STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:	)	CASE NO. 11,580
APPLICATION OF DEVON ENERGY OPERATING CORPORATION FOR WATERFLOOD EXPANSION, EDDY COUNTY, NEW MEXICO	)	ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

July 25th, 1996

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, July 25th, 1996, at the New Mexico Energy, Minerals and Natural Resources Department, Porter Hall, 2040 South Pacheco, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

* * *

I N D E X

July 25th, 1996
Examiner Hearing
CASE NO. 11,580

	PAGE
EXHIBITS	3
APPEARANCES	3
APPLICANT'S WITNESSES:	
FREDERICK L. CORNELL (Engineer)	
Direct Examination by Mr. Bruce	4
Examination by Examiner Catanach	15
DICK MORROW (Senior Reservoir Engineer)	
Direct Examination by Mr. Bruce	20
Examination by Examiner Catanach	26
REPORTER'S CERTIFICATE	31

* * *

E X H I B I T S

Applicant's	Identified	Admitted
Exhibit 1	6	15
Exhibit 2	7	15
Exhibit 3	11	15
Exhibit 4	14	15
Exhibit 5	22	26
Exhibit 6	22	26
Exhibit 7	22	26

* * *

A P P E A R A N C E S

FOR THE DIVISION:

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

FOR THE APPLICANT:

HINKLE, COX, EATON, COFFIELD & HENSLEY
218 Montezuma
P.O. Box 2068
Santa Fe, New Mexico 87504-2068
By: JAMES G. BRUCE

* * *

WHEREUPON, the following proceedings were had at 11:38 a.m.:

EXAMINER CATANACH: At this time we'll call Case 11,580.

MR. CARROLL: Application of Devon Energy Operating Corporation for waterflood expansion, Eddy County, new Mexico.

EXAMINER CATANACH: Are there appearances in this case?

MR. BRUCE: Mr. Examiner, Jim Bruce from the Hinkle law firm in Santa Fe, representing the Applicant. I have two witnesses to be sworn.

EXAMINER CATANACH: Additional appearances?

Will the witnesses please stand to be sworn in?

(Thereupon, the witnesses were sworn.)

FREDERICK L. CORNELL,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Will you please state your name and city of residence for the record?

A. Frederick L. Cornell, Yukon, Oklahoma.

Q. And what is your occupation and who is your employer?

A. I'm a petroleum engineer for Devon Energy Corporation.

Q. Have you previously testified before the Division?

A. No.

Q. Would you please outline your educational and employment background?

A. I have a civil engineering degree from Oklahoma State University. I'm a registered professional engineer in the State of Oklahoma.

I've worked for Devon Energy for approximately four years. Prior to that, I worked for LL&E, Inexico for 11 years, and I worked for Halliburton Services for four years, basically working production and operations through that time period in Anadarko Basin in Oklahoma, Permian Basin in Texas and New Mexico.

Q. And are you familiar with the engineering matters related to this Application?

A. Yes.

MR. BRUCE: Mr. Examiner, I would tender Mr. Cornell as an expert petroleum engineer.

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Bruce) Briefly, Mr. Cornell, what does Devon seek in this Application?

A. Devon seeks authority to inject produced water

into the Grayburg-Jackson Pool for waterflood purposes, through several wells within the Keel "B" and West "B" leases, located in Sections 8 and 9 of Township 17 South, Range 31 East.

Q. Would you please refer to Devon's Exhibit 1 and identify that for the Examiner?

A. Exhibit 1 is a map of the area of interest, with Devon's leasehold shaded in yellow. The circle is a half-mile radius around the Keel "B" 28.

Q. Now, this is a waterflood expansion. Are there other waterfloods in this area?

A. Yes, there are. There are several waterfloods in the Grayburg-Jackson.

Q. Okay. And before we get off of this map, who are the offset operators that we are required to notify of this Application?

A. Ray Westall operates the northwest quarter of Section 16, Marbob Energy operates to the northwest of the northeast quarter and the northeast of the northwest of 17.

Q. Okay, and all the other yellow acreage is, of course, operated by Devon?

A. That's correct.

Q. As far as other interested parties, is the Bureau of Land Management the lessee and the surface owner of the particular affected acreage?

A. Yes, they are.

Q. Now, you mentioned the Keel and West leases. Have these already been approved for waterflooding by the Division?

A. Yes, the Division has approved the Keel/West Waterflood Project covering all or parts of Section 3 through 10 by Orders R-2268 and WFX-585 and -587.

Q. So why are we here today?

A. Well, there's a problem well, the Keel "B" 28, which I mentioned previously. It's located 1980 from the south line, 660 from the east line of Section 8, which prevents further administrative approval for a waterflood injection in this area.

Q. Let's discuss the injection application. Would you identify Exhibit 2, please?

A. Exhibit 2 is the C-108 filed with the Division for this case. For reference, the pages are numbered in the lower right-hand corner.

Q. Okay. How many proposed injection wells does this Application cover?

A. It covers all seven wells. We eventually seek to convert to injection in the area of the Keel "B" 28. Those are the Keel "B" 12, 29 and 76, which we seek to convert immediately and the Keel "B" 27, 46 and 77, and the West "B" 35, for which we seek future administrative approval if

this Application is granted.

Q. Okay, and is basic information on these seven proposed injection wells given at pages 2 to 22?

A. That's correct.

Q. Okay.

A. There are three pages of information for each well, each of seven wells. For example, if you'll look at pages 2 through 5, you've got a list of information, and then followed by two sketches, which are the current proposed wellbore sketches.

Q. Okay. In looking through this, what is the approximate injection interval in footage for each of these wells?

A. The injection interval is essentially about 800 to 900 feet for each of the seven wells.

Q. Is each of the proposed injection wells adequately cased and cemented such that no injected water can escape to other pools?

A. Yes, they are.

Q. Now, let's go on to the injection operation, starting on page 49. What is the proposed injection rate?

A. As you can see on page 49, the proposed injection rate is 500 barrels per day, average, with a maximum of 600 barrels per day.

Q. And what will be the initial injection pressure?

A. The top perfs in these wells range from 2800 to 3050 feet subsurface. So under Division rules, the maximum initial injection pressure would be approximately 600 pounds.

However, Order Number R-2268-C, approved pressures up to 2500 pounds, which is the pressure we request for the initial three wells we are discussing today.

Q. Is there a proposed stimulation program for the injection wells?

A. Yes, we will acidize them with 15-percent NEFE acid, just as we've done on all injection wells in this area.

Q. How many wells are there in the area of review?

A. If you look at pages 23 through 29, it shows the area of review for each proposed injection well. And pages 30 through 31 is a list of those wells. There are 57 wells in the area of review. Six of these wells are P-and-A'd, and the others are producers or injectors.

Q. Okay. Were the six P-and-A'd wells adequately plugged?

A. Yes, except for the Keel "B" 28, which we'll discuss shortly.

Q. Okay. What about the producing -- the current producing and injection wells? Are they properly

completed, and will they prevent the movement of fluids?

A. That's correct.

Q. Okay. And I believe data on each of these wells is given on pages what? 32 to 42, I believe?

A. What's that?

Q. Data on all of these wells --

A. Yes.

Q. -- is given on pages 32 to 42 of the C-108?

A. That's correct.

Q. Are there any sources of fresh water in this area?

A. No. We checked with the State Engineer, and there are no freshwater wells within a mile of the proposed injection wells.

If you'll look back at Exhibit 1, there's two sections outlined in blue, Section 22 and 34. There were two wells drilled, one in each of those sections, that are dry, and the nearest known water is in the Caprock, which is approximately 10 to 11 miles to the east northeast of this waterflood project.

Q. Are there any open faults or other connections between the injection zone and any drinking water source in this area?

A. Not that we know of.

Q. What will be the source of the injection water?

A. The injection water will be produced Grayburg-Jackson water, plus make-up water from the Keel/West freshwater system.

Q. Is the injection water compatible with the formation water?

A. Yes, we've been using the same water for approximately 30 years.

Q. And there have been no problems of compatibility over those 30 years?

A. Not that we're aware of.

Q. Okay. Let's move on to your Exhibit 3 and discuss the Keel "B" 28 well. Could you identify that exhibit and go through its contents for the Examiner?

A. Exhibit Number 3 has three figures listed across it, each one depicting different phases of the operations performed by Arco during August of 1979.

Arco encountered a tubing leak and went in to repair that. On 8-10-79, if you'll look on the very first one, which is "Initial Configuration", they found a tubing parted at the surface, and they recovered two joints of tubing, attempted to fish the injection tubing by running a spear on the 2 3/8 work string. The spear went outside the 4-1/2-inch casing at approximately 600 feet.

They continued to run tubing and ran 5034 feet of tubing in the well. And you might note that the depth of

this well is approximately 3800 feet. When they pulled this tubing from the well, the bottom 3871 feet was bent, the top 1138 feet was straight. Obviously, it encountered a void or a cavern somewhere in the salt zone between 1134 and 1224, and the tubing went out in some nonvertical direction, anyway.

At that point in time, they continued to attempt to fish. As you'll see on Figure 2, this is the continued fishing operations. They ran a 3-7/8-inch overshot to fish parted tubing. There was no success. They were outside the 4 1/2, which is 601 feet.

They ran an impression block to 641 feet. There was no impression other than marks on the two sides of it, indicating they were in between something.

They ran a 3-7/8-inch wedge to try to get inside the casing, but that went outside at 601 feet. They ran it to 749 feet, did not tag anything.

They picked up on a 4-1/2-inch casing at that time. The casing parted at 597 feet. They made three attempts to fish the casing with a 7-3/8-inch overshot and a bent joint of 4-1/2-inch casing. They could not latch on to it. It was going outside of the 4 1/2 in each case.

They attempted to fish the casing with a 4-1/2-inch casing spear to go inside of it and could not get inside the casing. The spear was going down beside it

again.

They attempted to washover the casing with a 7-3/8-inch shoe. The shoe washed down beside the 4-1/2-inch casing.

They again attempted to fish casing with a 3-7/8-inch spear and a bent joint of 2-3/8-inch tubing. No success there.

They drilled and washed with a 7-7/8-inch bent to 1275. They ran a collar log. The log reached TD at 2375. You might note the top of cement is at 2200 feet. The log showed no casing collar from 2375 feet back to the surface casing, which is at approximately 550 feet.

At that time, they spotted cement plugs for P-and-A.

If you'll look at Figure 3, that's the schematic indicating the plugs and that plugging operation. If you'll look at the lowest plug, they spotted 300 sacks of Class C cement outside the 4-1/2-inch casing at 1250 feet. They waited on cement 12 hours and tagged the cement plug at 1230 feet.

They attempted to spot another 300-sack plug above that, outside the 4-1/2-inch casing, at 998 feet. They did not tag that and had no pressure during that operation.

At that point in time, they set an 8-5/8-inch

cement retainer at 482 feet and squeezed through the retainer with 300 sacks of Thickset cement and 200 sacks of Class C.

Q. Can the Keel "B" 28 well be successfully re-entered and repaired at a reasonable cost?

A. No, we don't believe so. We estimate, based on a 30-day fishing operation, it would take about $368,000 to conduct a 30-day fishing operation. We think that we would simply be doing essentially the same things that Arco attempted, and they attempted it numerous times. And we feel like there's probably less than a one-in-ten chance of being successful at doing any more than they did.

Q. Will Devon's next witness discuss your proposal for dealing with this situation?

A. Yes, he will.

Q. Was notice of the Application in this case sent to the surface owner and the offset operators, as required by Division rules?

A. Yes, Exhibit 4 contains copies of the notice letters and the certified return receipts regarding the mailings of Form C-108 and the Application for the hearing.

Q. In your opinion, is the granting of this Application in the interests of conservation and the prevention of waste?

A. Yes, it is.

Q. And were Exhibits 1 through 4 prepared by you or under your direction or compiled from Devon's business records?

A. Yes.

MR. BRUCE: Mr. Examiner, we would move the admission of Devon's Exhibits 1 through 4.

EXAMINER CATANACH: Exhibits 1 through 4 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Cornell, was this -- This Application was originally filed administratively; is that correct? Or do you know?

A. No, I believe we withdrew --

Q. Okay.

A. -- these wells from the original Application.

Q. Okay, the -- As I understand it, the 12, 29 and 76 wells, you want to be able to convert those immediately?

A. That's correct.

Q. And the 27, 46, 77 and 35 --

A. West "B" 35, right.

Q. -- do you know when those wells will be converted?

A. Well, I think the next witness will get into that with the proposal we're making here.

Q. Is this a new area within the project that has not been flooded before?

A. No, there are numerous injection wells within this half-mile radius.

Q. Within the half-mile radius you've got shown on Exhibit 1, there are currently injection wells?

A. Yes.

Q. Do you know which wells those might be?

MR. BRUCE: The next witness will have --

THE WITNESS: Yeah.

MR. BRUCE: -- Exhibit 6, Mr. Examiner. It's on there.

Q. (By Examiner Catanach) Okay. The injection interval is approximately 2900 to 3800 feet or --

A. That's -- approximately, uh-huh.

Q. You stated that it was your opinion that there is not any fresh water in this area?

A. To our knowledge, there's not.

Q. And you based that on what data, Mr. Cornell?

A. Based on what I have seen in reviewing well files throughout the life of the wells in this area, I have not seen any indications of water.

In fact, in several of the wells that were drilled with cable tools they did test for water, and I don't recall seeing any that tested water during the

surface -- through the surface intervals. And we have not encountered any water.

Q. Have you looked for fresh water?

A. No, we have not tested, Devon has not tested for fresh water.

Q. If there was fresh water in this area, would it be safe to say it would be at a fairly shallow depth?

A. Yes.

Q. Are you injecting -- In this area, are you injecting at a pressure of 2500 pounds?

A. Right now, our average pressure is somewhere between 2000 and 2100, in the approved...

Q. So that is in this area in the southeast quarter of Section 8?

A. Southeast of Section 8, yes, I believe we would be on the wells that are active injectors in that area.

Q. Have you recently drilled any wells in this area?

A. Yes, we have. As a matter of fact, the Keel "B" 28, the well in question, has a twin well which has been drilled within the last year or year and a half. The Keel "B" 76 has been drilled within the last two years.

Q. 76 is also in the southeast quarter there?

A. Yes, sir.

Q. Okay.

A. It's actually in the northeast, but it's within

that half mile.

Q. When you guys drilled these wells, have you encountered any water flows in any zones?

A. Not in the shallow zones in this area, and I don't believe in the deep zones either here. I don't recall any particular water flows in this area.

Q. Now, there is a salt section in this area; is that correct?

A. That's correct.

Q. Have you encountered any water flows in the salt section?

A. Not that I recall in this area. In other areas, we have.

Q. What other areas are you referring to?

A. Right offhand, I think over in Section 7, down in the south, southernmost part of that, approximately a mile away.

Q. Are the seven proposed injection wells -- are those necessary to conduct your waterflood operations in this area?

A. Yes, they are, and I believe the next witness will elaborate on that.

Q. Okay. You've examined the remaining wells in the area of review, and are you satisfied that each of those are cemented and cased and plugged adequately to --

A. Yes.

Q. -- confine the injection water?

A. Yes.

Q. Are each of the injection wells cased and cemented so as to confine the injection water?

A. Yes, they are.

Q. Do you guys have any problems in terms of mechanical failures within producing wells or injection wells in this area? Frequent failures or out of the ordinary?

A. Not in this area.

Q. Are most of the producing and injection wells within this specific area, are they fairly old?

A. The majority of these wells have been drilled, I believe, in the Seventies and late Eighties. I'm not sure about the producing wells right offhand, but of the injection wells proposed I know that -- I believe four of those were drilled prior to 1964. I think three were drilled 1961 to 1964, and then one was drilled back in 1954, I believe.

Q. Well, you mentioned something about conducting waterflood operations for 30 years.

A. I believe that Arco has been putting water in the ground since about 1964 or early Sixties.

Q. So there may be some wells in this area that are

Sixties vintage?

A. Yes, yes, there's definitely wells that are Sixties vintage. I believe the Keel "B" 28 is a Sixties-vintage well.

MR. BRUCE: Pages 32 to 42 of the C-108 do give the completion dates. There's a column of completion dates for each well.

EXAMINER CATANACH: Okay. I believe that's all I have of the witness.

DICK MORROW,

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

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. My name is Dick Morrow.

Q. And where do you reside?

A. Edmond, Oklahoma.

Q. Who do you work for?

A. I am a reservoir engineer employed by Devon Energy.

Q. Have you previously testified before the Division as a reservoir engineer?

A. Yes, I have.

Q. And were your credentials as an expert accepted

as a matter of record?

A. Yes, they were.

Q. And are you familiar with reservoir matters and petroleum engineering matters pertaining to this Application?

A. Yes.

MR. BRUCE: Mr. Examiner, I would tender Mr. Morrow as an expert reservoir engineer.

EXAMINER CATANACH: Mr. Morrow is so qualified.

Q. (By Mr. Bruce) Mr. Morrow, could you just -- You have three exhibits, 5, 6 and 7. Could you just -- I think you need to refer to them all at once. Could you identify them briefly for the Examiner and then discuss Devon's proposal with respect to a monitoring plan that would allow you to drill the proposed -- or I mean complete the proposed injection program?

A. Yes, the potential problem with the Keel "B" 28 is that as a result of injecting water into the Grayburg San Andres interval, that we built up enough reservoir pressure to induce crossflow up the Keel "B" 28 wellbore, which would adversely affect shallower zones.

First, I would like to reiterate that we don't believe that there are any shallow freshwater sands in this are to affect.

Secondly, I'd like to describe a monitoring

program that in our normal course of prudent waterflood operations will prevent pressure from building up around the Keel "B" 28 wellbore.

Exhibit Number 5 is an outline of our proposed monitoring program, and Exhibits 6 and 7 are areal diagrams.

If you first look at Exhibit Number 6, this is a larger-scale map of the area in question. Shown are the producing wells as the gray circles, active injection wells as the solid blue triangles, approved injection wells as the open blue triangles, and the first three proposed injectors as the dashed blue triangles.

I've shown the Keel "B" 28 in red there with the half-mile radius, and shown in yellow are our proposed monitor wells for Phase One.

Basically what we would like to do would be to convert those first three wells, the Keel "B" 12, 76 and 29, to injection. We would then utilize the nine wells that are shaded in yellow to evaluate the reservoir performance in this area, especially around the Keel "B" 28. What that would entail would be monitoring fluid levels and producing rates to monitor for waterflood response. As we experience waterflood response in these wells, we would adjust the injection rates in these nearby wells to keep the producing wells in a pumped-off

condition.

In other words, what we would try to do would be to try to balance our injection with our production rates so that we wouldn't build up any pressure in the reservoir around the Keel "B" 28. The low pressure would prevent any upward crossflow.

Also in normal prudent waterflood operations we would periodically run injection profiles on these injection wells to ensure that we didn't have any downhole problems.

After a sufficient time to experience waterflood response and to gather some data on our monitoring program, then we would like to convert the next four wells, which are shown on Exhibit Number 7. We would then convert the Keel "B" 77, Keel "B" 27, Keel "B" 46, and West "B" Number 35 to injection and utilize a smaller area to monitor the reservoir performance with the five wells that are shown in yellow on Exhibit Number 7.

Again, we would collect the same data as far as fluid levels and producing rates in these producing wells, to ensure that we're keeping the wells in a pumped-off condition. We would continue to utilize this area, especially the Keel "B" 57, to monitor the performance of the reservoir through the life of the project.

This whole monitoring program is designed to show

that we can keep the producing fluid levels low and, as such, keep the reservoir pressure low around the Keel "B" 28, which would prevent any problem of crossflow in that wellbore.

Q. And you believe that your monitoring plan will verify that there will be no adverse migration of fluids?

A. Yes, I believe it will.

Q. Okay. Now, the Examiner -- Or you mentioned about there is no water in this area. Now, these -- All of these wells in the area of review that you're looking at are in the Grayburg-Jackson Pool; is that correct?

A. Yes, that's correct.

Q. Which includes the Seven Rivers, top of the Seven Rivers, down to the base of the San Andres?

A. That's correct.

Q. Is there any producing zone above the top of the Seven Rivers?

A. No, there is not.

Q. You did mention the twin well, the Keel "B" 57. When was that completed or redrilled?

A. I don't know the date on that redrill.

Q. It was fairly recent?

A. Yes, it would be in the last year and a half.

Q. Okay. Then one other question came up. Within a half mile of the Keel "B" 28, there are two current

injection wells, the West "B" 10 and the Keel "B" 4. Those were completed sometime back in the 1960s, before the situation with the Keel "B" 28 arose; is that correct?

A. Yes, if you look back on Exhibit Number 6, those wells are the dark blue triangles, the West "B" 10, the Keel "B" 4.

As the previous witness mentioned, the waterflood activity has been going on out here since 1964, so these were older injection wells that have been active since that time, prior to the problems they had with the Keel "B" 28.

Q. One final thing, Mr. Morrow. What will be the effect on Devon if it cannot complete its waterflood plans in this particular area?

A. There are an estimated half a million barrels of secondary reserves in this area that will not be recovered unless we can convert these seven wells to water injection.

Q. You will not be able to complete the waterflood pattern that you have going to the north of your --

A. That is correct.

Q. In your opinion, will the granting of this Application be in the interests of conservation and the prevention of waste?

A. Yes, it will.

Q. And were Exhibits 5 through 7 prepared by you or under your direction?

A. Yes.

MR. BRUCE: Mr. Examiner, at this time I would move the admission of Devon's Exhibits 5, 6 and 7.

EXAMINER CATANACH: Exhibits 5, 6 and 7 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Morrow, in some of the other producing wells within your waterflood project area, do you -- I mean, aren't the fluid levels routinely maintained at low levels?

A. Yes, and that is a good point. As I said, in a prudent waterflood operation you intend to keep the fluid levels as low as you can, to maintain your producing rates. So this monitoring program is really nothing out of the ordinary; it would just be under a slightly more powerful microscope, I guess you would say.

Q. Do you have places in your project where you do have some high fluid levels or some -- or do you just adjust your pumping rates to accommodate the higher levels?

A. Yes, we do. If fluid level increases, you can increase your pump size or your pumping conditions, or you can lower your injection rates. So far, we have not had any problems in that aspect.

Q. How long have the "B" 4 and "B" 10 wells been injecting? Do you know?

A. I do not know the answer to that.

Q. Do you have any idea? Is it several years or --

A. Oh, yes, I think these are probably some of the older -- probably 1970-vintage injection wells.

Q. Do you know if these wells have been injecting at the higher pressure, the 2500 pounds?

A. Currently they are, and in the time that we've taken over the waterflood, yes. Prior to that, I would have to look that up.

Q. When was the Arco well plugged?

A. The Keel "B" 28?

Q. Yeah.

A. I believe it was 1979.

Is that what you --

MR. CORNELL: Yeah.

THE WITNESS: Yes.

MR. CORNELL: Yes.

Q. (By Examiner Catanach) I assume that they -- prior to them plugging the Arco well or the Keel "B" 28, they did maybe have some problems with the salt section in that well?

A. I would have to refer to the previous witness for that, but I believe his testimony said that that's where they had some of the problems, yes.

Q. Okay. In your Phase Two monitoring, you're going

to have a direct straight line from four injection wells to the Keel "B" 28 without having any pressure sinks in between. Do you see that as a problem?

A. No, I don't, as long as we maintain the five wells that I have shaded in yellow there, you will create a pressure sink in that whole area which should prevent any injection -- high-pressure injecting fluid from getting to the Keel "B" 28 wellbore.

Q. Is this reservoir pretty continuous so that you don't have channeling in one particular direction?

A. Yes, sir, it is very continuous.

Q. So you don't have a lot of channeling?

A. No, sir.

Q. And what is the -- The "B" 57 is a producing well; is that right?

A. Yes, it was redrilled as a producing well.

Q. How close is that to the "28"?

A. I don't know.

Q. Do you see the high injection pressure, 2500 p.s.i., as a problem in this area insofar as it may contribute to any water reaching the 28 well?

A. No, I don't. If you -- The reservoir, the Grayburg San Andres reservoir, is very low in permeability, and you need the high injection pressure to get the water into the ground.

As the water moves out radially from the injection wells, pressures decrease rapidly, within the first 100 feet. And I don't see any problem with that channeling or that pressure getting very far out into the reservoir that would affect the area around the Keel "B" 28.

Q. Do you feel like you could carry on effective waterflood operations in this area at a reduced pressure?

A. No, I don't think so.

Q. There's a chance that this well could be -- the Keel 28, Keel "B" 28 -- Let's see. There's a good chance that the Keel "B" 28 would be adequately plugged from a depth of maybe 500 feet to the surface; is that your --

A. I do not have a copy of that exhibit in front of me, but I believe that's correct.

Q. What have you got -- Basically in between, say, a depth of 500 feet and the top of the Seven Rivers, you've basically got a salt section, and do you know what else is in there?

A. I would have to refer back to Mr. Cornell on that, or maybe our geologist.

Q. Okay. What would you guys do if you did experience some high fluid levels in some of these monitor wells? Would you reduce the injection rate in some of the injection wells?

A. Yes, that's our definite plan. We would -- If we could not maintain the low producing wells by adjusting the pumping rates on our producing wells, we would lower the injection rate on the adjacent injection wells.

EXAMINER CATANACH: I think that's all I have.

Mr. Bruce?

MR. BRUCE: I have nothing further with this witness. Just a couple of minor things.

The C-108 does show that the Keel "B" 57 well is about 80 feet away from the Keel "B" 28.

And Mr. Cornell informs me -- and if you have any questions, go ahead, Mr. Examiner -- he says that he was aware of no problems in the salt section before the 1979 plugging operation or attempt at a plugging operation by Arco.

EXAMINER CATANACH: Okay.

MR. BRUCE: And we have nothing further in this case.

EXAMINER CATANACH: Okay, there being nothing further in this case, Case 11,580 will be taken under advisement.

(Thereupon, these proceedings were concluded at 12:21 p.m.)

* * *

CERTIFICATE OF REPORTER

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

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

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

WITNESS MY HAND AND SEAL July 31st, 1996.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1998

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 11580, heard by me on July 25 1996.

, Examiner
Oil Conservation Division