I believe it was in 1986.

Since that time we have supervised and installed in excess of nine waterflood projects in the State of New Mexico. Currently we are operating three waterflood projects, two of which are in Eddy County, and we're supervising one additional waterflood project for Barber Oil in Eddy County.

Some of the clients that we have performed waterflood supervision services for are McClellan Oil and Gas, Murphy Operating, and Barber. We're currently operating one Penrose waterflood project approximately 15

miles to the south, 15 miles to the northeast -- to the southeast of called the East Millman Pool Unit.

Q Mr. Newton, you have before you a bound brochure of 53 pages entitle Preliminary Waterflood Study. Was this brochure prepared by Stephens Engineering with your aid and assistance?

A Yes, it was.

MR. RICHARDSON: Would his qualifications be acceptable?

MR. STOGNER: Are there any objections, Mr. Carroll?

MR. CARROLL: None.

MR. STOGNER: Mr. Newton is so qualified.

Q The Division has been handed and submitted a duplicate copy marked Exhibit One through Seven. It has been divided into seven different exhibits with each exhibit being tagged, clearly identified as Exhibit One, Exhibit Two. One or two of the exhibits refer to a map. The maps have been given an exhibit number as well as the map of the map, so that it can be readily identified.

The -- if you would, Mr. Newton, please refer to Exhibit Number One, which is a cover letter, and would you please briefly state the contents of this Exhibit One, Cover Letter?

A Cover letter from Stephens Engineering prefaces the body of this report. It's addressed to Read & Stevens, Inc.. This cover letter serves the purpose of defining the purpose of the waterflood study. In addition it defines the area of interest, being called the project area. It gives a brief summary of the history of production from the Bunker Hill Penrose area, as well as our recommendations of future activity that we would recommend that occur in the future in this same project area.

Q What type of operations does this summary indicate is necessary?

A It would be our recommendation that the Bunker Hill Penrose Sand be unitized for the purpose of conducting secondary recovery operations and after such time that a unit has been approved, that a pilot waterflood project be installed for the purpose of determining several things.

A pilot waterflood in the Penrose Sand would serve the purpose of determining injectivity into the reservoir into the Penrose Sand, as well as determining any preferential permeability trends in the reservoir.

At that time we would also be able to determine anticipated injection pressures for the full waterflood project.

After the pilot waterflood project has

been completed, this Exhibit One recommends that the remainder of the field be converted to a secondary recovery unit for the purpose of full waterflood operations.

Q Will you now please refer to Exhibit Two, which is entitled History and Development and please state the contents of this exhibit?

A History and development is a detail of the history of drilling and completion Penrose Sand Wells as well as other nearby formations in the Bunker Hill Field, giving a chronological order of how the wells were drilled and completed and by whom these wells were drilled and completed. Also gives a detail of the previous production obtained from the various reservoirs in the Bunker Hill Field.

Q Do you say when the first Penrose -- the Penrose was first found to be productive in the Bunker Hill area?

A That was in October of 1964.

Q And how many Penrose wells were drilled between 1964 and 1980?

A None.

Q And when were these wells drilled?

A The wells were drilled between 1980 and 1983.

Q So practically all the drilling and de-

velopment within the Bunker Hill Penrose Field has been between 1980 and 1983 and when would you consider that that Penrose Field, Bunker Hill Penrose Field, reached its economic limits?

A I would say late 1987 or early 1988.

Q What was the daily production from the 28 wells within the unit area at the time you began assembling information for this engineering study?

A Approximately 115 barrels of oil per day, 3 barrels of water per day, and 325 MCF of gas per day.

Q And this would equate to an average of how many barrels per well per day?

A It would be 4.1 barrels of oil per day per well.

Q So, from having studied this field and area, can you state positively that the reservoir has -- reservoir to be unitized has been reasonably defined by development?

A Yes, it has.

Q If you would, would you please now refer to Exhibit Three, which covers pages 5 through 21 of the brochure, and is entitled Geological and Reservoir Data. The written test refers to plats and maps by name and I have tabbed these plats as Exhibit Three, together with

name. Please briefly describe the lithology and structural features and thickness of the Penrose Sand as found within the unit area. When referring to a plat or a map, please state the Exhibit Three and name of plat.

A From the report the Penrose Sand is a Guadalupe Series, Permian Age sandstone found at an average subsurface depth of approximately 3,550 feet in the project area.

Reservoir rock is described as a moderately compacted, moderately sorted arkosic sandstone with anhydrite occurring as the major cementing agent. The sandstone grains are consistently coated with corrensite and discrete chlorite which are water and acid sensitive clays.

Field structure indicates the Penrose Sand to be draped on the eastern flank of a subsurface high rising to the northwest at an average rate of 70 feet per mile. The zone is bound on the top and bottom by distinctive anhydrite beds. Areally reservoir limits are defined to the northwest, west, and southwest by the gas cap and to the east, southeast, and northeast by an increasing loss of adequate porosity.

Exhibit Three, Geologic Structure Map, page 19, is a map that is contoured on the bottom of the Penrose Sand. Along with that map, Exhibit Three,

Structure Map, the top of the Penrose Sand is a structure map contoured on the top of the Penrose Sand.

Page 20, Exhibit Three, Isopachous Map Oil Column, shows the limits of the reservoir as they extend in each direction, north, east, south and west, as well as the contoured intervals of that sand.

Exhibit Twenty-one -- I mean Exhibit Three, Isopachous Map Gas Cap on page 21, is a gas cap gross volume pay that shows the areal limits and contour intervals of the gas cap existing in the pool.

Q Mr. Newton. you'll also find a tab which reads Exhibit Three, Well Records, and another which reads Exhibit Three, Reservoir Data. Could you please state the contents of these portions of Exhibit Three?

A Exhibit Three, Well Records, is a summary by well for each well in the proposed unit area, of each well's drilling and completion history as well as recompletions, subsequent treatments. This well records tabulation shows dates and depths formations were encountered and completed in the Bunker Hill Field.

Exhibit Three, Reservoir Data, deals specifically with the Penrose Sand as it occurs in each well in the proposed unit outline. This tabulation shows the surface KB elevation of the well. It shows the occurrence of the Penrose Sand in each well. It shows the per-

forated interval in each well and the total gross pay in each well. In addition it shows several, or two, reservoir characteristics, those being the average porosity encountered in each well, as well as the average water saturation encountered in each well.

Q Mr. Newton, from your studies and report, did you determine that the reservoir was in effect composed of three different areas --

A Yes, I did.

Q -- of production and what would those areas be?

A Those areas will be an area comprised of gas cap only; an area comprised of a gas cap underlain by an oil column; and an area comprised of an oil column only.

Q In calculating your gross acre feet of pay in the reservoir, what percent porosity did you use as a minimum or a cutoff?

A 11.8 percent of the pore volume.

Q With your calculations, what is the net productive oil reservoir volume?

A 4,380.8 acre feet.

Q In addition to the 11.8 percent porosity cutoff, Exhibit Three shows that you use some 13 other factors in analyzing the reservoir. Without going into detail as to all of the tremendous calculations and consider-

ations, what were your conclusions as to the original oil in place and the amount that has been recovered through primary operations?

A I had calculated the original oil in place in the Penrose Sand in the Bunker Hill Field to be 548.8 stock tank barrels per acre foot

Primary recovery operations have recovered 76.1 stock tank barrels per acre foot.

Q In your opinion what is the estimated percentage of original oil in place that has been recovered?

A 13.9 percent.

Q And you also show some cumulative gas production and as of August 1st, 1988, your cumulative gas production shows to be 618,600 MCF. Did you you estimate what percentage of this gas was produced from the gas cap and what percentage produced is solution gas?

A Yes, I did. I estimated the percentage of the gas recovered that would be included as solution gas was 43 percent, while the gas that had been recovered that was attributable to the gas cap was 57 percent.

Q And your calculated oil saturation as of August the 1st, 1988, shows to be 43.3 percent. In a solution gas drive reservoir what does this movable oil saturation indicate?

A First off it indicates that normal primary recovery has occurred. There was no -- there were no extraneous circumstances involved with primary recovery.

Secondly, it indicates that there is a sufficient oil saturation remaining in the reservoir to economically justify a waterflood program.

Q Does Exhibit Three, which you have just reviewed, state a statement or contain a statement as to the reservoir horizontal limits?

A Yes, it does. Horizontal reservoir limits, as referenced in Exhibit three, Geological Reservoir Data, states that areally the reservoir limits are defined to the northwest, west and southwest by the gas cap; to the east, southeast and northeast by an increasing loss of adequate porosity.

Q Was a unit outline determined from and made to correspond to the horizontal limits of the reservoir?

A Yes, it was. In determining our recommendation for the proposed unit outline we included each 40-acre tract that was cut 50 percent or more by the 5-foot contour interval.

Q Has there been any water produced along with the oil and gas from the Penrose?

A Very negligible.

Q And what does this lack of water indicate?

A It indicates firstly that the reservoir is not now nor has been in the past affected by active water encroachment.

If further indicates that the reservoir is an irreducible water saturation.

Q Mr. Newton, I have marked pages 22 through 38 as Exhibit Four, which is entitled Estimate of Recoverable Oil. Please state the contents of this Exhibit Four and your conclusions as to the number of additional barrels of stock tank oil that are estimated to be recovered through secondary recovery operations.

A Exhibit Four shows our methods for determining oil in place, as well as our method for determining the cumulative primary production and what percentage that occupied.

It further indicates our methods for determining the projected secondary recovery of oil from the Penrose Sand as a result of waterflooding.

We've determined or have estimated the future recovery in stock tank barrels from the Penrose Sand as the result of waterflooding operations to be 342,959 barrels.

Q That is additional oil to be recovered

through secondary.

A Right.

Q You have previously testified that approximately 13.9 percent of the original oil in place has been recovered through primary operation. If you add primary and secondary you estimate a recovery of 676,237 barrels. What percent recovery of original oil in place do you estimate this as being?

A This would represent 33.7 percent of the original oil in place.

Q And your secondary to primary ratio you calculate as being what?

A 1.03 to 1.

Q Now, Mr. Newton, Exhibit Four, pages 24 through 38, are graphs showing reservoir performance curves on 15 leases in the Bunker Hill Pool.

Based upon your study of reservoir performance did you confirm that the Penrose Sand reservoir has reached its economic limits under primary operation?

A Yes, it is has.

Q What generally happens to a pool or a field that has reached economic limits?

A If secondary recovery operations are not undertaken, then wells will be plugged and abandoned leaving recoverable reserves in the ground.

Q Will your recommended water injection program has been marked Exhibit Five and consists of pages 39 through 51 of the brochure with page 47 being a plat of proposed injection facilities for a completed, full flood.

Does this Exhibit Five also set forth the participation formula?

A Yes, it does.

Q Would you please state the parameters or factors which are the basis of your participation formula?

A Surface acreage per tract, the floodable volume, floodable reservoir volume contained beneath each tract, the cumulative primary recovery experienced by each tract, and the current barrels of oil per day equivalent being experienced on each tract.

Q And what weight percentage do you give each of these four factors?

A We gave surface acreage 3 percent weight; reservoir floodable volume, 47 percent; cumulative primary recovery, 25 percent; and current barrel -- barrels of oil per day equivalent, 25 percent.

Q Which factor or what factor has been the greatest weight?

A The floodable reservoir volume contained beneath each tract.

Q And prior to arriving at your

participation formula did you consider other factors which may have been involved, or other factors, say, that you had used on different waterflood areas?

Just, in other words, these four things weren't the only things that you considered?

A That's correct. There are always a number of different parameters that can be included in a participation formula in any combination. Other factors that we included, that we considered while developing this formula were the gross Penrose footages included in each well as well as the current cash flow being experienced on each tract; however, the final formula did include just these four.

Q Well, based upon your study, knowledge and experience, is this participation formula you have prescribed the most logical and perhaps the best for this particular reservoir?

A Yes, it is.

Q Will the participation formula allocate production to the separately owned tracts on a fair, reasonable and equitable basis?

A Yes, it will.

Q We note that there are several tracts within the unit area that have not been drilled. What is the purpose of including the undrilled tracts?

A The purpose of these undrilled tracts is to protect the unit from non-unitized offsetting withdrawals. If allowed, if someone were allowed to come in and offset the unit while not cooperating with the unit, they could do considerable damage to the future operations.

Q Were these undrilled tracts given any weight in your participation formula?

A Yes, they were. We included a 3 percent weighted factor for surface acreage.

Q Exhibit Five also, Mr. Newton, mentions certain reservoir characteristics which could affect permeability. Would you mention these and state what can be done to perhaps overcome that effect.

Q Potentially detrimental to the success of the waterflood is the fact that the reservoir does contain corrensite and discrete chlorite, which are water sensitive clays. If not properly handled and if injected water is not properly treated, those clays could be caused to swell, limiting permeability in the reservoir. That would be a detrimental effect.

The other detrimental possibility is that within the reservoir there are contained high permeability streaks which would preferentially control the flow of water; however, with a properly monitored waterflood program, those things can be overcome, also.

Q Exhibit Five also contains a cost estimate for a pilot as well as for a completed, poolwide flood.

As I understand it, this cost estimate was prepared last August or September and was based on prior cost experience personally gained from other waterflood of a similar nature. A more recent cost estimate, prepared in December, is considerably higher than that set out in Exhibit Five.

Without going into an item by item cost analysis, will you please state the estimated cost of the pilot project as well as a completed poolwide flood as shown by the most recent December estimate?

A The most recent estimates for installation of a pilot project is $165,905. Upon installation of that pilot project there will be existing salvage equipment available in the field for sale and after the sale of that equipment the net investment for that pilot waterflood project would be $151,705.

When expansion to the full waterflood came about, the investment there would be $303,690. Once again there would be considerable salvaged equipment available for sale and that would bring the net investment for the expansion down to $196,201.

Q Are there any particular items that you

would like to mention that would account for this increase from your first estimate as shown in the Exhibit Five to the December estimate?

A Yes. One of the specific items that accounted for the increase in cost was plastic-lined tubing to be run in the injection wells. I had previously not -- not included plastic-lined tubing for the injection wells.

In addition costs have been included for damages to right-of-way, preparation of location, just simply updated costs from the time that I initially did my estimate till December, as well as some included costs for ditching and laying of lines.

Q Mr. Newton, the unit operating agreement, specifically the accounting procedure, attached as Exhibit E to the operating agreement, provides for administrative overhead rate of $3,500 for drilling wells and $325 dollars for each producing well.

Could you explain, please, why administrative overhead rates on an injection well should be the same, or very nearly the same, as a producing oil well?

A It is my opinion from experience dealing with injection projects, that an injection well requires the same, if not more, administrative work on a regular basis than do producing wells. By that I mean that volumes, injected volumes of pressures on injection wells must

be monitored and recorded daily, as well as filing regulatory forms. So I believe that injection wells do take just as much time, if not more time, to administratively keep up with as producing wells do.

Q Well, assuming that the waterflood will progress beyond the pilot stage and will result in an ultimate recovery of an additional 343 barrels of stock tank oil, could you please tell the Division your calculated return on investment and how you adjusted for widely fluctuating oil prices?

A To take into account the fluctuating oil prices, we ran two pricing scenarios, the first of which was a flat oil price case. Currently in the Bunker Hill Field we're receiving 7 -- $16.79 -- .75 per barrel for oil. Based on that flat case the return investment for the waterflood project is 3.7-to-1 after operating expenses.

Along the same lines to make some kind of an indication of what the return on investment would be from an escalated pricing case, we did just that, we escalated prices throughout the life of the flood in a reasonable manner, not at all what I would consider to be out of line as far as installation, and that pricing scenario yields the return on investment of 70.6-to-1.

Q This return on investment will be over what period of time?

A Over an 8 to 10 year period.

Q And you did talk about that. In arriving at this return to investment ratio you did include and calculate into your computations the monthly operating cost.

A Yes, I did.

Q Is that correct?

A Yes, I did.

Q In your opinion will the additional cost for this waterflood and unit return a reasonable profit to the working interest owners?

A Yes, it will.

Q Is a unit and unit operations necessary to effectively conduct secondary recovery operations?

A Yes, I believe they're absolutely necessary if this project is to be undertaken.

Q Will unitized operations substantially increase ultimate recovery?

A Yes, they will.

Q Will unitized operations of the Penrose Sand reservoir prevent waste and result in substantially more recovery of oil and gas than otherwise would be recovered?

A Yes, it will result in substantially more recovery of oil and gas. The amount of additional oil

recovery is approximately equal to the primary oil recovery; therefore secondary operations would double oil recovery.

Q I have marked page 52 of the brochure as Exhibit Six. Would you please state what this exhibit shows or contains?

A Page 52, which is Exhibit Six, is a tabulation of the calculated unitization parameters pursuant to the participation formula previously discussed. This tabulation lists each parameter that we included into the unitization formula by tract and then gives a resulting tract participation factor for each tract.

Q And is this the breakdown on a lease by lease, tract by tract basis of all of your participation for --

A Right.

Q -- all the factors in that?

Mr. Newton, the last exhibit, being the last page of the brochure, has been marked Exhibit Seven, and is entitled Composite Performance Curve. Would you please briefly describe what this graph shows paying particular attention to the projected points in time?

A This is a projection of our estimate of future withdrawal with the recommended waterflood program. The first point, being January 1 or February 1 of 1989, is

when we projected the pilot waterflood project to begin.

Approximately one year later, which is 1-1 of 90, is where recommended that expansion to the full waterflood program occur. As you can see, with wells being converted to water injection, you would have a drop in your current oil production rate at that time.

Ten months later we propose to see the first response from water injection on a fieldwide basis and it would take 30 months to reach the peak oil production rate, as indicated by the peak on the curve.

At the end of the flood, which is 53 months later, we propose that -- or we had estimated that the performance will be at economic limit by that time.

Q Mr. Newton, could you or could anyone, a petroleum engineer, production specialist, layman, whatnot, guarantee that a waterflood would be successful?

A No.

Q Is it possible for three or four more, three, four, or more petroleum engineers, geologists, whatnot, to have three or four different opinions as to workability?

A Yes, very possible.

MR. RICHARDSON: I have no further questions, Mr. Examiner.

MR. STOGNER: Thank you, Mr.

Richardson.

Mr. Carroll, your witness.

CROSS EXAMINATION

BY MR. CARROLL:

Q Mr. Newton, in your study of this particular Bunker Hill area, have you found that the pay zone throughout this area is -- is generally the same with respect to porosity and permeability?

A I didn't find any wide variations, no.

Q Have you, and I'm not sure, just trying to determine just exactly what process you were going through in calculating the pay zone, have you determined -- did you calculate what would be called a net pay zone for these wells?

A Yes, I did.

Q Okay. What was the criteria that you used in determining the net pay zone?

A The net pay zone was determined by first projecting what future and then ultimate primary recovery should be. We know from experience (unclear) speaking of "we", know from experience that recovery, primary recovery in a clean sand in this area should be 13 to 14 percent of the oil in place.

Using that we -- we calculated the net

pay, first by determining the gross pay in each well. We then planimetered a map constructed of contoured intervals and applied that 12 to 14 percent primary into that, coming up with a net to gross adjustment of 30.8 percent.

Q Well, how -- how did you determine gross pay?

A By log analysis.

Q Okay, did you examine each log for all the wells, then, in this -- the -- that are contained within this outline of this proposed waterflood?

A Yes.

Q Now, this particular -- the sand that we find out here, this Penrose Sand, in this area, it is not what one would normally call a clean sand, is it?

A It's not entirely clean, no.

Q In fact there's a high concentration of anhydrite or an anhydritic sand found in this -- this Penrose area.

A There is a concentration. I don't know that I can call it high, but there is present anhydrite right here.

Q Did you take into consideration in determining the net pay zone this occurrence?

A Yes. The anhydrite was precisely why I could not use gross pay calculations. The logs that I had

to work with when beginning this study, did not discriminate between sandstone and anhydrite. Those logs were just not able to do that. Therefore, I did have to take anhydrite into consideration.

Q All right. Did you try to determine what the net pay zone for each of these wells was on the basis of log, log analysis?

A I did try, yes.

Q All right, I take it by your answer that you were unsuccessful or you threw that out.

A Right.

Q Why were you unsuccessful and why did you throw it out?

A I was unsuccessful in determining net pay directly from logs because of what I just stated, that anhydrite, on the logs that I had to work with, was not distinguishable from the pay sand. The logs simply did not differentiate between nonproductive anhydrite and productive sand, and after -- after going through and making some assumptions as to net pay and then running those through volumetric calculations, the recovery results were simply not -- were simply not possible; therefore I threw those numbers out.

Q Did you prepare any cross sections of this area, the proposed waterflood area?

A I did not personally, no.

Q Were any cross sections prepared in connection with the preparation of this report that you've been testifying to that has the Stephens Engineering stamp?

A Not to my knowledge.

Q Wouldn't a cross section have been helpful in trying to determine some of the problems with the anhydritic occurrence in this reservoir and also the -- you mentioned one of the problems of this kind of reservoir is these permeability streaks.

Wouldn't a cross section have helped you determine where those things lie and given you some aid?

A Not from the suite of logs that I had to work with, no. I didn't see any particular reason to go to -- to do the cross section. I didn't see any wide variation from well to well as I looked at logs, to indicate any discontinuity in the reservoir. Further, the suite of logs that I had to work with would not have shown any appreciable permeability differences between the wells, so I did not feel it was necessary in this case to do a cross section.

Q All right. Are you saying that each log that you looked at, the area that -- the pay zone area that we're talking about in the Penrose Sand, appeared to be virtually the same?

A I didn't see any major differences, no, that I recall.

Q All right. Now you spoke "suite of logs". What kind of logs are we talking about that you were examining?

A There were electric logs and, if I remember correctly, a suite of logs called guard logs, and those are the type logs that I have worked with.

Q All right. Did you examine this -- these same kind of logs on the wells that were found on the Larue and Muncy operated acreage?

A Well, off the top of my head I cannot recall what type of logs I had to work with on those. I just -- I don't remember.

Q It is your testimony that the porosity and permeability on the H -- on the Larue and Muncy acreage which are -- were noted by the names the Rutter Federal Lease and the Joe Lease, do they exhibit the same kind of porosity and permeability that you find throughout the rest -- the remainder of this proposed waterflood area?

A I do have an indication, a well -- reservoir data tabulation in the report.

The Joe No. 1 exhibited normal porosity. I did not have a porosity available for the other (not clearly understood.)

MR. RICHARDSON: Might I make a slight clarification here?

You referred to the Larue and Muncy wells and that is the wells under which your client has an interest.

MR. CARROLL: That's correct.

MR. RICHARDSON: And you're representing H & S; however, the leases that are being discussed as Larue and Muncy are the leases under which your client has an interest.

MR. CARROLL: Yes.

MR. RICHARDSON: The Larue and Muncy wells are yours, you're talking about.

MR. CARROLL: That's -- that's correct, the Larue and Muncy, for the record, and for the Examiner, is the actual operator of some 200 acres and my client, H & S Oil is a working interest owner of approximately 25 percent under those two leases.

MR. STOGNER: Let me go back and make sure I'm clarified on this.

On Exhibit Number Six, page 52, Larue and Muncy, there's two leases, a Joe lease and a Rutter Federal, is that correct?

MR. RICHARDSON: Right, yes.

MR. STOGNER: Do those have

tract numbers?

MR. RICHARDSON: Yes, under the unit agreement. I think they are both Tract 1 and 2 in the unit.

MR. STOGNER: So Joe would be Tract 1?

MR. RICHARDSON: I believe that's correct. Randy, do you have a copy of the unit agreement there that would have that?

MR. STOGNER: Maybe I'm getting ahead of myself. I just -- let me rephrase that. It's clearly shown on -- in some later testimony which will be coming up, is that correct?

MR. RICHARDSON: Yes, the Larue and Muncy Joe Federal Lease is Tract Number 1.

The Larue and Muncy Rutter Federal is Tract No. 2.

MR. STOGNER: For more clarification, Mr. Carroll, H & S has -- do they have a certain percentage in both of these leases?

MR. CARROLL: They have, as I understand, it is the same percentage, roughly, in both leases, approximately 25 percent working interest.

MR. STOGNER: Thank you, Mr. Carroll, you may proceed.

A In answer to your question about porosity on the Larue and Muncy properties, I found the porosity on the Joe No. 1 to be 13.9 percent, while the field-wide average porosity was 13.4 percent; therefore, the Larue and Muncy property to the south had above average porosity.

Q All right, then the porosity that you're talking about is determined the same way that you described earlier. You did not determine it from the logs but you determined it through the process of using, I guess, volumetric type calculations.

A The porosity was determined from logs, right.

Q Oh, the porosity was determined from the logs?

A Yes.

Q Now, you used, and in questions by Mr. Richardson, you -- you talked about the fact that these wells out here had reached their economic limit. Would you define what you meant by economic limit?

A Economic limit is commonly referred to as the point at which a well is no longer economic to produce. In other words, you're losing money by keeping that running.

Q All right. Did you perform -- what kind

of calculations did you perform? Was it just one general calculation or did you look at each well in this area?

A I did not look at each well. I calculated perhaps a field-wide economic limit and I understand from -- from speaking with Read & Stevens and to their employees, that in fact lease by lease the property has declined to the economic limit.

Q Well, have you performed any kind of analysis of the Larue & Muncy acreage, or obtained any figures concerning operating costs, that sort of thing?

A I did obtain figures for operating costs on that lease, yes.

MR. RICHARDSON: And also production figures.

A And production figures, also.

Q What value for oil were you using in determining your economic limit?

A What value?

Q Yes, what price.

A The current price at that time.

Q Do you recall what that was?

A I don't recall just what that was.

Q That is -- it was lower than the 16.75 that we -- that you talked about when you were determining your return on oil.

A I believe it was at that time; however, I still believe the field has an economic limit at $16.75.

Q Okay, do you recall what -- what your average lease cost was for a well or for a lease that you were using?

A Oh, --

MR. RICHARDSON: You're speaking of operating cost, is that correct?

MR. CARROLL: Yes.

A No, I do not recall. I'd have to look that information up.

Q Now, you -- on page 41 of this brochure that's been prepared by your company, the -- at the top of it you have the -- this is the participation formula that you're proposing to be used by -- in this project, is that correct?

A Yes, it is.

Q That formula, was this a formula that you arrived at, Stephens Engineering arrived at?

A Yes.

Q Can you tell me what information was used in determining that with respect to the surface acreage that it would be given a, I guess, an influence factor of 3 percent. What -- what caused that?

A The main reason that we decided to

include a 3 percent weighted average for surface acreage was due to the fact that we were including non-drilled tracts. Those non-drilled tracts had to have -- had to be given some -- some type of participation in the unit. With no production occurring on those tracts at the time, no prior production on those tracts, surface acreage was about the only thing left.

In addition there were some acreages to the south, I believe the Joe Federal, as a matter of fact, was one that has considerable surface acreage but was not drilled up. In order to fairly include that tract in the unit we decided the surface acreage was fair.

Q Why did you choose the figure of 3 percent as opposed to, say, 5 or 10 percent?

A Because of this problem.

Q What criteria did you use --

A To arrive at this 3 percent?

Q Yes, that's a fair question.

A Just talking with -- with my employers and what they found out there in the past as far as secondary recovery formulas, as well as some -- some discussion with the BLM.

Q Do you recall what -- what is the closest waterflood unit to this particular area? Do you know?

A No, I don't. I don't know what the closest waterflood unit is to this, no.

Q All right.

MR. RICHARDSON: The Square Lake, I think, is a waterflood. It's right close but it's not Penrose.

A We have a Penrose 15 miles away.

Q Okay. Most of the undrilled acreage that's going into this unit does occur on acreage that my client has a working interest under, isn't that true?

MR. RICHARDSON: About 50 percent.

A Yeah, there are other undrilled tracts included in the unit that I don't -- I have no knowledge that your client has an interest in.

Q Mr. Richardson indicated that about 50 percent of the undrilled acreage is under this, is that what you --

MR. RICHARDSON: The west half of the northeast of 14 and the north half southwest of 14, which is, what, 160?

MR. CARROLL: Uh-huh.

MR. RICHARDSON: So there's 40 acres, roughly -- no, it wouldn't be that much -- there's 80, 80 acres Larue and Muncy acreage going in.

MR. CARROLL: Uh-huh.

MR. RICHARDSON: And 160 of non Larue and Muncy acreage.

MR. CARROLL: All right.

Q The remainder of these figures, the weighting of 47 percent towards -- with respect to the floodable volumes, the 25 percent for the cumulative primary production, and the current barrels of oil per day equivalent, you're saying that these are just figures that you arrived at after consultation within your organization.

A Yes, and consultation with Read & Stevens and other people knowledgeable about this project and knowledgeable about unitization.

Q Okay, well, what -- was there any established criteria that you looked at, I mean other than, well, we get 25 percent over here, 28 percent over here, was there actual criteria that you looked at to arrive at a numerical value?

A There were no specific written guidelines to have me arrive at those figures, no.

Q Okay. Now, apparently you have used, in determining what -- what the cost for this project is going to be, you have actually taken into consideration the fact that once this area is unitized, that the wells that have already been drilled, you will have available to the

operator of this waterflood to salvage equipment and -- and have taken that into account in trying to reduce the overall cost.

A Yes, that's correct.

Q So that is, in fact, one of the -- a prime consideration, then, of this operator, is to utilize the material or the well equipment out there on these leases.

A Use as much as possible and sell the remainder so a credit can be issued to the unit.

Q Now, you have testified that the $325 per month overhead cost is, I guess, an appropriate figure not only for the producing wells but the injection wells in this waterflood, is that correct?

A Yes, that's correct.

Q Where and how did you arrive at the $325 per month? How did you determine --

A Those figures were arrived at independently of anything I had to do with. Those figures were arrived at, I believe, by Read & Stevens. They did consult us on what we felt like averages were running in that area, and this figure does fall within averages, published averages.

MR. RICHARDSON: Those averages are published, I think by the Ernst and Whinney Sur-

vey.

Q So you're telling me that you did consult Ernst and Whinney, the published averages that they -- that service that they provide when you -- you at least compared the figure to you by Read & Stevens to those published averages.

A Yes, I did.

Q What -- do you recall what the low is for a figure per month overhead cost in this area?

A No, I don't know. I don't know that that was published. It may have been and I didn't pick up on it. I do not recall what the low and high were in that area; just the average.

Q In figuring your return on investment, you've stated that you first figures a return of 3. -- 3.7 to 1 based on 16.75 flat oil price.

Then you stated that you had an escalated pricing formula. Is that escalated pricing formula one of your exhibits that have been presented to the Commission?

A No, it's not.

Q How did you escalate this pricing and could you describe for me what you were doing then?

A I increase the price of oil $1.00 per barrel per year for the first five years and then I -- at

that point I put the oil price on a (unclear) 6 percent increase per year throughout the life of the flood.

As far as gas production, I increase the price of gas by 10 cents a year for five years and then put the price of gas on a 6 percent escalation thereafter.

Q Mr. Newton, did you -- on page 20 of your brochure you have prepared an exhibit and as I understand it, and correct me if I am incorrect, there is a dotted or hashed line that goes around and I believe it is -- is labeled "estimated floodable limit."

Is that, the area within that hashed line, is that the area which you feel like you're going to have an effective waterflood?

A Yes.

Q Did you prepare or try to determine how much of the acreage that you've included in the boundaries of this unit lie outside of that estimated floodable limit but within the boundaries that you've proposed?

A Ask that again. I'm not following you.

Q Okay, what I'm trying to find -- if you use a -- defined a -- a waterflood, the outer limits, and I'm just trying to determine the percentage of the acreage that lies within your estimated floodable limits and -- and the percentage of the acreage that lies outside of it.

A I do not know what percentage of acreage

lies outside of the floodable limit.

MR. RICHARDSON: What page are you on?

MR. CARROLL: Page 20.

A That would be easily arrived at but I have not done that.

Q How long do you feel it will be before the outer limits that you have, this estimated floodable limit will be reached in this waterflood?

A Approximately, from -- from the time of waterflood inception?

Q Yes.

A Seven -- seven to eight years.

MR. RICHARDSON: Mr. Carroll, did you say page 20?

MR. CARROLL: Page 20, yes.

MR. RICHARDSON: That is your oil, isopach map oil column, is that correct?

MR. CARROLL: That's -- that's the one I was referring to, yes --

Q If you would look at page 15 of your -- your brochure and I've forgotten now what -- I think you call that exhibit -- part of Exhibit Three, Well Records.

The well records that you have here for the Larue and Muncy, it's got -- you show, at least, the

Amoco Federal. The Amoco Federal was not included in your boundaries of this unit, was it?

A No, it was not.

Q Okay. Now is there -- and I'm just wondering if there's some omission or what have you -- I -- I see no well records for the well on the Rutter Federal acreage. Is it -- have I just overlooked it?

A Now I believe that -- I believe that lease, as far as well records, did get left out because I was not able to obtain any well records for that well.

Q Now this Amoco Federal acreage was excluded, and could you tell me again why it was excluded?

A Amoco Federal lease was not included in the unit because it had no substantial primary oil production. We felt like it was not going to contribute anything to the unit if it were included.

MR. RICHARDSON: I'm sorry I didn't mark you a book, too, Mr. Carroll.

MR. CARROLL: Well, you didn't have it to mark.

And just to clear up, Mr. Richards, were there other exhibits outside the book that you presented to the Commission?

MR. RICHARDSON: Yes, not on his testimony. It was a unit plat and land testimony,

which will come up later.

MR. CARROLL: Okay, well, that's what I wanted. All the exhibits that Mr. Newton had testified to are in this particular volume.

Okay, I think I'm just about through. Let me check one thing.

MR. STOGNER: Mr. Carroll, Mr. Richardson, any redirect?

MR. RICHARDSON: No.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Newton, in your testimony you stated how you came up with the unit area and what -- could you go over that with me again?

A Yes. We included in the unit outline each tract that was cut -- that had 50 percent or more of its area included within the 5-foot contour interval.

Q Okay, now direct me to the map with the 5-foot contour interval.

A Page 20, which is Exhibit Three, Isopach Oil.

Q Okay. Now when I look up in the north-western portion of this, like in Section 14, the northeast quarter of the -- I'm sorry, the northwest quarter of the

northeast quarter, I, correct me if I'm wrong, I don't see that any of that quarter quarter section is included in the 5-foot interval.

A Let me -- let me go back and say, I've forgotten also to mention that we did throw in a couple of tracts for the purposes of protecting the unit from non-unitized withdrawals. There were a few, there were a few tracts that were included to protect the unit but were not cut by that 5-foot contour.

Q Could you tell me what tracts those were?

A All right, let me find it. Just a second.

Okay, let me direct your attention to page 40 of the report.

Q Okay.

A At the top of the page, a little ways down, consequently the north half of the southwest quarter of Section 14; the southwest quarter of the southwest quarter of Section 14; the west half of the northeast quarter of Section 14, were included for protection purposes.

Q What do you mean protection purposes, if you can go into that in a little more detail.

A Okay. Let's get back to a map to look at here. If you'll look at pages 20 and 21, which is the

isopachous map for the oil column, and the gas cap. If unauthorized and uncooperative or non-unitized parties were allowed to come in at certain -- in these tracts that we have included for protection, if they were allowed to come in and uncontrollably withdraw fluids or gas from those areas, they could cause a lot of damage to the future of the waterflood project. Therefore we protect the unit by including those tracts so that non-authorized withdrawals cannot occur.

Q Why wasn't, for instance, the southeast quarter of the northwest quarter, that Texaco lease, why wasn't that brought in? It looks like that appears that it could be in the same parameters for protection purposes?

A That Texaco tract, we didn't feel like there was much possibility at all that a well would be drilled there.

If you'll look directly to the west, Read & Stevens has that tract and we feel like that their well can block any gas cap withdrawals from that Texaco tract.

Q Okay, now this is an associated pool, is that correct?

MR. RICHARDSON: Correct.

MR. STOGNER: Now, is this Read & Stevens well in the south portion of the northwest

quarter, is that a gas well? Do you know, Mr. Newton?

A Are you referring to that Amoco Skeeter Well?

Q No, the Read & Stevens No. 1 Well, which you -- I'm sorry, is that the Amoco Skeeter 1?

A Yes.

Q Yes.

A No, I believe that is a gas well. I believe that's an oil well in a different formation.

Q In your opinion a well drilled into the Penrose formation, do you feel -- in this particular area -- do you feel that would be a gas well or an oil well?

A Gas well.

Q Okay. Now as far as the percentage in the quarter quarter section which is included in the unit, other than these protection areas, as we look into the south and to the east and to the north, those parameters are included, is that correct?

A Which parameters?

Q You said your 50 percent of a quarter quarter section that falls within the --

A Right, that's correct, and that's indicated by page 20, the isopachous map of the oil column.

Q Do any of these wells make water?

A I think the total field makes 3 barrels

a day.

Q So there is no water --

A Nothing to speak of.

Q All right; strictly a gas cap reservoir in the truest sense.

A Exactly.

Q Okay.

MR. STOGNER: Mr. Richardson, the witnesses coming up, will they be testifying as to the presentations that was made to the mineral interest owners in this unit area concerning the proposed packers and all that kind of -- and such as that?

MR. RICHARDSON: Yes.

MR. STOGNER: Okay.

I have no other questions of this witness at this time.

Are there any other questions of Mr. Newton?

MR. CARROLL: I have none.

MR. STOGNER: Okay, you may be excused at this point, Mr. Newton, but we may recall you later.

A Okay.

MR. STOGNER: Let's take about a ten or fifteen minute recess, how about that?

(Thereupon a recess was taken.)

MR. STOGNER: This hearing will resume to order.

Mr. Richardson?

MR. RICHARDSON: Yes, sir, I have one witness which has been sworn.

RANDALL R. FORT,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. RICHARDSON:

Q Mr. Fort, would you please state your name, address, educational and professional background which enable you to testify in this case?

A My name is Randall R. Fort. I live at Box 3084, Roswell, New Mexico. My educational background, I have a Bachelor's degree and a Master's degree from Eastern New Mexico University; been a landman approximately twelve years, independent and company landman.

I've been with Read & Stevens the past eight years.

Q You are employed by Read & Stevens at the present time as an in-house full employee --

A That's correct.

Q -- landman.

A That's right.

Q And as part of your duties, you were charged with contacting royalty owners, working interest owners, and aiding in the assembling of signatures to this unit agreement and unit operating agreement.

A Yes, sir.

Q And have you read the unit agreement and unit operating agreement and are familiar with the contents?

A Yes, sir.

MR. RICHARDSON: Will Mr. Fort -- let's see, are his qualifications accepted?

MR. STOGNER: Are there any objections?

MR. CARROLL: None.

MR. STOGNER: Mr. Fort is so qualified.

Q Mr. Fort, you have before you a plat which has been marked Exhibit Eight. I have already handed these, or submitted his plats as the case continuation. This will be Exhibit Eight.

MR. STOGNER: Thank you.

Q You have before you a plat which has been marked Exhibit Eight. Would you please tell the Division what this plat reveals?

A That's the unit outline of the Bunker Hill Waterflood Unit proposed. It's in Township 16 South, Range 31 East, Eddy County, New Mexico. It covers parts of Sections 13, 14, 23 and 24.

You'll note that the pilot program is also delineated thereon.

Q Could you please tell the Division by legal description the lands that are included within this unit area?

A Okay, it's all in 16 South, 31 East, Section 13, the southwest quarter of the northeast quarter and the west half of 13; Section 14, the northeast quarter and the south half; Section 23, the east half of the northwest quarter, the southwest quarter of the northwest quarter, the northeast quarter, the northeast quarter of the southwest quarter, the north half of the southeast quarter; and in Section 24, north half of the northwest quarter and the southwest quarter of the northwest quarter.

Q Mr. Fort, again referring to the plat, would you please state the number of acres of Federal, State and fee lands within the unit outline?

A There are 840 acres of State of New Mexico lands, 320 fee acres, and 200 Federal acres.

Q And total acreage would be what?

A 1360 acres.

Q Could this unit outline be considered as the horizontal limits of the Penrose Sands formation?

A Yes, sir, that's my understanding.

Q You have before you, Mr. Fort, a copy of the unit agreement, also sometimes referred to as the plan of unitization. Three copies of this unit agreement were filed with the Division along with the application for statutory unitization.

Have any changes been made in the unit agreement between January 23rd and today, February 15th?

A There's no material changes. There's been some typos that we found and three of the partners have elected to sell their interests and just get out, so they've sold their interests to Read & Stevens.

Q There are no material changes that would affect the meaning of anything, though.

A No, sir.

Q The unit area contains 200 acres of Federal lands. Has the BLM designated this unit area as suitable for secondary recovery operations?

A Yes, sir, they have.

Q I have submitted to the Examiner a copy of a letter marked Exhibit Nine. Could you briefly say what Exhibit Nine shows?

A It's a letter from the BLM in Roswell to Randolph Richardson just saying that the unit has been tentatively approved by the BLM.

Q And has the BLM approved the form of unit agreement?

A Yes, sir, they have.

Q The Commissioner of Public Lands, has the Commissioner of Public Lands approved the unit agreement?

A Yes, sir, he has.

Q A copy of the letter of approval, tentative approval or preliminary approval by the Commissioner of Public Lands, has been submitted as Exhibit Ten.

Have both the BLM and Commissioner been furnished copies of the engineering study introduced by the previous witness?

A Yes, sir, it's my understanding that they have.

Q The preliminary approval letter from the Commissioner provides that you must submit the initial plan of operations as provided for in Article 11 of the unit agreement, as well as a redesignation of well names, num-

bers and descriptions. This is to be submitted at the time the unit agreement is filed for final approval. At the proper time for filing what would be your initial plan of operations?

A They'll begin the pilot operation, operation of the pilot flood at that time.

Q You would also file proper Division forms redesignating the unit wells.

A Yes, sir, that's correct.

Q Is that correct?

A That's correct.

Q Please, Mr. Fort, if you would, turn to Article 11 (h), paragraph 3 of the unit agreement and read for the record the definition of unitized formation.

A A unitized formation shall mean that interval contained in the Penrose Sand underlying the unit area, the vertical limits of which extend from an upper limit described as +950 feet above mean sea level to a lower limit of +700 feet above mean sea level. The Penrose Sand was recorded on the Dresser Atlas compensated Densilog, compensated neutron log taken on the Dartmouth No. 1 Well located at 660 feet from the south line and 660 feet from the east line of Section 14, Township 16 South, Range 31 East, Eddy County, New Mexico, on April 29, 1981, as being the interval from +804 feet above sea level to +776

feet above sea level, said log being measured from a corrected Kelly drive bushing elevation of 4,402 feet above sea level.

Q Would this definition of unitized formation also define the vertical limits of the unit area?

A Yes sir, to my understanding, it does.

Q Would you please now refer to Article II (i), or little 1 on page 3 and read the definition of unitized substances.

A Unitized substances are all oil, gas, gaseous substances, sulphur contained in gas, condensate, distillate, and all associated and constituent liquid or liquifiable hydrocarbons, other than outside substances within and produced from the unitized formation.

Q Mr. Fort, does the unit agreement provide for allocation of unitized substances among the several different tracts of land within the unit area?

A Yes, sir, it does.

Q What is the basis of this allocation?

A It's the tract participation formula in the unit agreement.

Q In your opinion does the unit agreement and participation formula allocate unitized substances on a fair, reasonable and equitable basis?

A Yes, sir.

Q Who is designated as unit operator?

A Read & Stevens, Incorporated.

Q Would you say what the effective date of the unit agreement would be?

A It should be the first day of the month after approval by the BLM, authorized officer of the Commissioner of Public Lands, and the OCD.

Q And the filing in Eddy County.

A Right.

Q Exhibit B, Mr. Fort, to the unit agreement shows a very divided ownership as to most of the tracts, as well as a great difference of ownership between tracts.

Does this extreme diversification of ownership between tracts, as well as there being several 1-well tract, indicate that unitization is necessary?

A Yes, sir, definitely.

Q Approximately how long has this unit and secondary recovery operation been under consideration?

A We started in approximately May of '86, approximately 2-1/2 or 3 years, you might say.

Q Have all individuals and entities owning an interest, whether royalty, overriding royalty or working interest, been furnished copies of the unit agree- ment and their joinder solicited?

A Yes, sir, they have.

Q How many different individuals or entities were furnished copies of the unit agreement?

A 98.

Q 98. Excluding the BLM and State of New Mexico, royalty owners are entitled to 15.24 percent of the unit production. What part of this 15.24 percent has been committed to the unit agreement?

A We have 11.574864 percent committed.

Q And if you include Federal and State royalty in your total commitment, what percentage do you have?

A I have 20.744631 percent.

Q And this is what percent of the total?

A It's 70 -- well, with the State and Federal, you mean?

Q Yeah, with the State and Federal.

A 84.9 percent.

Q 84.9 percent. In other words, 84.9 percent of the royalty is committed.

A Right.

Q And the working interest owners, Mr. Fort, are due to pay 100 percent of the cost of unit operations and what part of the working interest, or what is your percentage of the working interest that is committed?

A We have 80.183689 percent.

Q Of the working interest --

A Of the working interest --

Q -- that is committed.

A -- right.

Q Have you made any efforts to obtain joinder by the noncommitted owners?

A Yes, sir. We have several letters that we've written and then phone calls to some of them; a trip to Artesia the other day.

Q Well, can you offer any explanation as to the uncommitted working interest?

A Some of the people just don't want -- don't want to join the unit at this time. We still have several that just have not returned their paperwork yet. I don't think there's any problem there; just haven't got around to returning it to us.

Q Would you say that Read & Stevens has made a good faith effort to secure voluntary commitment?

A Yes, sir.

Q In your opinion will the unitization of the Bunker Hill Penrose Pool and adoption of unitized operations therein benefit both working interest and royalty owners?

A Yes, sir.

Q Does the unit agreement or plan of operation provide for the sharing of cost and expenses to be incurred?

A No, sir, the unit agreement doesn't but the unit operating agreement provides for that.

Q You have before you a copy of the unit operating agreement, sometimes referred to as plan of operations. Three copies of this instrument have also been filed with the Division, along with the application for statutory unitization. Have any changes been made in this unit operating agreement between January 23rd and today, February 15th?

A Once again, no material changes. We've found some typos and the owners that Read & Stevens has bought out, but there are no material changes to the operating agreement.

Q Mr. Fort, will you please refer to Article X, page 6, of the unit operating agreement, and please briefly state the manner in which existing investments in wells and equipment in connection therewith will be adjusted between the working interest parties.

Also on page 6, Article X, the unit operating agreement provides that all wells and equipment, and so forth, will be delivered to the unit operator. Could you briefly follow through Article X and state how invest-

ments in such equipment will be handled and accounted for?

A Okay, once again very basically, your working interest owners get together and appoint an investment committee. They then take into possession of the unit any necessary items, items that are necessary for the unit, and a value is established for each of those items when they're taken.

After that's done, then the working interest owners, all the working interest owners, then are asked to approve that valuation to make sure that you all agree.

Q And it's balanced out credit to each --

A Right, like I said earlier, then you have either a credit or a charge to that person's account.

Q What provision is made in the unit operating agreement governing the cost of capital investments?

A Well, they're paid for by the unit operator and then the consenting working interest owners pay their unit working interest share.

Q How will operating costs, as well as capital investments be allocated and charged to the different working interest owners?

A According to the unit participation.

Q How will the operator recover expenditures made on behalf of a working interest owner who

does not in turn reimburse the operator?

A Well, the operator's granted a lien to recover unpaid amounts, to recover it out of production.

Q Does the unit operating agreement provide that the unit operator may charge interest on unpaid invoices or statements?

A Yes, sir.

Q What interest rate is described in Article 12.4?

A I-1/2 percent per month.

Q Is there a provision in the operating agreement providing for the carrying of nonpaying working interest owners?

A Once again the lien provisions and the operator can request the payment of nonpaying working interest owners' share by the paying of working interest owners.

Q These would be so-called carrying provisions where you have a lien and where we're talking about consenting working interest owners who have not paid bills or won't pay their share of the cost.

Is there anything in the unit operating agreement covering nonconsenting parties, those who will not join the unit?

A No, sir, there's not.

Q Does the unit operating agreement provide for a penalty to be recovered out of production allocated or owned by a nonconsenting working interest owner?

A No, sir, it doesn't.

Q In view of the fact that a nonconsenting party can take advantage of a waterflood without paying cost and can also interfere with proper injection and with its proper withdrawals, do you believe it reasonable and equitable that the unit operator be allowed to obtain reimbursement as well as paying a penalty out of production?

A Yes, sir, I do.

Q In this instance what would you consider a fair and reasonable penalty, taking into consideration that operator can expect no production for approximately one year?

A I'd say at least 200 percent plus costs, plus actual costs.

Q Does the unit operating agreement designate Read & Stevens as unit operator and further provide how Read & Stevens will supervise and conduct unit operations?

A Yes, sir, it does.

Q Please refer to Article VI, page 4. Does this Article VI provide for resignation or removal of operator and also a method of selecting a successor

operator?

A Yes, sir, it does.

Q Mr. Fort, an operator may resign at any time but what percent rate is necessary for removal of an operator?

A 80 percent after excluding the operator's interest.

Q So briefly upon resignation or removal, how is a new operator selected?

A Well, three or more of your working interest owners having 65 percent or more of the total unit interest can approve a new operator. The new operator has to accept the responsibility and then he has to be approved by the OCD, BLM, and Commissioner of Public Lands.

Q And Article IV of the unit operating agreement is entitled Manner of Exercising Supervision.

Would you please briefly state or outline the contents of this article with emphasis upon the voting procedure?

A Okay. Well, each working interest owner has a waterflood representative and each working interest owner has a voting interest equal to his unit participation. All matters that -- will be determined by an affirmative vote of four or more working interest owners having a combined voting interest of at least 65 percent. You can

also vote by mail and you can also do poll votes if you have a matter that comes up and notify the people by letter or telegram and they can vote in that manner, also.

Q At what point in time would you anticipate commencement of the unit operations?

A Approximately within sixty days after unit effective date.

Q What would be the effective date of this unit operating agreement?

A Well, the unit operating agreement is the same as the unit agreement.

Q And that effective date would be -- be what?

A Well, within, as we said before, within 30 days of -- I'm sorry, the first day of the month after approval by the various agencies and then filing in Eddy County.

Q And what is the term of the unit operating agreement?

A Well, the term of it runs concurrent with the unit agreement, and it's good as long as there's production or drilling, reworking, or other operations with no cessation of more than 90 days.

Q Does the unit operating agreement provide for continuation after termination of the unit

agreement?

A Yes, sir, it does.

Q When does the unit operating agreement terminate?

A After all the wells have been plugged and abandoned and there's been a final adjustment made.

Q So the unit operating agreement does provide for settlement of all accounts upon termination.

A Yes, sir.

Q Mr. Fort, you have now referred to an Exhibit Eleven. You have before you a copy of an affidavit which has been marked Exhibit Eleven, the original of which has been handed to the Division.

Would you please relate the contents of this affidavit, together with mentioning any exhibits attached thereto?

A Okay. This basically says that I'm stating that I'm a full time employee of Read & Stevens, who's the operator of the unit; that I was responsible for contacting all the owners of any kind within this unit; that all the owners were mailed by certified mail, return receipt requested, a copy of the unit agreement and the -- that working interest owners were mailed copies of the unit operating agreement in addition to the unit agreement. Joinders were solicited. All owners were also notified

more than 20 days prior to this hearing before the Division that the hearing would be held February 15th and that protests could be made or -- in person or by correspondence to the Division.

And then attached to this affidavit as Exhibit A is a list of the names and addresses of all the owners of interest in the unit area; and attached as Exhibit B is a copy of the return receipts on all the certified mailings that were done, which were sent to all the owners in the unit.

MR. RICHARDSON: I have nothing further.

MR. CARROLL: I have no questions.

MR. STOVALL: I think at this time I'd like to just get something into the record. Oh, yeah, I'm sorry.

MR. STOGNER: How many exhibits would you like to admit into evidence at this time?

MR. RICHARDSON: I'm sorry, all Eleven. I'm sorry, that will be this case.

MR. STOGNER: One through Seven and then Eight through Eleven?

MR. RICHARDSON: One through Seven, Eight through Eleven.\

MR. STOGNER: Are there any objections?

MR. CARROLL: No.

MR. STOGNER: Exhibits One through Eleven for Case Number 9606 will be admitted into evidence at this time.

Mr. Stovall?

CROSS EXAMINATION

BY MR. STOVALL:

Q Mr. Fort, I notice on your Exhibit Eleven, your interest owners list, there appears a William J. Lemay as having an overriding royalty interest.

A Yes, sir.

Q And that is the same William J. Lemay who's the Director of this Division, is that not correct?

A Yes, sir, that's correct.

MR. STOVALL: Let me state for the record that Mr. Lemay and I have discussed this. He advised me previously that he had an interest in -- over-riding royalty interest in this unit, which quite frankly, he's been unable to sell and dispose of in an effort to -- to avoid any appearance of conflict, but because he does have an interest in this unit, Mr. Lemay will not be re-viewing this case as Director. He will not be -- have any

contact with this case whatsoever and we will assign this case to Victor Lyon, Deputy Director, as Acting Director, for an order in this case.

I want that in the record so that we understand what Mr. Lemay's role is in this particular case.

I have nothing further.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Fort, in the provisions of the advertisement, as I understand it, you are seeking maximum penalty pursuant to the statutes which -- for those people in which the unit operator has to carry --

A Right.

Q -- of the undedicated interest, is that correct?

A Right, that's correct.

Q And you are seeking now 200 percent, is that correct?

A That's correct.

Q How is -- what is this 200 percent based on?

A What's it based upon?

Q Yes. Why are you seeking the maximum?

A I guess basically just due to the risk, well, we're not -- a risk factor, just the -- more of the time and expense involved in putting together a waterflood unit, the return on investment on our money. We normally offer our partners a 4-to-1 return on their money and we feel like this would just compensate us for -- for carrying their interest in the unit.

MR. RICHARDSON: That amount of penalty is within the discretion of the Division, I believe. It's very reasonable and equitable.

MR. STOGNER: Those provisions will be reviewed before a decision is made.

Q So there is no geological or engineering aspects in which this 200 percent is considered, is that correct, as I understand it from you, Mr. Fort?

A Not that I know of. Now you may want to quiz the engineer that's to come after me and he may have something to add to that, but --

Q Okay.

MR. STOGNER: I have nothing else further of this witness.

Is there anything further of Mr. Fort?

He may be excused.

Mr. Richardson?

MR. RICHARDSON: I have one more witness to call.

I would like to call Mr. John Maxey.

MR. STOGNER: We'll go ahead and keep these exhibits as One through whatever, but enter them in Case Number 9607.

MR. RICHARDSON: Okay, fine, thank you.

JOHN C. MAXEY,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. RICHARDSON:

Q Mr. Maxey, would you please state your name, address, and professional, educational background, which would enable you to testify?

A My name is John Maxey. I reside in Roswell, New Mexico. I have a BS in petroleum engineering from Oklahoma State University.

I've worked ten years in the oil industry with Chevron, Mesa Petroleum, Foran Oil Company, and two years consulting, all in drilling and production opera-

tions.

Q Have you ever testified as an expert before this Division?

A Yes, I have.

MR. RICHARDSON: Are his qualifications acceptable?

MR. STOGNER: Are there any objections, Mr. Carroll?

MR. CARROLL: None.

MR. STOGNER: Mr. Maxey is so qualified.

Q Mr. Maxey, you have -- was a copy of Division Form C-108 filed with the application for authority to institute a waterflood project?

A Yes, it was.

Q This project is for the purpose of secondary recovery as opposed to pressure maintenance, is that correct?

A That's correct.

Q What is the geological formation or zone into which you propose to inject water?

A Penrose Sand.

Q Is this formation and project within a designated pool and if so, what is the pool name?

A Yes, it's in the Bunker Hill.

Q The Bunker Hill Associated Gas, I think, Bunker Hill Associated Penrose -- Bunker Hill Penrose Associated.

What will be your injection interval?

A It will be the Penrose Sand at approximately 3550 to 3575.

Q I notice that you're proposing four injection wells. Were these four wells drilled for injection purposes?

A No, they were not.

Q Will this be a cased hole or injection through perforations?

A It's cased hole but the injection will be through perforations.

Q What is the depth of the Penrose Sand and approximately how thick?

A The average depth to the top of the Penrose Sand is 3550 feet and it averages 25 feet thick.

Q At this time you are proposing to convert four injection wells into a pilot project. Would you please identify these four wells by giving lease name, well number, and location by footage within the section?

A The four wells are the Bogle Farms No. 1, located 1980 from the south line and 660 from the west line of Section 13; the Gulf West Mesa No. 3, located 1910

from west line and 730 feet from the south line of Section 13; the Dartmouth No. 1, located 1980 feet from the east line and 660 from the south line of Section 14; and the Gulf West Mesa No. 2, located 660 from the north line and 660 from the west line of Section 24.

Q Mr. Maxey, please by well name could you state how each of the four proposed injection wells was completed as to casing and the cement, as well as interval perforated in the Penrose Sand?

A Yes. The Bogle Farm No. 1 was drilled, the surface hole, 12-3/4 inch -- or excuse me, 12-3/4 inch casing was run and cemented at 340 feet with 250 sacks of cement and cement was circulated to surface.

The long string, or the production hole was then drilled and 4-1/2 inch casing was set. The 4-1/2 inch casing was set at 4195. I couldn't find my TD. The 4-1/2 casing was cemented with 250 sacks of cement; top of the cement was found to be 2,910 feet from surface by temperature survey.

The Penrose and the Queen, the Penrose was first perforated from 3605 to 3629 and acidized and fraced.

The Queen was then selectively perforated and acidized and was -- the well was commingled, and that is the way the well has been produced, was the Penrose

and the Queen being commingled.

The Dartmouth No. 1 has 8-5/8ths inch surface casing set at 1,236 feet, cemented with 550 sacks of cement, circulated to surface; 4-1/2 inch casing is set at 4248 feet; cemented with 600 sacks of cement; top of cement is 3000 feet by log.

The Dartmouth No. 1 has been perforated in the Penrose from 3602 to 3622 and acidized and fraced.

The third well is the Gulf West Mesa No. 2. It has 8-5/8ths inch casing set at 1,252 feet, cemented with 550 sacks of cement. The 4-1/2 casing was then set at 4,242 feet; cemented with 775 sacks of cement.

The Penrose and Premier were perforated. The Premier was perforated first and selectively treated and acidized and tested in the Penrose. The Premier was 4033 to 4059. The -- did I say Penrose? I'm sorry, I meant Premier. The Premier was perforated from 4033 feet to 4059. The Penrose was perforated selectively and individually and treated from 3,600 feet to 3,622 feet and is also commingled right now; was produced commingled.

The Gulf West Mesa No. 3 is the fourth and final of the pilot injectors. 8-5/8ths casing set at 1,272; cement over 500 sacks to surface. The 4-1/2 casing was set at 4,248 feet; cemented with 625 sacks of cement. The Penrose was perforated, acidized and fraced from 3623

to 3647.

That's how the four injectors were completed.

Q Do you propose to convert all four injectors at the same time?

A No. We propose to set up the Gulf West Mesa No. 3 first for injection as a one well injector to determine permeability trends and injectivity of the formation.

Q How long do you estimate it will be necessary to study the first injector, the Gulf West Mesa No. 3, or injection results in that well, before converting the remaining three wells?

A Approximately 3 months.

Q Could you please describe the mechanical steps or procedure you propose for converting these wells?

A When converting these wells we will pull the rods and tubing that are in the -- currently in the wells. We will run a Baker Loc Set packer and set at approximately 100 feet above the perforations. The 2-3/8ths tubing that we run will be plastic-coated internally and a packer fluid will be pumped down the back side that will contain oxygen scavenger and corrosion inhibitors.

Once the well is, the tubing and casing is run and set, the wellhead will have a stainless steel

similar to a Wheatley (sic) valve with a -- set up with the stringer and a water meter to monitor injection of produced water, or of fresh water daily from our source.

The two wells that were mentioned previously that were commingled production from either the Premier or the Queen, prior to running our plastic-coated tubing the Queen or the Premier in both those wells will be squeezed off and isolated.

Q You have already testified as to the next question. There are some wells -- some of the four injector wells are already perforated either above or below the Penrose.

A That's correct.

Q And that will be squeezed off.

A They will be squeezed off. The Queen is above us. We will be able to have mechanical integrity tests on our packers after we squeeze the Queen and the Premier will be isolated before -- below a cast iron bridge plug and cement.

Q And you have already answered a question which is please describe the tubing you propose to install, giving a size, lining material, and setting depth.

A We propose to install 2-3/8ths 4.7 pound per foot J-55 material with 8 round EUE connections. It will be Salta lined; that's a plastic lining. The approxi-

mate setting depth will be 3450. That's approximately -- that's 100 feet above the approximate top of the Penrose.

In any case, the packers will be set 100 feet above the individual Penrose perforations.

Q And the packer you're talking about, could you use -- or state the name, model, and depth at which you propose to set -- you already said the depth was -- state the name and model of the packer.

A Baker Loc-Set.

Q Baker Loc-Set. Mr. Maxey, Division Rule 704-A requires certain pressure tests prior to commencement of injection. What testing procedure will you use and will you install any special gauges or measuring devices?

A The -- after the injection well has been readied for use, the tubing/casing annulus will pressure tested to 500 psi for 30 minutes. If the test is successful, the pressure will be bled off. There will be a gauge left on the tubing/casing annulus. We'll have a tubing gauge on the tubing to monitor injection pressure and flow meter on the tubing to monitor the amount of water injected.

Q Will that also be sufficient equipment so that the wells can be tested and monitored monthly?

A Yes.

Q And that will be also sufficient to test

annular pressures.

A Yes.

Q Mr. Maxey, what is the maximum and minimum, say, average, of water you propose to inject daily into each well?

A The average volume of water is 140 barrels of water per day.

Q The total volume for all four wells will be approximately how many barrels?

A 560.

Q What will be your minimum and maximum injection pressure, or your average and maximum injection pressure?

A Our average injection pressure we anticipate at 300 psi. The maximum will be 710 psi.

Q And, Mr. Maxey, where do you propose to obtain the water necessary for this project?

A From the Carlsbad water system.

Q And that is named the Carlsbad Double Eagle System, is that correct?

A That's correct.

Approximately how many feet from the Double Eagle Water System to your injection plant or injection facility?

A 600 feet.

Q Do you see a necessity for any water

pipelines on lands or leases not within the proposed unit area?

A No.

Q In other words, since all water lines, including those from the source to your plant, will be upon applicant's leases, it will not be necessary to acquire any additional right-of-way, is this correct?

A That's correct. No additional right-of-way but we will have to reimburse surface damages and fee and grazing lessees, fee owners, their fair market value for damages.

Q Mr. Maxey, you have before you a water analysis of 13 different water wells that are tied to the Carlsbad Double Eagle Water System. The exhibit has been stapled together and labeled Number One, Case 9607, and I have labeled the composite water analysis and did not go through and try to label each one of those different wells, if that's satisfactory.

MR. STOGNER: It's satisfactory to me. How about you, Mr. Carroll?

MR. CARROLL: No problem.

Q You have this water analysis on 13 water wells tied to the Double Eagle System, plus a composite analysis dated January of '87.

Could you please refer to the composite

analysis and briefly state what this analysis shows?

A This analysis is of Double Eagle water, the water we'll use as our source water for our waterflood. It indicates fresh water and it also indicates very small amounts of ionic concentration.

Q Is there any question as to whether or not this is fresh water?

A No.

Q I understand that the Penrose Sand contains water sensitive clays which could swell and affect permeability. Do you plan to treat this water in some manner to avoid this problem?

A Yes. we do. We plan to treat for corrosion and for clay sensitivity.

Q I also understand that the Double Eagle Water System contains aerobic bacteria and this dictates that the system be closed. Is this correct?

A That's correct. We're going to build a closed system to attempt to keep all the oxygen we can out of the system. We may use a small amount of oxygen scavenger.

Q In your opinion will the water, after adequate and proper chemical treatment be compatible with the receiving Penrose Sand?

A Yes.

Q Are there any fresh water wells within one mile of any of the four injection wells?

A Yes.

Q Is there a formation or zone bearing fresh water overlying this area?

A Yes, there is.

Q How far beneath the surface would the bottom of the fresh water zone or formation be located?

A The City of Carlsbad, their Double Eagle System has three wells in Section 13. Their lowest perforations based on the drilling log of the wells would be 318 feet into water-bearing sand. Immediately below that they hit redbed and clays.

Q Are those three water wells that belong to the Double Eagle System, are they spotted on that map that you have, which is Exhibit Two, which I hadn't got to yet. Never mind.

A Okay.

Q You have previously testified that there is one well differently completed in your four injection wells. Most of those wells, you testified that casing was set at around 3000 -- or around 1000 feet and cemented back to surface.

There was one well different, which was the Bogle -- which one?

A Bogle Farms.

Q Bogle Farms, and it was -- the casing was set to what depth?

A 340 feet.

Q 340 feet and cemented --

A To surface.

Q -- to surface. On all four of the injection wells do you think that the way the injection wells have been completed, will be completed, do you think that that completion will be sufficient to protect any fresh water zone above the Penrose?

A Yes, I do. I believe the surface casing on the Bogle Farms State is set at 340 feet into the redbed and the Queen in the Bogle Farms will be squeezed off. Thereby a mechanical integrity test can be run monthly to monitor integrity of the 4-1/2 casing in that well.

Q Have you examined available geologic and engineering data for evidence of open faults or other -- or any other connection or condition which would endanger fresh water in this area?

A Yes, I have.

Q Are the formations or zones within the project area -- are there any formations or zones within the project area which may be capable of producing oil or gas?

A Yes.

Q Would you please give the name and depth of the oil and gas zones or formations immediately above and immediately below the Penrose Sand?

A The Queen is located approximately 300 feet above the Penrose. The Premier is located approximately 650 feet below the Penrose.

Q Mr. Maxey, you have before you two plats, one of which has been marked Exhibit Two; the other, marked Exhibit Three.

Would you please briefly state what these plats show?

A Exhibit Number Two illustrates the half mile radius around our proposed injectors. That is the area of interest as outlined in the C-108.

Exhibit Number Three is just a copy of the unit as it appears on a land map.

Q Mr. Maxey, in your half mile circles around your injection wells there are quite a few wells within the half mile radius circles. Are there any wells within those half mile radius circles that are not within the unit area and that are not being operated by Read & Stevens, the applicants in this case?

A Yes, there are.

Q Would you please state what that well

would be, or what the wells would be.

A The Joe No. 1 and the Remuda Oil & Gas Southern Union State.

The Joe No. 1 is operated by Larue and Muncy.

Q Did those wells penetrate the Penrose Sand?

A Yes, they did.

Q Are either of those wells now completed in the Penrose Sand?

A The Joe No. 1 is completed in the Penrose.

Q The Remuda Well --

A Is completed in the Queen.

Q In the Queen and has been plugged back and the Penrose has been plugged off.

A Right, it's plugged back to the Queen (not clearly understood.)

Q Do you see any way that injection into the Penrose will damage or affect this well completed in the Queen?

A No, I do not.

Q How does the -- or does the Penrose produce water along with the oil and gas?

A Very minute quantities.

Q Approximately what will be the average daily water production from the pilot producing well?

A Zero.

Q At what point do you -- in time do you anticipate that water will increase and the wells start producing water?

A We're anticipating three years before we have breakthrough of water.

Q Have you given any consideration to the problem of disposal of produced water?

A The produced water will be used for make-up and we will reduce our fresh water requirements from Carlsbad's water system and thereby decreasing some of our operating costs.

Q Now, Mr. Maxey, in addition to Exhibits One and Two you have before you an affidavit which has been marked Exhibit Three -- no, Four, One, Two, Three, an affidavit marked Exhibit Four.

A Right.

Q Please briefly relate what this affidavit states and mention the exhibits attached thereto.

A This affidavit is for -- is for authority to inject water. It is a notification list that all the surface owners around the injection wells and the leaseholders of the areas of interest have notice of

hearing and with the return -- return receipts off the certified mail.

Q And that affidavit was sworn to and attested by whom?

A That was sworn to and attested by you, Randolph Richardson.

Q And it lists the names and addresses of all offset operators -- of all operators within the half mile radius circle.

A That's correct.

Q And in your opinion overall will the approval of this waterflood project and the pilot project in connection therewith, and the injection of water into the Penrose Sand, lead to substantial increase of recoverable reserves, prevent waste, and protect correlative rights?

A Yes.

MR. RICHARDSON: I have no further questions of this witness.

I would like to move to admit the exhibits. I'm going to request also that the authority to expand the flood later on after the pilot, that we be allowed to use administrative procedure for expansion of the flood.

And I do move that Exhibits One through Four be admitted.

MR. STOGNER: Mr. Carroll, do you have any objections?

MR. CARROLL: I have no objection to the admission of the exhibits.

MR. STOGNER: I do have a little problem at this point.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Maxey, did you -- let me back up. On January 23rd, 1989, I had hand delivered to me an application for waterflood. Essentially there is the C-108 and some attachments were given me.

Did you prepare those?

A Yes.

Q I'd like to make this a part of one of the exhibits and essentially that was what some of the testimony, or most of your testimony was based on today, is that correct?

A Correct, yes.

MR. RICHARDSON: That's correct.

Q For the record, and to keep things straight, let's make that Exhibit One-A of 960 -- I'm sorry, Exhibit Two-A of 9607. It's Form C-108 with its

attachments.

And as you testified, you have prepared that exhibit, is that correct?

A Yes.

Q Or the application at that point.

A Yes.

MR. STOGNER: At this time Exhibits One, Two, Two-A, Three and Four of Case Number 9607 will be taken under advisement -- I'm sorry, will be admitted into evidence.

MR. CARROLL: You short circuited me. I did have one or two questions.

MR. STOGNER: Okay, I'm going to let you cross examine at this time, Mr. Carroll.

MR. CARROLL: All right.

CROSS EXAMINATION

BY MR. CARROLL:

Q Mr. Maxey, at the time this unit -- you began your initial waterflood test, will you shut in all of the rest of the producing wells in this -- in this project, or what wells are going to be left producing as an oil well?

A Any wells that are economic would be left producing and right now we have a problem with the

wells being economic, but the wells immediately around the pilot flood would be left shut-in so we could monitor reservoir pressure by (not clearly understood).

Q But wells such as the (not clearly understood), that, if they -- if you determined that they were economic you would go ahead and allow them to produce?

A If we determined they are economic. I believe the Rutter Federal, the whole lease is producing just under two barrels a day, and I find it hard to believe those wells are economic, but if they were found to be economic, if that rate would support economic operations, we could turn it back on while we were in our pilot flood stage.

Q So you'll look at each well individually, then.

A That's correct. We have looked at each well. Factors can cause economics to change, primarily price.

MR. CARROLL: I think that's all I have.

RECROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Maxey, let's go to Exhibit Two-A.

A Okay.

Q And portion number four, Roman Numeral IV, which states a tabulation of data on all wells from public records -- I'm sorry, VI, I'm sorry, I read that backwards, Roman Numeral VI.

Are you familiar with that particular portion of the C-108?

A I believe so.

Q I don't see that in here. Could you elaborate a little bit more on that?

MR. RICHARDSON: That, Mr. Examiner, could be back -- it's in the engineering brochure, Exhibit Seven in the first case. That is a tabulation of all the Read & Stevens wells and the wells within the unit area.

MR. STOGNER: Oh, okay, --

A There was a lot of redundant information on the C-108 versus our report, and we have a total compilation in the report of how all the wells in the unit were completed.

Q Okay, and let's now refer to Exhibit Three, I believe, well records, is that what you're referring to?

MR. RICHARDSON: Yes, I think so.

Q And are you familiar with that, Mr.

Maxey, all the well records?

A Yes, Exhibit Three?

Q Yes.

A I think so. Let me get the exhibit out of there.

MR. STOVALL: Exhibit Three of the 9606, I believe it is, the engineering booklet that was previously testified from.

A Okay, is that the completion information?

MR. RICHARDSON: Well records, I think.

A Right, I know what you're talking about if it's the well records.

Q Okay.

A And it has the initial potentials and production.

Q Are all the wells that are within the half mile radius in which you show on your Exhibit Two, are they included or they a part of this Exhibit Three of 9606?

A I've just testified that two wells, the Remuda Oil & Gas and the Joe, well, the Joe was in the book, Remuda Oil & Gas is not in this listing on the C-108.

MR. RICHARDSON: The only -- only one well is not operated by Read & Stevens and not

within the unit --

A And it is temporarily --

MR. RICHARDSON: -- and that is the Remuda Southern Union Com.

Q Okay, Mr. Maxey, would you submit adequate data to suffice Roman Numeral VI on that particular Remuda Well?

A Yes.

Q Now let's go over to the wells that are listed on the Exhibit Three Well Records, and do you have the tops of cement listed on those?

A In the Well Records?

Q Yes.

A No.

Q Okay, could you please supply me that information pursuant to Paragraph 6 --

A Yes.

Q -- of the C=108?

A You'd like it in written form versus the testimony, correct?

Q I need it per well. Yes, I need a written tabulation per well --

A Okay.

Q -- and how it was calculated if it was calculated or --

A Right.

Q I suppose you have that information.

A Yes.

Q But it's not included anywhere today, is that correct?

A Right.

Q Okay, if you can supplement this with that information subsequent to today's hearing.

A Okay.

Q And, hopefully, prior to the hearing on March 1st in which this will be continued.

A It will most definitely be prior to that.

MR. RICHARDSON: We do have complete well information which we got out of the OCD office in Artesia on that Remuda Well, which we could either introduce now or send back with the rest of it.

MR. STOGNER: Oh, if you have it with you, let's see it, yes.

MR. RICHARDSON: It's somewhere around here.

MR. STOGNER: Other than that I have no further questions of Mr. Maxey at this time.

Are there any other questions

of this witness?

He may be excused.

Is there anything further, Mr. Richardson?

MR. RICHARDSON: No, sir, I just wanted to say should I run by and copy this right now and leave it with you or you want to go ahead and send it back when he sends the rest of it?

MR. STOGNER: You can go ahead and make a copy and leave it on my desk and it will be made part of this record subsequently.

MR. RICHARDSON: Fair enough.

MR. STOGNER: If there's nothing further in today's case -- or today's hearing on these two cases, we'll take -- we'll continue both of these cases, 9606 and 9607, to the Examiner's Hearing scheduled for March 1st, 1989.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C. S. R. DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case Nos. 9606 and 9607 heard by me on 15 February 1989.

Michael E. Stogner, Examiner
Oil Conservation Division