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

3 February 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Penroc Oil Corporation for salt water disposal, Lea County, New Mexico. CASE 9303

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

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I N D E X

E X H I B I T S

MR. STOGNER: This hearing will come to order.

We'll call next Case Number 9303, which is the application of Penroc Oil Corporation for salt water disposal, Lea County, New Mexico.

We'll call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin, the Santa Fe law firm of Kellahin, Kellahin & Aubrey, appearing on behalf of Penroc Oil Corporation and I have one witness to be sworn.

MR. STOGNER: Call for additional appearances?

MR. CARR: Mr. Examiner, my name is William F. Carr, with the law firm Campbell and Black, P.A., of Santa Fe.

I represent ARCO Oil & Gas Company and I have one witness.

MR. STOGNER: Are there any other appearances? There being none, will the witnesses please stand at this time and raise your right hand.

(Witnesses sworn.)

MR. STOGNER: Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Stogner.

MOHAMMED YAMIN MERCHANT,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Merchant, would you please state your name and occupation?

A My name is Mohammed Yamin Merchant. I'm President of Penroc Oil Corporation based in Hobbs, New Mexico.

Q Mr. Merchant, you're also a petroleum engineer by education, are you not?

A Yes.

Q And as a petroleum engineer you've testified before the Oil Conservation Commission and Division on numerous occasions, have you not?

A That is correct.

Q Have you caused on behalf of your company that Commission Form C-108 be prepared and supplied to all the appropriate parties for the application on behalf of your company to seek the approval of a salt water disposal

well in Lea County, New Mexico?

A That is correct, I have.

Q I have shown you, Mr. Merchant, what is marked as the Commission Form C-108, marked as Exhibit Number One through Exhibit Number Thirteen. Have you examined that document and satisfied yourself that the information depicted on these exhibits is -- is correct?

A That is correct. The information is correct.

Q All right, we have some supplemental information with regards to some of the information shown on the disposal well, and we'll come to that in a moment.

Was the information prepared on this exhibit done by you or compiled under your direction and supervision?

A Both.

Q Would you summarize for the Examiner, Mr. Merchant, what you propose to do with the State AF Well No. 2 in Section 8 of Township 18 South, Range 35 East, of Lea County, New Mexico?

A The Well No. 2 currently is an Abo Reef, Abo producer. We intend to drill out the cement and the bridge plugs and convert this well to a salt water disposal in the Devonian formation.

Q It might be helpful to orient the Exam-

iner as to the various locations of wells in this immediate area.

Let's turn, if you will, please, to Exhibit Number Six, which is the half mile and the two mile radius plat of the area, and first of all, describe where, approximately this well is located in relation to any surface information, such as a highway or a community or something other than that.

Q Okay. The AF No. 2, the well in question, is located on the AF Lease, which is approximately four miles from the small community of Buckeye, New Mexico. The well itself is located on the east side of Highway 8, State Highway 8 on the map, which is a kind -- which is an ownership map. It has always been shown on the west side but that is -- that's the way everybody have done it so it's shown that way.

Q Let's take a moment and first of all find the proposed disposal well that's referred to as the AF -- the State AF No. 2 Well, and that is located in the southwest of the southeast quarter of Section 8?

A Yes, that is correct.

Q Okay. When we go immediately to the west in the next 40-acre tract there is a well symbol there. Would you identify that well for us?

A Immediately to the west is ARCO Oil & Gas

4011 Lease Well No. 1 producing from the Devonian formation.

Q 4-0-1-1 No. 1?

A Yes, 4-0-1-1, Well No. 1.

Q And that also produces from the Devonian formation?

A That is correct.

Q We'll come back to those wells in a moment. Let's continue further to the west and in the next 40-acre tract that adjoins the ARCO well, what is that well?

A That is the State AF No. 1, which Penroc Oil Corporation completed as a Devonian producer back in August, early September, late August, early September, and it is currently producing, or it is in a producing status. It's shut-in because of water disposal problems.

Q As we go north of that well to the 40-acre tract to the north, we're right ont he edge of that half mile radius. There's another Penroc well north of the last one we described. What is that well?

A That is AF No. 3. That well has been applied for to convert it to a disposal well in the Wolfcamp formation two weeks ago today. It is a noncommercial well in the Wolfcamp.

MR. KELLAHIN: We'll have to get you the case number, Mr. Examiner, but this was a case that Mr. Merchant put on on January 20th and it refers to

his request for a disposal on the Penroc AF No. 3 Well.

MR. STOGNER: Has -- do you know if there's been an order issued out on that, Mr. Kellahin?

MR. KELLAHIN: No, sir, there's no order issued yet on that case.

MR. STOGNER: Was that the one heard at Mr. Catanach's hearing on --

MR. KELLAHIN: Yes, sir.

MR. STOGNER: -- January 20th?

MR. KELLAHIN: That's correct.

MR. STOGNER: Case Number 9287?

MR. KELLAHIN: There was two cases on that docket for Penroc and I'm not sure which one it is. They followed in sequence.

MR. STOGNER: One was in Section 8 of 18 South, 25 East?

MR. KELLAHIN: That would be it.

MR. STOGNER: That would be Case Number 9297.

Q All right, to complete our discussion of -- or to continue our discussion of wells in the immediate area, Mr. Merchant, let's go back to the disposal well now, or the proposed disposal well, and let's look to the south.

We're going down into Section 17 now, the well immediately to the south of the disposal well in the northeast -- actually it's the northwest quarter of the northeast quarter of 17. Would you identify that well for us?

A That is ARCO Oil & Gas Lee 403 Well No. 6, which was at one time completed in the Devonian formation and later on plugged and abandoned in August of 1981.

Q As we move to the south and west of the ARCO 403 No. 6 Well, right on the edge of the half mile radius is a No. 5 Well?

A That is correct. That's another ARCO well, Lee 403 State No. 5, which again was perforated in the Devonian and plugged in March of 1975.

Q All right, then finally, as we continue around that half mile radius clockwise, we get up to the northwest of the northwest of 17. There's also an ARCO well there, is there not?

A That is correct. That's Well No. 4 and it's completed in the Abo or Abo Reef at 9800 plus or minus. And it is a producer currently.

Q I think we've identified most of the key wells in the half mile radius, Mr. Merchant. Let's go now and refer specifically to the proposal for the disposal well and have you identify what is marked as Exhibit Number Two.

A Okay, Exhibit Number Two is Commission

Form C-101, basically outlining Penroc's plans to drill out the cast iron bridge plugs and complete the well as a disposal well in the lower Devonian.

Q You're complete -- to deepen the well to a total depth of 12,000?

A That is our intentions, to deepen it to 12,000 feet.

Q And where will that put you in relation to the Devonian formation?

A That will give us approximately 200 feet from 11,800 to 12,000 with 200 feet of open hole.

Q All right. The -- the 12,000 foot interval will be at the base of the Devonian?

A No, it's the -- almost in the middle of it.

Q Mid-Devonian, all right. Let's turn now to Exhibit Number Three, Mr. Merchant, and have you describe for us the proposed average and maximum daily disposal rates that you request for this well.

A Once again, Exhibit Three is a follow-up on Form C-108, basically our detailing the data on Well No. 2. It also -- also lists the average daily injection rate of 5000 barrels a day and a maximum of 10,000 barrels a day in the Devonian formation.

Q What will be the anticipated sources of

water to be disposed of in the well?

A Part of the water is going to be coming from the AF Lease produced from AF No. 1 and the other remaining water would be coming from other sources in the Buckeye area.

MR. KELLAHIN: Mr. Examiner, at this point we would request that you take administrative notice of the water analyses that were submitted in Case 9297, one of which is included in this package but there are -- there are other water analyses, which I need to get for you from that case file.

In addition, that case file contains the waiver of the surface owner for the prior disposal well request and also includes the subject well.

MR. STOGNER: We'll take administrative notice of the records in Case No. 9297 and who might the surface owner be?

MR. KELLAHIN: All right, the surface owner is Mr. Bill Lee, he and his family.

MR. STOGNER: And he owns the surface?

MR. KELLAHIN: His family owns the surface. It's a ranch.

MR. STOGNER: Now, is this a state lease?

A No.

MR. KELLAHIN: No, sir, it's a fee property, is it not?

A It's a -- no. The surface is leased by Bill Lee from the State, the grazing rights, Bill and R. D. Lee.

MR. STOGNER: Okay, and has the State Land Office been notified?

A The State Land Office has been notified.

Q And that would also be in the record of the previous case.

A Of the previous well, that is correct.

Q Let's talk about the anticipated pressures for the disposal, Mr. Merchant. What will be your recommendations with regards to injection limitation pressures on the well?

A Well, first of all, we do not anticipate any injection pressures based on Penroc's experience in the Devonian Field, especially the one to the south of this field, and they are basically being disposed under vacuum, and that's what we expect in our well, but we still would like to have permission to a maximum pressure of 500 pounds.

Q Let's spend a moment and discuss the potential for contamination of any fresh water sources by disposal into the Devonian.

Based upon your investigation, what is your opinion as to the potential sources of fresh water in the immediate area?

A The only fresh water which exists in the area, to the best of my knowledge, is from approximately 200 - 250 feet in the Ogallala formation. We being almost 12,000 feet from -- from that depth and a good -- good cementing and casing job, we do not anticipate any problems.

Q Do you see any wellbores within the half mile radius that are defective to such an extent that they will serve as conduits by which disposal fluids would migrate from the Devonian into the shallower Ogallala formation?

A The two plugged ARCO wells, the Lee 403 No. 5 and the Lee 403 No. 6, Exhibit Eight and Nine, we believe they have been properly plugged by ARCO back in 1981 and 1975; therefor, we do not expect that there would be any contamination because of our disposal.

Q In your examination of wells in this half mile radius, Mr. Merchant, do you see any producing wells that are completed in such a way that they will serves as sources of -- by which disposal fluids can migrate to shallower fresh water sands?

A No, sir, I don't.

Q Let me direct your attention now to the

potential to have volumes of water such as you propose to serve as a source by which oil production is adversely affected or might be prematurely watered out because of your operation.

Let's turn, sir, if you will, to what is marked as Exhibit Eleven.

A Exhibit Eleven is a structure map of the Devonian formation in that field.

Q All right, let's take a moment and identify the wells so that we get some sense of what you're about to tell us.

Where is the disposal well?

A The disposal well is located in Section 8 on the east side of the fault line, which is subsurface depth of -7882.

Q And the ARCO well immediately to the west is the next dot?

A That is correct.

Q I don't see a footage depth on that well.

A I don't -- I don't have it on this particular map, Mr. Kellahin, but the well immediately to the west, which is Penroc producer in the Devonian, State AF No. 1 is subsurface depth -7535, and the ARCO well should be within 50 -- 50 feet, plus or minus, of the AF No. 1.

Q What is your best information with re-

gards to the producing interval perforated by ARCO in that well that offsets you to the west?

A The ARCO -- ARCO Well 4011 is approximately 250 feet, perforated 250 feet above the Devonian where we are proposing to dispose, and secondly, it lays on the upper side of the fault and the lower side of the fault.

Q The information tabulated by you on the ARCO 4011 No. 1 Well is found on what page, sir?

A Okay, it's on what's marked immediately after exhibit -- marked Exhibit Seven, it's the second page.

Q Second page after Seven, at the bottom of that page is the perforated intervals for the ARCO 4011-1 Well?

A That is correct, and it is shown as 11,506 to 11,586 feet.

Q In examining the information about the disposal well, have you determined whether or not there is any discrepancy in the information between the scout ticket on -- on your disposal well and the information displayed in the C-108?

A That is correct, Mr. Kellahin. When this, these exhibits were prepared information we had from the previous operator, it showed that the 7-inch casing was set in the Devonian in the subject well for application, the 7-inch casing supposedly was set a little bit higher than

where the scout report shows. In further investigation in the last few days, the scout report is correct.

Q But you give us the necessary information by which we can correct Exhibit Number Five?

A Yes, I will submit additional information which will show the 7-inch casing at 11,850 feet rather than at 7,000 -- I mean 11,837.

Q So the 11,837 on Exhibit Five should be changed to be 11, --

A 850.

Q -- 850.

A And also based on the scout report, which is later on confirmed, the previous operator in 1964 did perforate it, the perforations from 11,840 to 11,848, and tested the Devonian reservoir.

Q All right, the perforations again, sir, are where?

A 11,840 --

Q All right.

A -- to 11,848; were acidized and tested water. If I may, I -- if the Examiner would like, I would like to submit the copy of the scout reports on this -- on this well.

MR. KELLAHIN: I have an extra copy of that, Mr. Examiner, and I'll supply one to Mr. Carr.

Here is the scout ticket that Mr. Merchant is referring to.

MR. STOGNER: Mr. Merchant, is there any record of the -- how much it took to squeeze these perforations off?

A Unless there is a record in the Oil Commission files, I do not have a record of it.

MR. STOGNER: Okay, you know of no record that these perfs were indeed squeezed or anything?

A No.

MR. STOGNER: Let's see, well, now, let me ask you this. You show a plugged back TD at 11,409. Was it tested down in a deeper zone and then plugged back?

A That is correct. Based on the scout report and the Commission files in the Hobbs OCD office, they perforated the well from 840 to 848, acidized with 1000 gallons, swab tested it for water, and plugged back to 11,750, perforated in what I would assume that it's Upper Devonian, acidized with 2000 gallons and swabbed dry.

MR. STOGNER: Okay. I just wanted to clear that up. Thank you.

Q Let's go back to Page 11 now that shows the structure map.

What is your information with regards to the current producing rates on the ARCO well to the west?

A To the best of my knowledge the ARCO well is averaging 40 barrels of oil and a little over 2000 barrels, I think it's about 2200 barrels of water a day.

Once again, the Penroc well which is to the immediate west, the AF No. 1, which really completed in late August, early September, it's averaging, or was averaging until we shut it in for water disposal problems, was averaging 150 barrels of oil and 1800 barrels of water a day.

Q When we look at your well to the west of the ARCO well, what is the perforated interval for that well? Do you know approximately what it is?

A I can tell you in just a second. It's perforated from 11,513 to 11,573.

Q Do you have an opinion, now, Mr. Merchant, as to whether or not your proposed disposal in the interval as requested will cause an adverse impact upon your ability to produce the Devonian oil as well as ARCO's ability to produce the remaining Devonian oil?

A Based, again based on my experience with the Devonian reservoir in Lea County, New Mexico, I don't know of any reservoirs which have produced or are capable of producing on the low side of the fault where this disposal well exists and both wells, both Penroc State AF No. 1, as well as the 4011 of ARCO, they exist on the up-dip side or

on the upper side of the fault, so I don't believe that they'll have any adverse effect on either one of them two wells in term of oil production.

Q Describe for the Examiner what procedure you propose to follow in changing the current information -- the current wellbore to the proposed completion for disposal. Describe for him your procedure.

A Okay. I'd like to go back to the -- to Exhibit Five, which shows the current wellbore on the State AF No. 2 and the proposed -- and what we propose to do is squeeze the ABo perfs from 8937 to 9025 and 9050 feet and 9080 and drill out the cement bridge plug at 9702 and 10,100, deepen the well from its present depth of 11,850 down to 12,000 feet.

Q What will you then do?

A We would run a string of 3-1/2 inch, either 2-7/8ths or 3-1/2 inch tubing, plastic coated tubing, with 7-inch packer, and begin disposal process.

MR. STOGNER: What size of tubing again, 2-7/8ths or what?

A Or 3-1/2.

MR. STOGNER: Okay. Thank you.

Q Prior to commencing disposal will you test the well to see if there's any remaining oil that could be recovered from the well?

A Since this application was filed, we have had access to additional information, especially the scout reports back from 1964, which indicated that the well DST'd for -- with free oil, 928 feet of free oil and no water. The previous operator, Texas Pacific, did perforate and tested the well, which I indicated earlier, swabbed acid water and then later on formation water with trace of oil, but since there was -- there is a chance that there might be some oil there, we will -- naturally, we're in the oil business and not water disposal business, per se, we would like to test and we will test for oil production in the No. 2 Well from the Devonian.

Q Do you have the rights to recover oil in this wellbore?

A Yeah, we do have the rights and if that's the case, we'll make a producer rather than a disposal well.

Q Have you provided notice as required by the Division rules to all the offset operators that are affected by the application?

A Mr. Kellahin, Mr. Examiner, we have the Exhibit Thirteen, the last -- the last exhibit of this package, shows notification to all the offset operators by certified mail.

Q Have you received any objection from Texaco as to the disposal?

A Have not received any objection from Texaco.

Q And have you received any objection from Bledsoe Petroleum Corporation?

A No, sir, I haven't. In fact, they have called at least three times wanting to know when we'd be ready to dispose because they are in a bind disposal-wise and they would like to give us some water.

Q All right. Have you received any response or inquiries from Maralo, Inc.?

A Yes, I did received a letter from Maralo, dated January the 11th, which was addressed to the Oil Conservation Division, of which I have a copy, in which they are the one who brought my attention to the scout report and I fully agree with them, if that's the case, we will not be disposing where we said we would dispose. We'll dispose below 12,000 feet.

Q What is your response to the Examiner with regards to the Maralo request, then, that the disposal interval be confined to depths below the 12,000 foot interval?

A First of all, we'll be testing the Devonian pay from 11,840 to 11,850, or hopefully just the top part of it, and if it is a producer, naturally we are not going any further. We're going to make it a good producer

and hope for a 200-barrel a day well, but if that turns out to be not true, noncommercial, then we will go down below 12,000 feet and do what Maralo is recommending or suggesting.

Q Let me direct your attention now to your notice ot Mr. Lee. Has Mr. lee objected to the proposed disposal in the well? I believe he's the grazing lessee owner in the area?

A He is the grazing lessee and he has had no objection. In fact, he wanted to be here today to testify on our behalf but I didn't think it was necessary.

Q Finally now, let me direct your attention to ARCO as the offset operator. Have you received any objection or inquiry from ARCO as to the operation?

A Shortly after we filed the application I received a phone call from ARCO indicating that they might have some objections. They're concerned about the producer, Lee 411, immediately to the east -- to the west, I'm sorry, and they indicated they would like to run some tests to make sure that there is no communication between our well and their well, between the disposal and the producer, and I don't have a problem with it, as far as running some kind of test.

Q Do you have a suggestion to the Examiner as to the various possible tests that might be conducted in

conjunction with determining the separation between the production in the ARCO well and the disposal in the proposed disposal well?

A I think, since ARCO is the one who has suggested they would like to see some tests, I'm convinced that we do not have -- those two reservoirs are completely two different reservoirs, being on opposite sides of the fault, but if ARCO have a desire to run one test or two tests, once we deepen the well, squeeze the perforations and deepen the well and so on and so forth, ARCO is more than welcome to run any or whatever tests they want to run at their own expense.

Q You'll make your wellbore available for whatever tests their engineers determine is appropriate?

A As long as it's done diligently, yes.

Q Well, what are the types of tests that you would believe to be reasonable to conduct in the wellbore?

A One of the tests which is known to the industry is called pulse testing. I believe that's one of the tests they might be inclined to run.

Q And you have no objection to the wellbore being utilized for that type of test?

A I don't have no objection whatsoever.

Q Let's turn now to Exhibit Number Ten, Mr.

Merchant, and have you identify that exhibit.

A Exhibit Twelve?

Q Ten.

A Ten, I'm sorry.

Q It's a water analysis, I believe.

A Okay. Exhibit Ten is a copy of the water analysis. The one on the lefthand side -- on the lefthand column says water well, which is a fresh water well which exists approximately four miles east, northeast, east, of the captioned well. It belongs to Bill and R. D. Lee.

The water analysis on the righthand column comes from the Penroc well, State AF No. 1, producing from the Devonian.

Q Do you anticipate any difficulty with disposal of produced water from the Devonian formation back into the Devonian with this disposal well?

A Mr. Kellahin and Mr. Examiner, this is being done all over Lea County, New Mexico, and I don't see that this one is any different than anything else.

Q Does the introduction of the possibility of disposal from production in the San Andres formation cause any incompatibility problems with the water present in the Devonian formation?

A Not to my knowledge, but we -- we will -- any time we take any additional water, any foreign water

from anywhere, we will run compatibility tests before we do so.

Q Do you have an opinion, Mr. Merchant, whether approval of your application will be in the best interest of conservation, the prevention of waste, and the protection of correlative rights?

A Yes, I do, for more than one reason. Penroc have existing well which is currently shut in. It came in at 640/650 barrels of oil a day and within three months declined to 150 barrels a day and that's where be believe it's going to pretty well stay with a normal declline rate of a Devonian reservoir, but at the same time we lift approximately 1800 barrels of water a day, which we don't have no place -- nowhere to go with.

Also, in this area, as many people are aware in the Buckeye area, including ARCO, have quite -- quite a few problems getting rid of the produced water and if we don't have room to dispose produced water, we'll be looking at losing a lot of reserves, not only just Penroc but many other operators.

MR. KELLAHIN: That concludes my examination of Mr. Merchant.

We would move the introduction of his Exhibits One through Thirteen.

MR. STOGNER: Are there any ob-

jections?

MR. CARR: No objections.

MR. STOGNER: Exhibits One through Thirteen will be admitted into evidence at this time.

Mr. Carr, your witness.

MR. CARR: Thank you, Mr. Stogner.

CROSS EXAMINATION

BY MR. CARR:

Q Mr. Merchant, as I understand your testimony, it was Maralo that sent you scout tickets that caused you to suspect the well might be capable of producing some oil, is that right?

A That is correct.

Q And it was the original drill stem test information on the well that caused you to decide you'd better test the well before you convert it to disposal?

A Would you repeat your question again, please?

Q Was it the original drill stem test data that caused you to decide to test the well for oil before converting to disposal?

A That is correct. Just the recovery on

the drill stem test. The chances of making a producer are going to be slim but --

Q But it's worth a test.

A -- it's worth a test.

Q And if I understood your testimony, Maralo requested that you test the well, or suggested that you test the well and did you say that in any event they requested that you dispose below 1200 feet?

A They --

Q Or 12,000 feet?

A Maralo did not request that we test the well. Maralo suggested that -- and if you would like, I will read those two lines off the letter, "the presence of an oil column on the downthrown side of the major fault controlling the South Vacuum accumulation" that they recommend to the Oil Commission that we dispose below 12,000 feet, and we do not -- Penroc does not have no problem with that.

Q As I look at your schematic drawing, which is Exhibit Number Five, the total depth of the well you propose is 12,000 feet. Are you intending to go below that?

A We will -- since Maralo's letter of January 11th, yes, we will have to go below 12,000 feet.

Q And how much below 12,000 feet do you plan to take the well?

A A couple of hundred feet.

Q And what would be the disposal interval now in the well?

A After we -- after we deepen the well? It will be from 12,000 to 12,200. Since I don't have access to a log to see how thick of a reservoir we have, 200 should be plenty.

Q Now, if, as I understand it, the ARCO well is only 300 or 1320 feet from the proposed disposal well, isn't that correct?

A That is correct.

Q And so to assure that -- to prevent any problem in the ARCO well that might result from water disposal, you need to have that fault there.

A That's our whole contention and I think Maralo's letter is pointing towards the same thing; they agree with us that there is a major fault controlling the South Vacuum Field, but at the same time, like I testified just moments ago, that we do not have any problem ARCO running a test to satisfy themselves.

Q And they'd have to satisfy themselves not only the fault is there but that it is a sealing fault, isn't that correct?

A Whatever suits their fancy.

Q Now you indicated you wouldn't have any

objection for ARCO testing the well. Would you be willing to bear the expense of those tests?

A I will bear the expense of deepening the well but I will not be open for paying the cost of the test whatsoever.

Q If we look at your Exhibit Number Three, which is the attachment to Form C-108, you indicate that a maximum injection rate would be 10,000 barrels of water per day. Now you have a need for 1800 barrels right now, is that correct?

A We have a need for 1800 or less.

Q And you were planning to use the well also for a commercial disposal operation?

A We certainly intend to do so because we have had requests from several other operators in the -- in the offsetting area, who would like to utilize the well.

Q Are you also using the AF No. 3 for a commercial disposal operation?

A No, we'll be using AF No. 3 for our own disposal.

Q Do you operate any other disposal wells in the area?

A Not -- when you say in the area, you're talking --

Q Within five miles?

A No, but I will be.

Q Do you have a disposal well in the San Andres up in Section 2 to the -- to the northeast?

A I have filed an application to do so.

Q Do you have any other applications pending?

A No, sir, none other than that.

Q Is that well -- is this all the same lease that you're -- is the AF-3 and the AF-2, are they on the same lease?

A That is correct.

Q And the lease would be -- unless you're able to return the No. 2 to producing status, you'd be using it only for disposal purposes.

A The No. 2 Well, yes.

Q As well as the No. 3? There are no other wells on that lease.

A No. 1. No. 1 is a producer, Mr. Carr. It's 150-barrel a day well.

Q And that's the 1800 barrel, or less, water producer?

A 1800, give or take a barrel or two, which is currently shut in.

Q But it is not possible to use the AF No. 3 for the water that you're now proposing to dispose in the

AF No. 2?

A AF No. 3 is going to be a disposal well in the Wolfcamp formation, which, to my knowledge, we don't know exactly how it's going to act for a period once we start disposing.

MR. CARR: I have no further questions.

MR. STOGNER: Mr. Kellahin, do you have redirect?

MR. KELLAHIN: No, sir.

CROSS EXAMINATION

BY MR. STOGNER:

Q Okay, let's see, I'm a little confused here on the injection interval. I see it was advertised today as being 11,837 to 12,000 feet. Now the 11,837 was the based of the 7-inch casing but that has been changed now to 11,850 feet, right?

A That is correct.

Q Okay, now how much do you propose to deepen this well by?

A We propose to deepen it approximately 200 feet.

Q More.

A More, which will put us -- well, it will

be -- it will be more than that, and I'm sorry, it will be more than that. We'll be deepening it below 12,000 feet to accede with Maralo's request.

Q Okay, now will the deeper portion below 12,000 feet, will it be plugged back or will you be utilizing that deeper portion for injection also, or disposal?

A I'm -- I'm not sure when you said plugged back.

Q Are you going -- are you going to have a deeper interval, injection interval, than 12,000 feet?

A That is correct. We'll deepen it from -- from 11,850, or 837, wherever that casing might happen, I mean I'm not sure if it is at 837 or 850. Let's say it is at 850, we will deepen it from 11,850 to 12,200 feet and we will run a 5-1/2 liner inside that open hole.

Q So it will no longer be an open hole completion, then.

A It will no longer be an open hole completion after that, that is correct.

MR. STOGNER: Mr. Kellahin, we're going to have ot readvertise this, since we're going that extra 200 feet and the earliest we can get that readvertised would be March -- the first hearing in March and I --

MR. KELLAHIN: I believe that's

the 3rd of March, is it not? The 2nd.

MR. STOGNER: March 3rd.

MR. KELLAHIN: The 2nd.

(Thereupon a discussion was had off the record.)

MR. STOGNER: Okay, we'll go back on the record now.

We'll have to readvertise this for the March 2nd, 1988, hearing to satisfy the extra depth there.

Mr. Kellahin, do you have anything further?

MR. KELLAHIN: Not at this time, Mr. Examiner?

MR. STOGNER: All right, Mr. Carr?

MR. CARR: At this time I'd call Danny Campbell. I have no further questions of Mr. Merchant.

RICHARD DANIEL CAMPBELL,

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

DIRECT EXAMINATION

BY MR.CARR:

Q Will you state your full name for the record, please?

A Richard Daniel Campbell.

Q Mr. Campbell, where you do you reside?

A Midland, Texas.

Q By whom are you employed?

A ARCO Oil & Gas in Midland, Texas.

Q And in what capacity are you employed by ARCO?

A Senior Operations Analytical Engineer, handling the southeastern New Mexico area for ARCO.

Q Have you previously testified before the New Mexico Oil Conservation Division and had your credentials as a petroleum engineer accepted and made a matter of record?

A Yes, I have.

Q Are you familiar with what Penroc seeks with this application?

A Yes, I do.

Q Are you familiar with the subject area?

A Yes, sir, very well.

MR. CARR: Are Mr. Campbell's

qualifications accepted?

MR. STOGNER: Are there any objections?

MR. KELLAHIN: No, sir.

MR. STOGNER: Mr. Campbell is so qualified.

Q Mr. Campbell, would you please refer to what has been marked for identification as ARCO Exhibit Number One, identify this, and review it, please?

A Yes. What you see here is a yellow area which is in 18, 35, Section 18 and Section 17, identifying ARCO's acreage. The green dot is the State AF No. 2, which Penrod -- Penroc proposes injection into the Devonian, and the red dot is ARCO's Lee 403, 4011 State No. 1, offsetting it to the west.

Q And what field is the ARCO well producing from?

A Mid-Vacuum Devonian Pool.

Q How many wells are still producing from this particular pool?

A ARCO was the only well left in Section 8 and 17 until Penroc re-entered the AF No. 1 in '87.

Q Would you refer to Exhibit Number Two and identify this, please?

A Yes. This is the average daily oil and

water production for the Lee 4011 State No. 1, which ARCO operates.

Q And what does this show you?

A It shows the constant oil rate of 40 to 50 barrels a day for the last three years, and a water rate of a little over 2000 barrels a day.

Q Now, Mr. Campbell, would you go to Exhibit Number Three and first of all identify the source of this particular exhibit?

A Yes. This is a Devonian structure, which was presented by Penroc in their application for the disposal well AF No. 2.

Q And what does this show?

A It shows a major fault running from the northwest to the southeast. The orange dot, solid orange dot, is ARCO's well and the green dot with the orange circle around it is Penroc's AF No. 2.

Q Do the other dots on this map show Devonian wells in the immediate area?

A Yes, it does.

Q Does ARCO dispute the existence of this fault?

A No. ARCO firmly believes that the Devonian formation is a highly faulted structure. We feel like there are probably more than the one fault. The one fault

that is shown is the major fault in the area.

Q Would you now refer to your Exhibit Number Four, which is the cross section displayed on the wall, go to the exhibit and review for Mr. Stogner what it shows?

A Yes. What we have here on the wall is sonic logs, acoustic times, and gamma ray, for the 4011 No. 1 and the AF No. 2.

Let's first look at ARCO's well. You have the Woodford Shale, the Lower Mississippian, and then you have the Devonian formation, which we TD'd at about 12,000 feet.

You can see in our well that the Devonian does occur over a 500-foot interval.

If you go to the AF No. 2, when Texas Pacific originally drilled this well, they cut the Woodford Shale, drilled into the top of the Devonian 10 feet, ran a DST, got the oil show, it's already been previously done, they acidized with 1000 gallons, as the scout report will show, swabbed load oil, some acid water, and as the formation water had (not clearly understood) and had worked their way back up-hole doing some testing.

Q How would you characterize the reservoir in this area? How would you describe it?

A We firmly believe that the Devonian formation is a fractured porosity reservoir. You can see that

there's a fault that we've talked about between these two wells. We have no problem with that. As a matter of fact, we feel like there's more than that because of the size of the Woodford Shale in the two wells and the size of the Lower Mississippian. There's probably more than one fault in the whole Devonian structure, but only one major fault being between the two wells. And that has created the dominant porosity in the Devonian formation, which is your (unclear) porosity.

Q Would you like to return to your seat, now?

A Okay.

Q All right, Mr. Campbell, what is the reservoir drive mechanism in this particular reservoir?

A We feel like the mechanism is water encroachment in the Devonian formation.

Q And what would, in your opinion, be the effect on this reservoir of Penroc's proposed injection?

A They would be putting additional mass, water mass, in the Devonian formation around producers.

Q And what would the -- be the effect on the pressures in the reservoir of their injection?

A Because the two producers in the field are ARCO's 4011 No. 1 and Penroc's AF No. 1, which both sit due west of the AF No. 2, they will be creating a high pres-

sure point within the Devonian formation an the two producers are creating a low pressure point, and ARCO's well is in between Penroc's two wells and your water mass will move directly west.

Q In your opinion could this injection therefor damage the Lee 4011 State No. 1 Well?

A There's a very strong possibility that we would see water problems in our well in the very near future.

Q To protect yourself from that potential damage, would the fault between them have to be a sealing fault?

A Yes, it would have to be a sealing fault to protect us.

Q Do you have an opinion as to whether or not that is in fact a sealing fault?

A Yes. I have the opinion that it is not a sealing fault.

Q And what is that opinion based on?

A Based on DST data, original DST data in the Mid-Devonian Field.

Q Would you now refer to ARCO Number Five and identify that, please?

A Yes. What you see here are the wells from Section 8 and Section 17 in the Mid-Devonian Field.

The 403 No. 4, the 4011 No. 1, and the AF No. 1, were the original three wells drilled in the Mid-Devonian Field. ARCO, or Sinclair at that time, was the operator. Texas Pacific was the operator of the AF No. 1.

If you look at the DST data, you can see that the original reservoir pressure is definitely hanging around the 4700 pounds mark and all those final shut-ins are either hour and a half or two hour final shut-ins on the DST's.

Q Are these wells listed in the order that they were actually drilled and completed?

A Very much so, and that leads to -- as you walk on down, you start getting into around nine months of production when the AF No. 2 and AF No. 3 were tested across the fault, and you can see, even though they're deeper, you had a pressure drop in the area because of the production.

Q And what does this tell you?

A We feel like this tells us there was a drawdown, a localized drawdown in the area that was even effective across the fault.

Q And so does that tell you whether or not this is a sealing fault?

A Yes. We believe it leads to the fact that it is not a sealing fault, and also we go back to the DST data in the 4011 No. 1, and if you look at the DST data

in the No. 1, ARCO cut 500-foot of the Devonian formation and as DST down through the Devonian formation, even though you get water production, you still have a reservoir pressure that is consistent with the top of the reservoir, being that it's all in communication.

Q And what kind of permeabilities do you experience in this reservoir?

A From the DST data from the original wells you have somewhere around 100 millidarcies of perm and we think that's also shown in the fact that Penroc's No. 1, our 4011 No. 1, and other wells in the area produce a lot of fluid.

Q In your opinion is the formation capable of moving these fluids?

A Yes, very easily.

Q In terms of -- what would be the effect on your correlative rights if Penroc's application was granted?

A We feel the fact that that would be a high pressure point, ARCO would be operating at a low pressure point, that by their -- by the water moving in a directly western direction, we would water out any oil production on the ARCO lease that would come from the south or from the west. We would lose that oil production.

Q That you'd be unable to produce oil that

you might otherwise be able to produce?

A Correct. We're currently operating at an economical situation of 40 to 50 barrels a day and 2200 to 2300 barrels a day of water.

Q In your opinion would this result in the waste of oil?

A Yes, it would.

Q What is ARCO's recommendation to the Examiner in this case?

A We ask that they deny the application.

Q Now, Mr. Campbell, you've heard Mr. Merchant talk today about testing of the wells in this immediate area to establish whether or not there is communication across the fracture.

Do you have a recommendation to make concerning any testing that might be made?

A Yes. I feel like if they're wanting to use the Devonian -- Mid-Devonian formation as an injector while we still have a producer directly offsetting them, they should do the testing at their cost to show that the fault is sealing because based on original DST data, it is not.

Q Now what kind of a test would you recommend be run?

A The testing which Mr. Merchant has talked

about, the pulse testing, is a test that is accepted in the industry. The only other options I would know of at this time is doing build-ups on both wells. That's probably a little more risky than the pulse test.

Q Do you have a recommendation as to one or the other?

A I'd have to consult with our experts within the company that are pressure people, but in the past in working with them the pulse tests have been their recommendation.

Q Were Exhibits One through Five prepared by you or compiled under your direction and supervision?

A Yes, they were.

MR. CARR: At this time, Mr. Stogner, we offer ARCO Exhibits One through Five.

MR. STOGNER: Are there any objections?

MR. KELLAHIN: No objections.

MR. STOGNER: One through Five will be admitted into evidence.

MR. CARR: That concludes my direct examination of Mr. Campbell, and I pass the witness.

MR. STOGNER: Mr. Kellahin?

MR. KELLAHIN: Thank you.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Campbell, describe for me what it is that you do for the Midland office of ARCO. What is your specific area of responsiblity?

A I have anything from the Vacuum Field over to close to the Abo, Empire Abo Field. I do all the reservoir and drilling proposals in that area.

Q Are you the staff engineer assigned the task of monitoring the production from the Lee 4011 State No. 1 Well?

A Yes, I am.

Q In watching that well's performance, have you seen any fluctuation in its production based upon what is occurring with the Penroc well to the west of your location?

A I think if you'll go back and look at the records you'll see that the well was just done in August and you've only got three months of production from the AF No. 1 and most of those records are just now getting out, so until we've got some kind of longer history of that well actually performing, no, I don't think we see anything because your production data within the records are not up to that date.

Q I was curious as to whether or not you'd

attempted to determine what, if any, effect the Penroc Well was having on the performance of your State No. 1 Well.

A Not at this time because I do not have their data up to that date.

Q What are you currently doing with the volume of water being produced from the State 1 Well?

A We carry it about a mile and a half to the southeast and dispose it into ARCO's disposal system.

Q Have you made a calculation of the anticipated remaining recoverable reserves from the well based upon its current operation?

A Now, that's part of the problem with this well, the fact that it's been doing 40 to 50 barrels a day for over three years, it's very difficult to determine what kind of remaining life of reserves you had, especially after you see a test like the AF No. 1 come in in the Middle Devonian. The Middle Devonian in the AF No. 1, AF No. 2, AF -- ARCO's 403 No. 4, 403 No. 6, may be economical to go back into in the area, so there's maybe more reserves there for all of us to recover.

Q Are there currently any disposal operations into the Devonian in the immediate area by anyone?

A Within our lease I know there's not. I cannot say for all the other operators in the area.

Q Have you seen any decline in the pressure

from the -- this well or the other wells in this immediate area during the performance of the wells?

A I don't know because I don't know if there's any injection in the area.

Q I was curious as to whether or not there's available data for you as an engineer to make any kind of pressure analysis to determine the future performance of the well.

A Because it is a very active water drive, I think the pressures that you're going to see in any of the wells in the Mid-Devonian is going to be just localized around producers, because you do have the active water drive and so any mass that we put in is going to go to that localized low pressure point.

Q I believe I understood you correctly that your Exhibit Three is simply a reproduction of the Devonian structure obtained from Penroc's exhibits and I also understood that you or the staff geologists have no disagreement with the way the faulting is projected on the display.

A Correct. There is a major fault running from the northwest to the southeast. That is the dominant fault in the area, correct.

Q If Mr. Merchant puts his disposal interval at 12,000 feet or below in the Devonian, what, based upon your study, is going to be the vertical distance be-

tween your lowest perforation and the 1200 foot interval?

A If he goes to the 12,000 foot mark and below, it would be right around 500, 500, no, 400 feet, if I'm not mistaken.

Q A little over 400 feet separation, then, between your lowest perforation and his upper disposal interval?

A Correct.

Q Have you attempted to quantify the rate at which the water migration will occur in the reservoir if its disposed of as Mr. Merchant proposes using an injection disposal rate of 500 pounds psi or less?

A It basically comes down to the -- whatever mass you take out of the 4011 No. 1 and AF No. 1, you'll be taking out X amount of mass and creating a low pressure point and by creating a high pressure point, AF No. 2, with 200 millidarcy rock, fractured reservoirs, that would be very difficult to determine at this point.

Q Can you -- can you quantify the rate at which you might see any response in your well from the disposal well?

A Yes. We could be able to possibly make some projections but that's all they would be is projections.

Q You have not done that, have you?

A Not from the standpoint of considering the fault as a carrier. From the 100 millidarcies pressure response should be able to be seen in a seven to five day response. Pressure response only.

Q I'm attempting to understand and test your hypothesis that the pressure sink created by production and the corresponding pressure increase from disposal is going to have an adverse effect on -- on your operation, and that's what I'm trying to understand.

A It's very simple. When you have fractured reservoirs, your -- your fluid is not going to -- it's mot moving through a porosity matrix of a laid down grain-to-grain basically whatever the dominant direction of your fracture perm is in the area. That's going to be the dominant direction of your fluid movement.

Q I'm trying to determine how this operation is different from the kind of response we might anticipate from a simple waterflood operation where we are injecting disposal waters down structure and seeing a positive, affirmative response in the producing wells.

A It's very, very simple. A fractured reservoir from a waterflood does not respond the same way as a San Andres matrix. There are two different types of mechanisms controlling that. Fractured porosity is -- is not the same as a matrix porosity reservoir.

Q You have suggested some choices as ways to test the separation between the proposed disposal well and the ARCO well, one of which was to conduct the necessary tests by which the engineers can make a pressure build-up analysis of the performance of the wells?

A Correct.

Q All right. Describe for us what's involved with each of the wells.

A In a pulse test you have to create --

Q I'm sorry, I did not make myself clear.

I want, first of all, the talk about the pressure build-up analysis.

A Oh, pressure build-up, excuse me. In a pressure -- in a pressure build-up situation what we would be looking for there is you'd have to create a drawdown in the AF No. 2 and do a build-up, calculate its reservoir pressure, either water drive or if there's a barrier out there, and you'd have to do the same thing in the 4011 No. 1. You would have to pull everything out of the hole. You would have to do a swab test, some kind of drawdown. You would run your build-up there. you would look at the pressure differential curve to identify your dominant mechanism of -- of production, if it's a two porosity reservoir, meaning a fractured reservoir; is there a barrier, sealing barrier, (not clearly understood) and to be

a sealing fault, that would have to be seen in both wells.

Q If that is the choice made by the Examiner if he requires further testing, approximately what period of time would be necessary to satisfy you as an engineer that the test have been run over a sufficient period of time to --

A I would --

Q -- to test it?

A I would set down with our pressure people, who are so much more qualified than I am, and let them look at the -- any of the DST data or any past pressure data that's in the Mid-Devonian Field in the area, and determine what those lengths of time were, but just --

Q As a generalization.

A 72 hours to 5 days.

Q During that period of time your well would have to go off production?

A Correct.

Q What is physically done with your wellbore that would result in an expense?

A The submersible has to be pulled.

Q Do you have an estimate for us of what it might cost to conduct a pressure build-up test and analysis on your well?

A Because the submersible has been in the

hole as long as it has, we do not know for sure what we would encounter in pulling that well. Our closest estimates would be $20-to-50,000 to -- to run something of this sort.

Q When would you normally change a submersible pump such as this?

A We'd pass.

Q And how long has it been in the wellbore, do you know?

A I know it's been in a minimum of three years but beyond that I can go back and check two sets of records. We've had enough consolidations of offices that all the records are not in the same place at this point.

Q Is there any appreciable difference in the cost of running either a pulse test or the bottom hole pressure buld-up test?

A There's a possibility that your build-up test may be somewhat cheaper from the standpoint that you would not have to take both wells maybe down at the same time, but overall cost is going to be about the same because you've got to run pressure equipment in both wells. It's got to be some length of time. You've got to pull our well. You've got to drill out the AF No. 2 so cost should be relatively in the same ballpark.

Q Apart from th expense issue and who bears that cost, is it acceptable to your company, Mr. Campbell,

that your wellbore production be interrupted and be utilized for testing?

A Of course we hate to take production down but, yes, if that's what the Commission sees is the alternative of -- versus approving the application, yes, we would defnitely consider that.

MR. KELLAHIN: I have nothing further. Thank you, Mr. Examiner.

MR. STOGNER: Mr. Carr, do you have anything on redirect?

MR. CARR: I have nothing on redirect, Mr. Stogner.

MR. KELLAHIN: May I have a moment?

MR. STOGNER: Yes, because I'm going to need a moment, too, to check some records and then we'll come back here. Let's take a short recess.

(Thereupon a recess was taken.)

MR. STOGNER: Tom, did you have some questions, some more questions for him, or --

MR. KELLAHIN: Well, I have a few while you're gathering your thoughts, Mr. Examiner. There was a couple of points I wasn't sure about, if you'd

like me to continue, I could finish up in just a few minutes.

MR. STOGNER: Yeah, do you have any objection on that?

MR. CARR: None whatsoever.

Q Mr. Campbell, it's not quite clear to me how your well is going to experience the potential for adverse consequences when the proposed disposal system is to be operated on a vacuum with a -- with a maximum disposal rate of 500 psi.

A Very easily. You just take the fluid level times your gradient and it comes above 4700 pounds, you can operate on vacuum and as long as you're putting a high volume of water in, that's going to be your high pressure point and the two producers to the due west are the lower pressure points, so your mass's movement is going to be from high pressure to low pressure, which is in the westerly direction.

Q You said the drive mechanism for the reservoir was water encroachment. Can I equate that with water drive as --

A Correct.

Q -- the drive for the reservoir?

A Yes.

Q Can you affect the volume of water produced in your wells by the -- where they are perforated in

the Devonian?

A Yes, if you get down to oil/water contact, wherever that may be, I'm not sure that's fully known, you could go back and probably do some work and you'd have a reasonable estimate of what it is.

Q At this point we don't have available to us or you've not made the study to determine in your opinion where that oil/water contact might be?

A No, I have not done a complete study to determine where the oil/water contact is. You can look on the structure map and which I'll present it, and there's -- there's wells that are -7824, which is our 403 No. 5, which produced oil at that point.

Q I think in part of your explanation or discussion generally about the area, you thought there might be a potential to come back in and make additional perforations in the No. 5 and the No. 6 Wells on the 403 Lease? Did I hear you say that?

A I think it's very simple. You can look at AF No. 2. Why are they -- why are they reconsidering going back in and testing the Devonian formation? The AF No. 2, they had a 1000 foot oil column on the DST.

Q Have you undertaken that project to make an evaluation of those wells to determine additional perforations at this time?

A Very much so. I was in the process of evaluating this area when the application come through. That's the reason I knew so much about the area when the AF No. 2 showed up on -- for disposal.

We have, I think it goes further than that. There's up-hole potential as far as Abo detrital Bone Springs, also, and it's not just the Devonian formation.

Q You would anticipate that the No. 5 and No. 6 Wells, if additional perforations were made and if they produced water, they would also produce Devonian oil?

A There's a strong possibility since they were the Devonian oil producers, yes, there's a good possibility they would return to oil production. At what economic limit is the question.

Q For benefit of oil production in this particular structure, where would be the lowest point on that structure in which produced water might be reinjected?

A I don't know. I'd have to sit down with some geologists to work that area and try to find an area which they felt comfortable with from a geological standpoint.

Q I was trying to understand the scope and extent of your recent studies. You said you were studying this area and I wanted to know whether or not you had examined what to do with this produced water.

A Oh, what to do --

Q Yes, sir.

A -- with the produced water? We operate our own injection system at this point, a mile and a half down. There's also other wells in the area that, of course, we would consider operating our own water disposal system in one of those wells.

Q In terms of the current disposal operations, do you have the capacity to utilize that current system for disposal?

A No, not under its current diagram. We're only injecting into the Lower San Andres at this point.

Q And what is the disposal volumes that that current well is able to take? Do you know?

A I don't know. We're putting between 2500 and 3000 barrels a day in it, in the Lower San Andres.

Q Are you experiencing any problems with that disposal well?

A Yes. It is a high pressure injection system.

MR. KELLAHIN: Thank you, Mr. Examiner.

MR. STOGNER: Mr. Carr, do you have any redirect?

MR. CARR: I have no redirect.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Campbell, I'm going to assume that for the geological data that both parties agree here since I got the same exhibit from both parties.

A Yes, sir, basically all I did was Xerox their exhibit, asked our geological group that works the area to examine it and see if they have any problems with it and they said no, there is a dominant fault that runs in the same direction and which is shown on their exhibit exact location; they feel like it does cut between the two wells but exactly which well it's closer to or the total direction, they didn't have any problems with it.

Q Okay, so that I'm understanding here, whenever I look at your Exhibit Number Three, that is the blow-up --

A Right.

Q -- copy of the fault, the other well that is on the up side of the fault --

A AF No. 3?

Q Is that the AF No. 3 in that --

A Yes, sir.

Q Now is this pool this localized or does it extend on further in either direction of the fault?

A I don't know.

Q Okay. Is there any indication of fluid movement between the fault, or fault line and any other location?

A Well, the only thing I can say is that the AF No. 3, that AF No. 3 and AF No. 2 was much after the production had come on in the wells up, on the up-thrown of the fault, but we see pressure drops in wells as they come on in the area.

I have not looked further to the northwest or to the southeast. There are many Devonian wells in that area. I have not looked to see how far that fault carries and what the pressure situation is.

I concentrated my -- my effort on the Mid-Devonian Pool wells.

Q Do you have any idea why there might not have been any more exploration on the other side of the fault in the Devonian formation?

A I think it basically goes back to the AF No. 2 and AF No. 3 both drilled by the same company in the May -- I mean April to May timeframe of 1964. For some reason they felt it was uneconomical to continue over there. They did get an oil column in the No. 2 Well after cutting only the top 10 feet and swab testing.

Q All right.

A They moved on up-hole.

Q All right. Okay, let's talk about this pulse test. I'm not too familiar with it, who does it, or anything like that, and since this case will be continued until March 2nd hearing, I'd like for either party or both parties to give me a little information on this pulse testing; who does it; what it consists of, but let me ask you on this.

Would a pulse test run on this proposed injection well, if it tested negative would that satisfy ARCO to allow it to go ahead, to allow Penroc to go ahead and inject or dispose of water at the 500 psi maximum injection pressure?

A If it shows that the AF No. 2 and 4011 No. 1 are in separate reservoirs and they will go to the 12,200 foot -- 12,000 to 12,200 to inject water, and do this examination at their cost, ARCO would for sure go with it.

Q That's a yes.

A There were some qualifiers in there.

MR. CARR: It was a yes.

Q What is the perforations in the 4011 No. 1?

A Current I think are 508 to 586. That's -- that's rough numbers. You want the exact numbers?

MR. KELLAHIN: We've got it here somewhere.

A They're in the application.

Q If I looked at --

A Yeah, 506 -- 11,506 to 11,586. I was off two feet.

Q Is that a continuous perforation?

A Yes, sir, I think it is. Let me look back at this original perforating data and I can probably -- no, sir, I take that back. That is not a continuous --

Q Have you got the perforations listed?

A On here it shows perforated Devonian from 11,560 to 28, 22 holes.

Q Now, hold it, 560?

A 506, I'm sorry.

Q Okay.

A 506 to 528 and then 552 to 586.

Q So two sets of perforations through this interval?

A Yes, sir, based on some data that I show the original completion. I had to go back and confirm in our records if there's been any additional perforating since the original completion.

Q Refer to your Exhibit Number Four, and this seepage or connection or -- or communication would essentially have to be injected and it would have to come up in the formation about 200 feet, is that correct?

A Yes, sir.

Q So it would have to follow the fault line up to be communicated.

A Yes, sir, it would have to move in that direction. It would have to come up, but whatever the throw, whatever the true throw is at the Devonian formation.

Q Are there any -- strike that question. Let me check in here.

Are there any logs that you know of that exist for the Devonian formation on the -- I guess I should be calling that the down-thrown side and the up-thrown side.

A Down-thrown side would be the AF No. 2.

Q But it did not perf -- penetrate the Delaware, did it?

A The entire Devonian?

Q Yes, I'm sorry, the Devonian.

A No, sir, it didn't penetrate the entire Devonian. I'd have to go back and look at the scout reports here on the AF No. 3, which is in -- also in Section 8, to see what its -- its depth of penetration was.

MR. STOGNER: Mr. Merchant, you can ponder these same questions because I'm going to ask you the same ones.

MR. MERCHANT: Shoot.

MR. STOGNER: Well, later on.

A I do show the AF-3 DST being from 11,923 to 11,956, and based on the subsea depth, that's probably pretty close to the top of the Devonian formation in the AF No. 3.

Now, the AF No. 2 that you look at there, penetration was, I think, 11,850 and they did that based on once they got to the bottom of the Woodford they cut ten foot and DST'd.

Q Well, regardless, it does not cover the same producing interval that you have, is that correct?

A It has not cut the entire Devonian, that's correct.

Q Okay.

A Because other wells that have cut the Devonian in the area show the Devonian to be massive. I consider, I guess, 500 foot of reservoir massive.

Q Are there any other similar structures like this in the Vacuum Devonian area in the Devonian formation in this particular area?

A There are other Vacuum Devonian pools out there, correct.

Q Do they have a fault running through them like this?

A I don't know.

Q Is there any similar structures like this

that exist in Lea County?

A I imagine there is but -- because we play the Devonian quite extensively as far as ARCO and one of the things we do look for is a faulting area, that if you can get a fault block that is definitely high, many times you have a cumulation of oil. That doesn't necessarily mean that those fault blocks are sealing. It's just you have enough throw at your closure point. In this case you have a closure point of probably 200-to-300 foot, so you look for that closure point, same as you would look for them on structure.

That's the reason we go back to the AF No. 2 DST, the fact that there was showed reservoir quality rock based on the DST, that you did have an oil column and you did have reservoir pressure and you do have fluids.

That -- that throw is just a closure, closure point for an oil trapping mechanism, just as a structure would be, a down turn in your structure would be a closure point.

MR. STOGNER: I have no further questions of Mr. Campbell.

Are there any other questions of this witness? Mr. Carr? Mr. Kellahin?

MR. CARR: No, sir.

MR. KELLAHIN: No, sir.

MR. STOGNER: Mr. Kellahin, do you have any plans for bringing Mr. Merchant back on the stand?

MR. KELLAHIN; I'll be happy to. I think you had some further questions --

MR. STOGNER: Yeah, I have some questions. I didn't know whether you had --

MR. KELLAHIN: -- that you wanted -- why don't you resume your seat over here?

MOHAMMED YAMIN MERCHANT,

being recalled as a witness and remaining under oath, testified as follows, to-wit:

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Merchant, I want to ask you the same question about the -- do you know if there's any existing logs or any wells that penetrated the same producing interval as the Devonian formation in the ARCO State Well No. 1, the 4011, on this vicinity?

A Not -- not within the Mid-Vacuum Devonian Field. The two Penroc wells, the AF-2 and the AF-3, since they were on the down side of the fault, there were no further penetrations made back in 1964, and there are no wells,

there are not any Devonian wells to the east. I'm talking reasonable miles. You can go as many as five or six miles and you won't find anything.

All the Devonian wells have been to the -- to the west and I'll point out two of them to you. One is Texaco State AN No. 9 in Section 7. It's in the --

Q Just to the north and to the west, is that correct?

A Yes, it's the northwest of the AF No. 1, 330 from the lease line in the northwest quarter of the southwest quarter.

That was a Devonian well at one time; produced, oh, I'd say about a quarter of a million, 250,000 barrels of oil.

And the well immediately south of it, the State AN No. 8, at one time was a Devonian well. They're both P & A'd now.

And then you have another Devonian well, which is -- I'm not sure what pool it's called, but it may be the Mid-Vacuum Devonian. That's in Section 16 in the northwest quarter of the southwest quarter. That's Maralo's well.

Otherwise there are no wells beside ARCO wells in the Devonian.

Q Are you aware of any other Devonian

structures such as this that exist in Lea County, or in this area?

A You have -- one comes to my knowledge over in the Bough Devonian at Crossroads.

Q I'm sorry, the what?

A Bough, B-O-U-G-H. I won't call myself an expert geologist or anything like that, but the structure, the faulting looks pretty similar to what is shown here in the MId-Vacuum Devonian.

And over there, just for your information, Amoco converted one of the Devonian wells, which is on the same side of the fault as this one, or the same side of the fault as the producer, and they haven't hurt anything whatsoever in the last seven years I know of.

In fact, if anything, it's helped the production since it was on the same side of the fault.

Q In this particular area, is there any Mississippian production?

A Not to my knowledge.

Q And why wouldn't the Mississippian formation be a good candidate for injection?

A I can't answer that question. Basically the Devonian has been the reservoir that will take all the water you can give it.

Just to the southeast of it Union of Cal-

ifornia have a Devonian field where they're producing, still producing two or three wells with extremely high water cut, but at the same time they have put like at least 20-to-25,000 barrels of water a day on vacuum in the Devonian.

Q How about the Pennsylvanian formation? Why wouldn't that be a good candidate in this well?

A Like I say, the Pennsylvanian, or below the Abo?

Q Yeah, below the Abo, top of the Mississippian, anywhere in that range, is there some production in there that would --

A No, if you go back two weeks ago when we were here to ask approval for the Wolfcamp, we just don't know how much water it would take, because that's the only well there. I personally don't have any experience in disposal in the Wolfcamp formation or Penn.

Q How about Fusselman? How about if you drilled on down to the Fusselman through the Devonian? Is there any -- why wouldn't that be a good candidate?

A I don't know if it's ever been drilled that deep.

Q Do you know how thick the Devonian is in this area?

A I think it varies anywhere from -- I may be wrong -- it's 5-to-800 feet, maybe more.

But I'll say this, just conferring with people with 40-45 years experience in Lea County, New Mexico, people said, people have told me that there's no place in Lea County where you can make oil production on the down side of the fault out of the Devonian. Maybe I can prove that otherwise, I don't know.

MR. STOGNER: I have no further questions of Mr. Merchant.

Are there any other questions of this witness?

MR. KELLAHIN: I have some, Mr. Examiner.

MR. STOGNER: Okay, Mr. Kellahin.

REDIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Merchant, let me ask you what alternatives are available for an adequate commercial disposal facility for the Devonian produced water in this area to which you would have access?

A Right now there aren't any.

Q ARCO is using a disposal facility some distance to the south and east, I believe, of their well. I think that's for their needs, is it not?

A To my knowledge that is correct.

Q Are there any others available to any other operator in this area for disposal?

A Maralo have a disposal well south of Section 16, which is in the Devonian, I understand.

Q And they utilize that for their operations?

A They are utilizing for their operations, that is correct.

Q Now, Maralo is an offset operator that requested the disposal interval be below the 12,000 foot depth. Where is their property?

A Their property is located in the northwest quarter of the southwest quarter, called the Maralo State No. 1, I believe.

Q Northwest of the southwest of which section?

A Section 16, I'm sorry.

Q So they're to the south and east of -- of the disposal facility.

A That is correct.

Q Do you have an opinion, Mr. Merchant, as to whether or not you can bear the cost of the type of testing Mr. Campbell suggests if that cost ranged between $20-and-50,000?

A The answer is going to be negative and approximately more close to $50,000 than $20,000, just because ARCO has not pulled that well ever since they ran it.

Q Let's -- let's test the hypothesis that the fault for which there is no dispute as to its location, to test whether the Examiner can base approval of your application on the fact that the disposal interval is on the down-thrown side of that fault.

Mr. Campbell is concerned. Let me ask you, sir, whether or not you as an engineer experienced in the area share Mr. Campbell's concern about the ability of that fault to provide an adequate barrier whereby disposal in the Devonian on the down side of that fault is not going to impact adversely his operations on the up-thrown side?

A Well I share his concern. I don't have no firsthand knowledge of anywhere where any company may have disposed water on the down side of the fault and have hurt production on the up side of the fault. There have never been a case in the history of Lea County, New Mexico, anywhere in the Devonian Field, and there are quite a few Devonian fields and there are quite a few people disposing in the Devonian.

Q Are there any Devonian producers on the down-thrown side of this structure?

A There are no, to my knowledge, again,

there are no Devonian producers on the down side of the -- of the fault.

Q Mr. Campbell cites as a reason for his concern the fact that the drill stem test shown on the scout ticket for the disposal well does show the potential for oil in that drill stem test. What were the drill stem test results again so we have that fresh in our mind?

A The drill stem test showed they recovered 928 feet of free oil with no water and when they did set pipe and perforated, that there was -- there was barely a trace of oil and just strictly formation water.

Q Based upon your experience, Mr. Merchant, how do you assess the potential of a drill stem test results with the importance of Mr. Campbell's opinion that there is migration across this fault?

A Well, to me, if there was a commercial -- if this was an oil-bearing reservoir to be commercially -- and -- and be commercial, then it should have produced oil wehn they completed it, and you are looking at a substantial -- because of the faulting, which we all agree that there is a fault. It's just -- they're not two similar reservoirs.

Q Other than the drill stem test in the proposed disposal well, that Mr. Campbell cites, do you see any other evidence by which you could conclude that there is a potential for migration of disposal fluids across this

fault vertically some 2-or-300 feet up structure into the ARCO producing well?

A No, sir, I don't. I don't have no reason to believe they will migrate that far up, especially if we're disposing below 12,000 feet.

Q Can you then as a reservoir engineer recommend to the Examiner based upon the data that we have available, that this application ought to be approved?

A Well, I strongly recommend that this application be approved, for more than one reason; not only -- not only that Penroc may have a problem getting rid of the water but other producers and one of the producers may very well be ARCO, especially it was mentioned this afternoon, right here in this room that ARCO may look at the possibilities of going back to Well No. 5 and Well No. 6 in Section 17. My question is what are they going to do with the water? They have 6500 pounds injection pressure on the salt water disposal well they have south of it. There's no room. There is no place.

MR. KELLAHIN: Nothing further, thank you.

MR. STOGNER: Mr. Carr?

MR. CARR: Nothing further.

RECROSS EXAMINATION

BY MR. STOGNER:

Q Point of clarification and then I'll be through.

Once you drill this well, deepen it, you said you would test the Devonian for oil production. What would that test consist of?

A We will run -- we'll perforate it and run a submersible pump and if we have an oil well, we won't go no further. We'll produce it. And I'll prove many of the geologists wrong then.

Q Okay.

MR. STOGNER: Are there any other questions of Mr. Merchant?

MR. CARR: No questions.

MR. STOGNER: I've got one question for Mr. Campbell.

Mr. Campbell, if they test the well for oil and it comes up negative, would that satisfy ARCO or would they still want a pulse type test run?

MR. CAMPBELL: I guess we would be more inclined to make sure that they went below the 12,000 foot marker and not inject in the top of the Devonian, the top 200 foot, or so. Even -- even if --

MR. STOGNER: I can't get that

as a yes or no. Let me rephrase my question.

If they do what they propose to do and they test for oil within the Devonian formation, would that satisfy ARCO if that test came negative?

MR. CAMPBELL: No, based on the current information.

MR. STOGNER: Mr. Kellahin, Mr. Carr, since this test -- I mean since this application is going to have to be continued, are you all ready for closing statements now or would you all want to come back at that time or how would you all like to proceed with this?

MR. KELLAHIN: I would be happy to submit a proposed order. We need to get you some additional documentation on a potential test. I'd be happy to make a few brief comments if you like.

MR. STOGNER: Okay, Mr. Carr?

MR. CARR: I'd prefer to close now and not reopen this on the 3rd. If you're planning to come back we can, I mean we would, but I'm not intending to and I don't think at this point ARCO is intending to come back and put on additional testimony. I think it's being continued just to correct that error in the ad and not to take a second shot at it.

MR. STOGNER: All right. That's essentially what it is. I wanted to clarify that.

So we'll take some closing statements at this time.

I'm requesting from both of you all -- I'm sorry, from both Mr. Carr and Mr. Kellahin a brief rundown on the test. Is that the only information we need?

MR. CARR: Do you want proposed orders, or not?

MR. STOGNER: Yes, I'm going to ask for that later, but it -- that was the only information I asked for.

MR. KELLAHIN: That's correct.

MR. STOGNER: All right. Some proposed rough draft orders, and since we're going to re-open, I mean since we're going to have to rehear this thing or recall it on the 2nd, I don't see any reason to have (not understood) before then.

Okay, Mr. Carr, you may go first and Mr. Kellahin you may follow.

MR. CARR: Mr. Stogner, ARCO is here today because Penroc seeks to dispose as much as 10,000 barrels of water a day in a well that offsets them 320 feet away in the Mid-Vacuum Devonian Field.

Much of the testimony here today has talked about what occurs in other pools, additional

logs, what other tests or studies might be conducted, what might be done, what other alternatives for the disposal of this water might exist.

But I submit to you what you have to do in deciding this case is look at the evidence that's been presented here today and when you do that, several things are very clear.

Mr. Merchant, on cross examination, acknowledged the existence of the fault, as do we, and stated he was relying on that fault being a sealing fault.

On cross examination he stated that we'd he'd have to get pressure information to establish whether in fact that fault was sealing. The only evidence that has been presented, and I submit the only evidence that exists in the nature of pressure information in this area are the drill stem tests that were presented by Mr. Campbell and they show that in the first nine months of production there was a pressure drawdown of approximately 200 pounds across this fault. It wasn't sealing then and it isn't sealing now, and that's the data that's before you.

And on that if you were to rule today on what's been presented here today that is factual, we submit you should deny the application. That would satisfy us and we would go home.

And that's what you should do if you're going ot protect correlative rights on what's before you today.

But Penroc does have a problem They have water they need to dispose of in an area that water is a major problem for all operators. But it's important to remember they are the applicant in this case. We don't want our well watered out but we're willing to co-operate with them in Penroc at its expense, albeit after the fact, wants to prove the fault is sealing, and run appropriate pressure tests.

We shouldn't come in and now be asked to prove their case for them by incurring the costs of these tests. They're the applicant and the burden is on them and so we're fully willing to cooperate with them to develop the data to show that in fact this fault is sealing, but it has to be at their cost and we submit that the order either has to be a denial of their application or it has to be conditioned on proper pulse or pressure build-up tests or you can continue the case indefinitely and we'd agree to having it reopened once there is additional pressure information that would show that the fault is in fact sealing or not.

We don't think you can just approve the application because to do that you have to ignore

the evidence presented here today and that you cannot do if you're going to carry out your statutory duty of preventing waste and protecting correlative rights.

MR. STOGNER: Thank you, Mr. Carr.

Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner.

Let me make sure I understand how far these wells are apart. I believe Mr. Carr misspoke when he said they were 330 feet. The Penroc well is 510 from the 40-acre line. The ARCO well is an additional 990 feet. I think they're about 1500-1600 feet apart.

Within that distance it's uncontested that the fault line in fact separates these wells.

Mr. Merchant, and his company, are very much concerned about the oil production and they would like to maximize their oil production.

Mr. Carr and ARCO seek an extraordinary burden to place upon us that we don't think is warranted by the evidence. It is uncontested we are on the down-thrown side of this fault. It's absolutely undisputed that to have production on the down-thrown side of this fault in the Devonian would be absolutely novel and unique

in this part of the country.

We think the facts are sufficient upon which you can base approval. The vertical distance between the perforations and the fact that we do have a fault that occurs here. The assurance that Mr. Merchant is not interested in affecting ARCO's production is manifestly clear by his desire to drill this well even deeper, and to dispose in the lower portion of the Devonian.

Maralo was concerned about it and in response to that concern we have certainly accommodated them. We believe that that is sufficient.

The final element of protection, I think, for the operators and the assurance for the Commission and the Division that they're doing the appropriate thing, is the fact that we're going to test that perforation for oil production and what better way to test the hypothesis of the fault than to actually test it for oil production. Mr. Merchant will do that.

That's your assurance. That's the safety net upon which the order can be based. If it does not produce oil, then it ought to be utilized for disposal purposes. It gives Mr. Merchant the opportunity without unreasonable expense to use it for disposal, to allow him to recover oil that he's not otherwise going to recover on the up-thrown side of the fault. It's a problem for everyone in

this reservoir and he wants to operate and produce his share of the oil and we believe that the application and the evidence have shown us a way that we can do it withou adversely affecting ARCO or anyone else.

We will propose to submit to you an order that will allow you to grant this application in a meaningful way, to protect not only ARCO but Mr. Merchant and his company.

Thank you.

MR. STOGNER: Thank you, Mr. Kellahin.

This case will be readvertised and continued to the Examiner's hearing scheduled for March 2nd, 1988; the file on this case will remain open until that time.

(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 No. 9305, heard by me on February 1985.

Examiner
Oil Conservation Division

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

2 March 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Penroc Oil Corporation for salt water disposal, Lea County, New Mexico. CASE 9303

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division:

For the Applicant:

MR. STOGNER: Call next Case Number 9303, which is the application of Penroc Oil Corporation for salt water disposal, Lea County, New Mexico.

This case was heard at the February 2nd Examiner Hearing at which time it was continued to today's Examiner Hearing to include any additional testimony or evidence to be presented at this time.

I will call for those appearances at this time?

There appear there being none, this case will e taken under advisement.

(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 No. 9303 heard by me on 24 March 1988.

, Examiner
Oil Conservation Division