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

~~19~~ 21 April 1988

COMMISSION HEARING

IN THE MATTER OF:

Application of Mobil Producing Texas & New Mexico, Inc. for salt water disposal, Lea County, New Mexico. CASE 9337

BEFORE: William J. Lemay, Chairman
Erling Brostuen, Commissioner
William M. Humphries, Commissioner

TRANSCRIPT OF HEARING

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I N D E X

I N D E X CONT'D

E X H I B I T S

MR. LEMAY: Case Number 9337.

MR. ROYBAL: Case Number 9337. Application of Mobil Producing Texas & New Mexico, Inc., for salt water disposal, Lea County, New Mexico.

MR. LEMAY: Appearances in Case Number 9337.

MR. PEARCE: May it please the Commission, I am W. Perry Pearce of the law firm of Montgomery & Andrews, appearing in this matter on behalf of Mobil Producing Texas & New Mexico, Inc.

Mr. Chairman, I have two witnesses who will need to be sworn.

MR. LEMAY: Thank you, Mr. Pearce.

Just a general idea timewise?

MR. PEARCE: I think I can do my direct in under an hour, Mr. Chairman.

MR. LEMAY: Thank you.

Additional appearances?

MR. NEAL: If the Commission please, I'd like to enter an appearance of J. W. Neal, firm of Neal & Neal, Box 276, Hobbs, New Mexico; and Mr. Michael Comeau, from Santa Fe, New Mexico, protesting the application on behalf of Snyder Ranches, Inc.

We have two witnesses and I would anticipate thirty minutes (not clearly audible.)

MR. LEMAY: Thank you, Mr. Neal.

Additional appearances in Case Number 9355.

If there are no additional appearances, will the witnesses please stand and be sworn in?

(Witnesses sworn.)

MR. LEMAY: The witnesses may be seated.

Are you going to go through opening and closing remarks or just put on the case?

MR. PEARCE: I think we can just proceed, Mr. Chairman.

MR. LEMAY: Proceed, Mr. Pearce.

MR. PEARCE: Thank you, sir.

PATRICK J. WHELAN,

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

DIRECT EXAMINATION

BY MR. PEARCE:

Q For the record would you please state your name and your employer?

A My name is Patrick Joseph Whelan. I work for Mobil Oil.

Q And what is your -- what are your duties with Mobil, Mr. Whelan?

A At present I'm a production geologist working the North Vacuum Field Area, southeast New Mexico.

Q Mr. Whelan, have you testified before the New Mexico Oil Conservation Commission or one of its Division examiners previously?

A No, I haven't.

Q All right, sir, for the Commission and those in attendance, would you please briefly review your educational and work experience for us?

A I have a Bachelor of Arts in geology from Trinity University in San Antonio, which I received in 1977.

I have a Master of Science in geology, which I received from East Texas State University in 1981.

I also minored in computer science with an emphasis in geophysics.

I was hired as a geophysicist by Superior Oil Company in 1980. I was an interpretation geophysicist

for four years before being hired by Mobil in the takeover in 1984, at which point I became a Regional Geologist, working the entire Permian Basin, looking for play types, new play types, and how to find oil and gas.

Also of late I've worked, beginning in January, the southeast New Mexico area as a geologist and a geophysicist, continuing an area that I've worked off and on for the past eight years.

Q Mr. Whelan, do I understand correctly that during your employment with Superior as an interpretational geophysicist, your main area of emphasis was the Permian Basin and southeast New Mexico?

A That is correct.

Q And is it fair to say that an interpretational geophysicist is responsible for interpreting seismic data?

A That is correct.

Q Mr. Whelan, are you familiar with why we're here this morning?

A Yes, I am.

Q Give us a two-sentence summary of what Mobil seeks, if you would, please?

A What we're attempting to do is to use an old, operated Mobil well, which has been temporarily abandoned to dispose salt water into it.

Q What zone are you proposing?

A To dispose of it in the Siluro-Devonian interval.

MR. PEARCE: Mr. Chairman, at this time I would tender Mr. Whelan as an expert in the field of petroleum geology.

MR. LEMAY: His experience and record are acceptable. His qualifications are accepted.

Q All right. Mr. Whelan, at this time, and I -- we may have a little trouble, Mr. Chairman, because of the distance, we're going to be hanging a set of exhibits. We have sets for each of the Commissioners, although I must warn you that only the set that I handed to the Chairman are colored and it may be, if you open a set, that will be the easiest set to work off of.

MR. PEARCE: I apologize to the Commission for the slight delay.

Q I would ask you to approach what we have marked as Mobil Exhibit One for this proceeding and I would ask you to describe for the Commission and those in attendance what's reflected on that exhibit.

A Exhibit Number One is a Siluro-Devonian structure map in the mentioned area of the salt water disposal well.

It's contoured on top of the Siluro-

Devonian carbonate which is present throughout this particular area.

On it I've also noted two cross sections; B-B', which extends southwest/northeast; and A-A', which extends southeast/northwest.

Also on here I have colored in yellow, most of these extending northwest/southeast across the area, a seismic line which I'll be showing later, with the shot points noted.

On the bottom I have a legend. The circles are Siluro-Devonian penetrations. The dark colored spots are two salt water disposal wells that we know in the area, and the green represents the approximate oil/water contact of the South Vacuum Devonian Field, the Mid-Vacuum Siluro-Devonian Field, and the Reeves Siluro-Devonian Field, as we know them to exist at the time of their discovery.

Q For clarification, Mr Whelan, is there an identifiable marker which you utilized to construct this structure map?

A Yes. I'll be showing it later in my cross sections, at the base of the Woodford shale is a very distinct marker at the top of the Siluro-Devonian, which I've picked and used to make this map.

Q All right, sir, at this time let's turn quickly to what we have marked as Exhibit Two to this pro-

ceeding.

All right, Mr. Whelan, what's reflected on Exhibit Two, please?

A Exhibit Two is cross section A-A', which I noted on my structure map here, trending southeast to northwest across the South Vacuum Field area.

What we've done is depict all of the original -- some of the original producing wells to make this cross section. It is a structure section showing the structure as it exists today.

The units that I've outlined in color here are in blue, the Mississippian limestone; in brown, the Woodford Shale; and at the base of that brown is the Siluro-Devonian carbonate.

Also, approximately right here, you have the Mobil --

Q Mr. Whelan, for the record, when you -- the log you're indicating right now is the third log from the righthand side of that cross section, is that correct?

A That's correct.

Q Okay, thank you.

A That is the Mobil State 27-2. This is the well that we propose for a salt water disposal well.

It TD'ed at 13,700 feet. I've outlined on your cross sections the open hole interval as it exists

today. The top of it is at the base of the casing.

Also on here I've noted with an arrow where we believe the -- based on engineering analysis -- the fluid is being taken.

Also at the top of the Siluro-Devonian I have the original perforations noted where these wells were completed in the Siluro-Devonian interval.

Q Anything else you'd like to point out about that exhibit, to us, Mr. Whelan?

A Just one other thing. The only other production in the area on this field is from the Bone Spring interval at the top and there were a number of wells completed from that.

Q Okay. At this time let's quickly hang what we've marked as Exhibit Three to this proceeding.

All right, Mr. Whelan, at this time would you please address your comments to Exhibit Three, the B-B' cross section, and highlight for the Commissioners and those in attendance the more important features reflected on that exhibit?

A Cross section B-B' as shown here on the structure map, extends from southwest to northeast across this area.

In the northeast side of it, towards B', I begin with the Reeves Field, into the Siluro-Devonian

Field here. We move to the west and we pickup the South Vacuum Field, wiich I've noted here at the top.

The particular point I want to emphasize about this is the fault-bounded nature of the field; that running northwest/southeast throughout the study area I have a fault which I have noted here; separated the South Vacuum Field, which is a fault-bounded anticline, from this lower area here, as I've noted it.

Q When you say the lower area here, that is an area to the northeast of the South Vacuum, is that correct?

A That's correct.

Q All right. Okay. The well in the Reeves Field is the well to the far right on that cross section, is that correct?

A That is correct.

Q And I notice that the well third from the left on this cross section appears to be the log of the proposed disposal well?

A That is correct. This is the Mobil, again, 27-2, which ties my A-A' cross section.

Again I note the interval that we feel is taking the fluid. Again these are the perforations at the top.

Also I'd like to note that along this

fault there were wells that penetrated the downthorwn side of this fault. One of them is noted here, the Pure State Lee F No. 1.

This well was originally drilled back in 1958 following the discovery of the field. It penetrated into the Mississippian limestone, which, as you can see by present day structure, was low. At that point the well was TD'ed and they made a completion in the Bone Spring. I've inferred, based on other wells in the area, where the approximate top of the Siluro-Devonian is, but based on other wells that were drilled at that time, they would have had to know that if they drilled any deeper, they would have encountered water, so they stopped drilling.

Q All right, sir, anything further on this exhibit?

A No.

Q All right, let's hand, and have you address, what we've marked as Exhibit Four to this proceeding.

All right, Mr. Whelan, could you try to tell and explain to the -- to those of us in attendance what's reflected on Exhibit Four?

A Exhibit Four is a seismic section originally shot by the Permian Teledyne Corporation in 1977 as a group shoot line, which would been available to many customers, not just Superior, which was the eventual buyer of

this line.

This is a copy of the original line. The shot points, again, are noted on the map. It runs northwest/southeast through the area.

What this represents is energy that is put into the earth, later recorded at the surface, which shows the interfaces of the different stratigraphic units that I've noted on my cross section.

The colors represented here, the blue color is the Mississippian limestone; the brown is the Woodford shale; and beneath it, the Siluro-Devonian dolomite.

In order to more effectively tie into these intervals that are noted on the seismic line, we have a velocity survey which was originally shot in 1958 by the Pure Oil Company. It's in Section 35, 1980 from the north and east, right next to the seismic line.

The purpose of a velocity survey is, again, after the well has been drilled, casing set in the hole, to drop a tool down, dynamite is set off at the surface and time is measured before that energy is received by the tool and reported at the surface.

We take that, we -- we have an opportunity to buy these surveys from other companies, which we did. We use that to tie into our seismic and with that I've effectively tied into the units here, so we know this is going

to be the Mississippian and the others as I have identified.

Also, a point I'm trying to make with this is that there is a fault separating the South Vaccum Field from the area to the northeast. It you'll look on your maps at shot point 62, which is represented here, you'll see we have a fault separating South Vaccum Field from the area to the northeast.

Q And where is that shot point 62 on Exhibit One?

A Shot point 62 is right here, the northeast portion of the Mobil acreage.

Q You're indicating in what section?

A It's actually in the northwest portion of Section 26.

Q All right, sir, anything else on Exhibit Four?

A No.

Q All right, Mr. Whelan, you've indicated that the cross section which you constructed shows that there is a fault to the northeast of the Vacuum Devonian South Field. You have been able to confirm that fault through seismic data, which Superior Oil purchased. You've been able to confirm the seismic data through the use of a velocity survey, which was purchased data.

I would now ask you to turn to what we

have marked as Exhibit Number Five to this proceeding and could you describe for the Commissioners what -- first of all, generally what this exhibit is before you address what it shows?

Q Exhibit Number Five is taken from the Roswell Geological Society Oil and Gas Fields of Southeastern New Mexico, published in 1960.

What they do is they ask geologists, often from companies, or they do it within themselves, to identify and explain fields that are discovered in the New Mexico area.

The South Vacuum Field was one of those fields that was asked to be picked. It was identified by a Mobil geologist, just by happenstance, a Mr. Upp. What he noted, as you can see, it's a little bit small, was that he noted this fault running northwest/southeast through the area separating South Vacuum Field from this acreage to the northeast.

That's all with this.

Q Okay. Let's hang and discuss what we have marked as Exhibit Six.

All right, Mr. Whelan, would you discuss Exhibit Six for us, please?

A Exhibit Six is a picture identification of the proposed salt water disposal well, the Mobil State

27.

What I have on the left is a copy of the gamma ray neutron log which was shot -- or which was run at that time.

Also on the right, taken from a Mobil sample log which was run at that time, a lithologic identification of the units which were done in conjunction with the log here.

What I've noted here in colors, again, is the Mississippian limestone, Woodford shale. As you can see, throughout the Siluro-Devonian interval you have alternating limestones and dolomites.

The top one that I'd like you to note, is the original perforated zone.

Q It's a perforated zone in the proposed disposal well?

A A perforated zone in the salt water disposal well.

Q Okay.

A It was where it originaly produced from out of a dolomite. It IP'ed for 275 barrels of oil a day.

I've noted the petrophysical characteristics next to it. It had porosity about 12 percent; water saturations of 30 percent.

It was a dolomite, light brown, white,

fine to medium crystalline, and vuggy porosity.

Also, I want to note another zone here, again, where I've noted the petrophysical characteristics which you can see at approximately 12,040 feet. This is the zone we feel most of the fluid is being taken. I've noted the petrophysical characteristics to note that it is not oil bearing. It has porosity about 10 percent, average, water saturation is 69 percent.

Immediately below it, just to verify the fact that it was not oil bearing, was a DST taken. It recovered 190 feet of salt water cut mud, plus 60 feet of salt water.

When we originally looked at this well in order to identify intervals that we thought would take the fluid, there were a number of porous intervals which I've noted with petrophysical analysis, and also notice they're also all dolomite here. These are zones we felt were porous enough potentially to take the fluids; however, this is the zone we feel most of it is going into.

Q As I understand it, we'll have some testimony on that from a subsequent witness, is that correct?

A That's correct.

Q All right, anything else you want to pount out to us about Exhibit Six?

A No, not right now.

Q Okay, Let's turn to Exhibit Number Seven, if you will, please.

Mr. Whelan, at this time would you please discuss Exhibit Number Seven for us?

A Exhibit Number Seven is a schematic cross section of the proposed salt water disposal well. It runs from the well immediately eastward across the fault. I have the well right here; again the colors you're familiar with.

The points I want to note on here, that we have two, main, porous zones I've been speaking of, the original zone that produced, and the zone that is taking the fluid.

I want to also note that the formation, as it comes up against the fault, is being sealed by the fault, and that in order for this zone to have produced oil, the fault had to be sealing.

Based on that information we feel this is a sealing fault and that the interval here that is taking the fluid is against that sealing fault. It's opposed by zones, based on our analysis, petrophysical as well as sample analysis, are tight and impermeable and that this will be a sealing fault and if we inject fluid here it will not cross the fault.

Q It will not migrate to the northeast, is that correct?

A That's correct.

Q All right. I notice that there are some markings in the area of the drawing of the Mobil wellbore. That contains the petrophysical data which you've referred to on Exhibit Six, is that correct?

A That is correct. I've noted it here, and here for this particular zone. I've also noted the DST.

If I could just make one more point? This dip of the beds away from the fault, straight away from the fault, can be also illustrated on the seismic data on Exhibit Four, I believe, where the beds come straight into the fault. If you look at the structure map, the contours indicate that the fault is a sealing fault for this reservoir.

Q Let's review, if we can at this point, Mr. Whelan.

You have drawn a structure map based on your review of log data.

You have constructed two cross sections.

You have reviewed seismic data.

You have reviewed a velocity survey conducted.

You have reviewed and constructed a sample log showing lithologic detail in the area of interest.

From that information you have constructed a schematic diagram of what you believe the geology and lithology in the injection zone is expected to be.

You have expressed for us the conclusion that that is a sealing fault and that the zone that is taking water in the proposed injection well abuts up against an impermeable zone to the northeast. Is that correct?

A That is correct.

Q Based upon your education and experience as a petroleum geologist, do you have an opinion on wehther or not fluids injected into the Mobil State Section 27-2 Well will migrate in a northeasterly direction?

A Based on my analysis of the data, in particular the fact that the fault is sealing here, we can see this fault defined clearly on the seismic line, I believe that no fluid will cross that fault.

Q Do you have anything further at this time?

A No.

MR. PEARCE: Mr. Chairman, I have no further questions of the witness. I will pass him. Would you have a seat, Patrick?

MR. NEAL: Mr. Chairman, may I have a 10-minute recess? We've only obtained these a few minutes ago and I want to talk to my people about them.

MR. LEMAY: We'll take a 10-minute recess, maybe 15, or 12. How about 15? Okay, we'll take 15.

(Thereupon a 15 minute recess was taken.)

MR. LEMAY: Mr. Neal?

MR. NEAL: If the Commission please, I'll get down closer to the witness. I have a sore throat a little bit and --

MR. LEMAY: That's fine.

MR. NEAL: -- want to get closer.

CROSS EXAMINATION

BY MR. NEAL:

Q Mr. Whelan, you testified that this was a temporary abandoned oil well?

A Yes.

Q When was it temporarily abandoned?

A It was originally completed in the Siluro-Devonian. We made Bone Spring completion, and after that. I don't know the exact date, after that is was abandoned.

Q Well, it's not temporarily abandoned. It

was abandoned.

A I really don't know. That's more of an engineering analysis on that.

Q Right. Now, in regard to that particular oil and gas lease --

A Uh-huh.

Q -- that is a lease issued by the State of New Mexico.

A I believe so.

Q All right. Do you know the confines, descriptions, of that particular oil and gas lease?

A No, I don't.

Q To your knowledge did the company make any application with the Land Office for a permit to drill, recore, or do anything to this abandoned well?

A All I know is that following the Bone Spring completion, the most recent would be an application for testing a salt water disposal well.

Q Was that made with the Oil Conservation Commission or with the Land Comissioner?

A I don't know.

Q Who handles that?

A It would be my engineering staff.

Q You didn't do it?

A No.

Q Is there anybody here in the witness chambers that would have done that?

MR. PEARCE: May it please the Commission, the next -- the next witness is in fact the engineering witness.

MR. NEAL: Fine, good.

MR. PEARCE: Sorry.

Q Now, where will this water that Mobil wants to inject, where will it come from?

A The water will come from the Vacuum Field to the northwest, approximately 7 or 8 miles.

Q On completely different leases, from different leases?

A Yes.

Q Leases that have private ownership, royalty ownership, as well as State and Federal.

A I believe so, but I'm not sure.

Q None of the water to be injected in this particular well will come from the State oil and gas lease on which the well was originally drilled.

A That is correct.

Q How will it be transported from -- I think, did you say about 6 miles?

A Approximately.

Q Could it be as much as 10 or 12 miles?

A It could be. We'll be showing that later in another exhibit.

Q Do you have that exhibit now?

MR. PEARCE: The next witness will be showing that.

Q Do you have any personal knowledge of it?

A I know that we plan to run a pipeline down. That's all I know.

Q To this well?

A To this well.

Q The, but how do you -- do yo know any details of the State oil and gas lease on which this well was drilled?

A No.

Q When it was issued, or anything like that?

A No, I don't.

Q Will the next witness know that?

A Yes. I hope so, yes.

Q Oh, you hope so? Okay, that's fine. Now directing your attention to Exhibit One. What is the yellow line?

A The yellow line here --

A For my education, and remember that I'm not a geologist, so --

A Let me just pull this out. The yellow line is the seismic line running northwest/southeast with the shot points noted on Exhibit Four.

Q That's right. In other words, Exhibit Four is a portion of what is shown on the shot line in yellow.

A That's correct.

Q Okay. Now, the -- I notice that you have caused the -- what in your opinion is this fault line to be in a heavy line. Is there any significance to that?

A We just make the heavier line. That's a convention we use to denote the faults and also the little tic marks denote the down side.

Q Okay, but has nothing to do with your scale.

A No, sir.

Q Is that also true with all the contour lines?

A The contour lines are -- every 500 feet we darken the contour line.

Q But the width of them has nothing to do with it?

A That's correct.

Q Okay, Now do you have a -- did you prepare this?

A Yes, I did.

Q And under your measurements and so forth, okay. Do you have a ruler with you?

A Yes.

Q Would you take the ruler --

MR. PEARCE: I think that's Mr. Neal's ruler.

MR. NEAL: Thank you.

MR. PEARCE: I thought he'd loan it to you.

Q -- and on a 020 scale?

A This is a 2000-to-1 cross section.

Q Okay, and is that scale on that ruler?

A Yes.

Q And would you draw out the northwest quarter of the northwest quarter to scale on your map?

A I'm not sure I know --

Q Section 26.

A What do you mean, draw it out?

Q Well, point out where the northwest of the northwest is.

A Oh, I'm sorry. The northwest portion is right here, right in front of this fault boundary.

Q And isn't it a fact that a portion of the northwest of the northwest of 26 is on one side of the fault

line you testified to and the other, there's some on the other side.

A That's correct.

Q So a portion of Mr. Squires, or Snyder Ranches property is on the -- one side of the fault.

A That's correct.

Q In an area where, as you testified under your (unclear), that it would move that point, would it not?

A It would move to the fault --

Q And then be stopped.

A And then be stopped.

Q But part of that would be on Snyder Ranches ranch -- property.

A I'm not completely familiar. I know it's a 40-acre plot.

Q On the northwest of the northwest, part of it would get on there, could get on there.

A I'm not aware of what the footage would be in a 40-acre spacing, so I don't know exactly.

Q In other words, you don't want to put it on here. Is that what you're sayihg?

A Well, I don't know how many feet there are from that 40 acres.

Q Well --

A It would be -- it would be approximately right where the fault trace is.

Q You could -- you have assumed things on this map, have you not, in drawing it?

A Yes.

Q And what is a usual 40-acre tract's legal description?

A I believe if we drill a well within it, we drill 660 but I don't know the exact --

Q What's the measurement of a square mile?

A 5,280.

Q Okay, what is the measurement of the northwest quarter?

A It's 5,280 from here to here, you have approximately 1000 feet to the fault.

Q Then in the north part of the northwest of the northwest is on one side of the fault.

A Yes.

Q And part of it's on the other side.

A That's correct.

Q That's the only point I'm trying to make. Thank you.

Now, what is the reason that you are wanting now to dispose of water in this particular well where you've been disposing from these particular wells already in existence and further to the north?

A If we -- I have recently moved into the area. We have been looking for a well to dispose of fluid that we are producing in the Vacuum Field. This is the well we propose to use for disposing fluid up there.

Q Have there been any studies made or concern made as to the amount of disposal in the Vacuum Salado area?

A Yes.

Q And what is that problem?

A The problem appears to be one of migration of the fluid being injected into the overlying evapoite Salado section.

Q And is it becoming a point that you can believe it's reaching a build-up or (unclear) pressures. and so forth, of that nature?

A Yes. We feel the pressures are too high.

Q And you cannot continue to inject water into -- underground in that area.

A We are continuing to do so, but we're

trying to alleviate the problem

Q You have a problem there.

A We have a problem in that it's overpressured.

Q And if it is not corrected it can become dangerous to -- to the environment, can it not?

A We have done studies and I'm going to have to say I don't know how much it could be, but it could be, yes.

Q Have you experienced or have any knowledge of the drilling wells in that area, where they have received substantial waterflows?

A I have knowledge of Texaco wells to the south of our lease that have had substantial waterflows from the Salado interval.

Q And for the record would you tell us what a waterflow is?

A It would be water flowing naturally from the wellbore after it's drilled to the surface.

Q Under pressure.

A Under pressure without any pump.

Q To the point that drilling a new well in that area sepecifically requires additional cost to control the waterflow.

A That I don't know. That's an engineering

thing.

Q Isn't it true that when these original wells were drilled in the Vacuum area, that that was not a problem?

A In the Vacuum Field that Mobil operates it's still not a problem but outside those boundaries it is a problem, yes.

Q Well, you all have a big committee that meets all the time, (unclear) all the time, don't you?

A Yes.

Q As a matter of fact, it wasn't too many years ago that as a result of the contamination from the pits that the no-pit order was issued. Are you aware of that --

A I am not aware of that.

Q -- a few years ago?

A I am not aware of that.

Q And that was -- do you know whether or not that was the source of the problem that led to the no pit order?

A I don't know.

Q Now, what -- how many barrels of water do you project that will be disposed of in this well?

A We estimate approximately 10,000 barrels of water a day.

Q Is that the amount of water that is being disposed of by Mobil on their lease at this time?

A I believe so, but I'm not sure. The engineer would have to explain that one.

Q Is it the intention under this plan for all those wells to stop disposing of water on all of the leases in the Vacuum area to the north?

A That would be the intent of this well.

Q I mean where they are now.

A Yes.

Q All right. So will this be the only area in which the water, produced water from North Vacuum, will be disposed of by Mobil?

A Yes.

Q Mr. Whelan, have you been involved in the discussions of Mobil's management, the policy or the decision making process in determining the economic value to Mobil for the use of this well as a disposal well?

A I've been in the room but I haven't gotten any specific numbers. I'm aware that this is the most economic way that we have right now.

Q And it will mean an economic benefit, substantial economic benefit, to Mobil.

A It will.

Q In the production of oil from the Vacuum,

North Vacuum Pool.

A Not specifically, but in a general way it will, yes.

MR. NEAL: Pass the witness.

MR. LEMAY: Thank you, Mr. Neal. Additional questions of the witness?

MR. PEARCE: Just one moment, if I may, Mr. Chairman.

MR. LEMAY: Mr. Pearce.

REDIRECT EXAMINATION

BY MR. PEARCE:

Q Mr. Whelan, if you would, please, refer with me to what we've previously marked as Exhibit Number Five, which is the Roswell Geological Society Report.

I would ask you to examine the trace of the fault shown in that report and I would ask you whether or not that report shows that fault as crossing through the northwest quarter of the northwest quarter of Section 26?

A Yes, it does.

Q Mr. Whelan, I would ask you again to look at that exhibit. Do I not understand what the northwest quarter of the northwest quarter is?

MR. NEAL: Well, we object to that. This is a reproduction of a map which he had nothing

to do with as an exhibit but he's already testified to his location that he calculated and for him now to go in and try to qualify that is not the proper redirect.

MR. PEARCE: Well, excuse me, Mr. Chairman, if I may, Mr. Neal was very careful to point out when he began with this witness that the scale of the width of the lines that this witness used when he drew his map was insignificant. He was very careful to qualify this witness on that point and I think that -- I think it's fair game. We have an exhibit which is an accepted technical paper from the Roswell Geological Society. Mr. Neal wants to quibble with where that fault is. If there is an accepted geological paper which places that fault in an exact location because it has a more narrow line than this witness used when he drew his exhibit, I believe I have a right to have this witness discuss that.

MR. NEAL: If the Commission please, I made no reference if this is exactly where the fault is.

My question was whether or not part of the property of Snyder Ranches is on one side of the fault line and the other was on the other side, and his answer was unequivocally, yes.

Now it has nothing to do -- I was just trying to make sure that the width didn't have any-

thing to do with this.

MR. LEMAY: Fine. I think we'll accept testimony on this Exhibit Five and recognize that the witness did not prepare this; however, it is an accepted paper that's been published in the Roswell Geological Society Symposium.

We will give that proper weight according to the (unclear) that the witness places on it and also accept the testimony that he gave in regard to your cross examination.

MR. PEARCE: Thank you, Mr. Chairman, after that I'm ready to get away from this and the only thing I believe I have remaining is I would move the admission of Mobil Exhibits One through Seven at this time.

MR. LEMAY: Without objection Exhibits One through Seven will be admitted into evidence.

Are you through, Mr. Pearce?

MR. PEARCE: This concludes my examination of this witness.

If Mr. Neal has nothing further, I will call my second witness.

MR. LEMAY: I'd like to ask some questions.

MR. PEARCE: Please do, Mr. Chairman.

QUESTIONS BY MR. LEMAY:

Q Some points on this field, Mr. Whelan.

The South Vacuum Field, according to your Exhibit Number A, the well you're going -- I mean Number 1 -- the well you're going to inject in looks like it's the -- not the highest well but the second well in the field?

A That is correct.

Q The highest well over there looks like it's in the southwest quarter of the northwest, is that well also -- is that watered out or does this say depleted, to your knowledge?

A No. that is a well that is producing today. On the cross sections it is noted as a producer.

Q Do you happen to know the -- how much oil it's producing today?

A I don't know the exact amounts. I know that the four wells, there are four wells that are producing like they are on that cross section, one, two, three and four, right here. They're producing at about a 95 percent water cut. They're averaging about 10 to 30 barrels of oil a day.

Q There are three or four wells, you said?

A There are four wells.

Q Four wells? Now this is only from the

Devonian. I'm not talking about the Bone Springs.

A Just Siluro-Devonian.

Q What would be your opinion as to the injection of water into that down-dip well, the effect of that injection on the -- on the currently producing wells?

A We know that some of these wells are producing on the order of 250,000 barrels of water per year, approximately. Certainly it is economic, they need that disposal well to make these wells economic, and an engineer would be more appropriate to discuss it, but it certainly would keep up pressure in the reservoir.

Q Is it my understanding this is a water drive reservoir or a gas solution drive reservoir?

A I'd say water drive reservoir.

Q Could I refer you just to one of your -- your cross sections, let's take Exhibit Two. You show a series of four zones. It looks like there are zones in the Siluro-Devonian that are dolomitized, is that correct?

A That is correct.

Q Where you have the limestone it's tight; where you have the dolomite it's porous?

A That is correct.

Q Do you show any differentiation between the Fusselman and the Siluro-Devonian or do you consider those in communication with each other or --

A I consider in this region -- in this area, there's been no production established from the Fusselman, and I mean generally in the southeast New Mexico area.

I consider this wet, although I don't consider it in communication.

Q Do you consider each one of these porous dolomite stringers to be separate reservoirs or in communication with each other within the Siluro-Devonian that you showed up there?

A I consider them each separate, discrete, units.

Q In general with Devonian production has production ever been encountered below the top porosity streaks in some of the lower porosity streaks and where the top zones have been water-bearing?

A No, it has not.

Q Generally have you found in this general area or has your experience shown that any of the lower zones produce or is it only the very top porosity within the Devonian that produces?

A It's only the top porosity in this area that produces.

Q So if you injected water in the zone where you show -- I'm assuming that some of these log calcu

lations are open to debate if you have a gamma ray neutron log or --

A Some of them are generally. We've tried to compare them to sample logs to make sure that those fit the data well.

Q But in fact to ascertain whether a zone is water-bearing or oil-bearing you do have the one drill stem test.

A Yes.

Q Do you have additional drill stem tests for the area to confirm that lower zone as being water-bearing?

A We have -- we know wells on the downthrown side that have tested in that interval; a particular one here in the northwest portion of Section 22 on the downthrown side which tested as wet.

No, I don't know of any others, no.

Q Assuming that you -- was it your intent to keep the injection zones below the producing zone or was it your intent to open up all porosity within the Siluro-Devonian to injection of water?

A It was our intent to keep open just the open hole interval at the base of the casing. Our intent was not to use the original perforations.

Q So with your testimony then you would say

that by injecting these lower zones that would have no affect upon the currently producing wells because it produces from the upper zones, is that correct?

A That is correct.

MR. LEMAY: Thank you.

MR. BROSTUEN: Excuse me.

QUESTIONS BY MR. BROSTUEN:

Q Mr. Whelan, base of surface casing is at approxiamtely 11,950, is that correct?

A 940, I believe.

Q 940, somewhere in there. And do you state that you believe that the zone that's taking the water is the -- that the dolomite zone immediately below that, oh, 12,030, perhaps?

A Yes, I --

Q 12,300, pardon me.

A I've noted that here on this particular cross section.

Q Okay. And do you have some other porosity zones, dolomitized zones, below that and you -- but you still believe that the upper zone is taking the water.

You say that you believe that that upper zone is the zone that's taking the water.

A Yes.

Q On what do you base that?

A Our next witness will demonstrate with some engineering data why he feels most of the fluid is going in there.

We identified a number of zones prior to our testing of this wellbore we felt the fluid would go in, this being one of them. That appears to be the one that is taking the fluid, this upper one.

Q Do you have someone that will have --

A The next witness will show it.

Q Thank you very much.

MR. LEMAY: Additional questions of the witness?

MR. NEAL; I have a few questions.

RECROSS EXAMINATION

BY MR. NEAL:

Q Where you're saying that this water is going, have you made any other tests where you can say without any qualification that this is the area where it's going?

A The next witness will illustrate why we feel it is the interval where it's going.

Q You're not trying to say, then, that this

is the only place it's going.

A Based on our analysis this -- this is the only place it's going.

Q Have you done any cement logs or anything like that.

A He has some logs that he will show to illustrate that.

Q Cement logs?

A They are gamma ray type logs.

Q Did you do a cement type to make sure there is no communication back up the hole or anything?

A I don't believe so.

Q Did you do any type of cement work?

A We have -- again this is an engineering question.

MR. NEAL: That's all.

MR. LEMAY: Mr. Pearce, redirect?

MR. PEARCE: Nothing further, Mr. Chairman.

MR. LEMAY: The witness may be excused if there are no additional questions.

MR. PEARCE: At this time, Mr. Chairman, I'd like Mr. Hamner to take the stand.

C. J. HAMNER,

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

DIRECT EXAMINATION

BY MR. PEARCE:

Q All right, sir, at this time, if you would, please, for the Commission and those in attendance, would you state your name and employer?

A My name is Curtis Jack Hamner. I work for Mobil Producing Texas & New Mexico, Inc.

Q In what capacity are you employed by Mobil, Mr. Hamner?

A I am a reservoir engineer.

Q Mr. Hamner, have you previously testified before the New Mexico Oil Conservation Commission or its examiners and been qualified as an expert in the field of petroleum engineering?

A Yes, I have.

Q And are you familiar with the application of Mobil that is under consideration today before the Commission?

A Yes, I am.

Q And have you conducted certain petroleum

engineering studies, analyses, and work relative to this application?

A That is correct.

Q And is the purpose of your testimony to testify concerning those studies today?

A Yes, it is.

MR. PEARCE: Mr. Commissioner, at this time I would tender the witness as an expert in the field of petroleum engineering.

MR. LEMAY: His qualifications are accepted.

Q Mr. Hamner, at this time I'd like for us to hang a copy of what has been marked as Mobil Exhibit Number Eight to this proceeding and I'd ask you to discuss that for the Commission.

All right, Mr. Hamner, at this time if you would approach that exhibit and describe it for the Commission, and if you'd speak up for the sake of all of us, please.

A Okay. Exhibit Eight is a display which shows North Vacuum Abo Unit, displayed by the arrow showing this outline.

It also shows encompassed (unclear) in the North Vacuum Abo Unit outline the Vacuum Grayburg-San Andres Pool, depicted here with an arrow. It also shows the

proposed salt water disposal outline coming from the North Vacuum Abo, essentially the center of it, going through a series of State leases all the way down to the Vacuum Devonian South Field, which I have indicated here, our acreage in yellow and the proposed SWD well; also I've indicated here in a pool outline, the Vacuum Devonian South Field Pool outline as we know it from regulatory information.

Q Mr. Hamner, I notice that your line comes from the center of the North Vacuum Abo Unit; however, as I understand it, there are numerous wells throughout that area in various units and pools which will be contributing water, is that correct?

A Yes, sir, that is correct. Basically, 95 percent of the fluids, produced fluids, will be coming from the North Vacuum Abo Unit, which is the Abo formation, in combination with the Vacuum Grayburg-San Andres Pool outline.

The extraneous 5 percent comes from production that we have within the North Vacuum-Abo Pool Unit outline, or excuse me, the unit outline, and that is basically from the Glorieta, Penn, and Blinebry wells.

Q Okay, and I understood you to say that the proposal was to have the pipeline from that area to the disposal well cross only State acreage, is that correct?

A To the best of my knowledge that is cor-

rect.

Q Do you know if Mobil has yet applied for easements and rights-of-way for that pipeline?

A No, we have not.

Q Does Mobil expect to do that upon approval of this application?

A Yes, that is correct.

Q Do you know if Mobil has applied for permission from the State Land Office to inject water into this well at this time?

A Not to my knowledge.

Q Do you expect Mobil to do that upon approval of this application?

A Yes, I do.

Q All right, sir. Is there anything else you'd like to demonstrate to the Commission from this exhibit?

A No, I do not.

Q All right. If you would return to your seat, please, sir, and I would ask you to refer to what we have marked as Mobil Exhibit Number Nine to this proceeding.

All right, Mr. Hamner, generally what is Mobil Exhibit Number Nine?

A Exhibit Nine is the SWD application submitted by Mobil to inject fluid in the State 27 Well No. 2.

It is in Vacuum South Devonian Field.

Q All right. I would ask you to look at what is the fourth page of my exhibit, which is a well schematic. Do you have that page in front of you?

A Yes, sir, I do.

Q Is this the schematic which was submitted with the initial application?

A Basically, that's correct.

Q I'm sorry. Is this the schematic which was submitted?

A Yes, it is. I would like to point out on the schematic the reason I qualified that, is that there are a couple of corrections that need to be made on the schematic.

Q All right, would you tell us what information has changed from the original application.

A Yes, I would. The -- first of all, where the permanent packer is shown on the schematic, we have a ±11,800, and I believe it says, I can't read that, 55 feet. Actually that should be 11,875 feet.

We also have some junk in the hole which is a profile logging tool. The junk in the hole at that, for the particular logging tool is at 12,206 feet through 12,223 feet, and that is it.

Q Okay. I would ask you to turn to the

next page of this exhibit and summarize for the Commission the information shown with regard to Roman Numeral III in response to Roman Numeral III on Form C-108.

A Roman Numeral III is just a written out version as to what is shown on the well sketch schematic on the previous page. It depicts the casing, the surface casing, 13-3/8ths, set at a depth of 422 feet.

It shows the intermediate string of 9-5/8ths inch casing at 3900 feet; also, additionally, it talks about the Bone Spring perforations, Devonian perforations, which are in fact squeezed, and additionally it shows the production string, which is 7-inch pipe set to a depth of 11,950 feet, which is cemented to the top at a depth of 3849 feet.

Additionally, it just goes on and mentions the 4-1/2 inch Duoline pipe which we propose to run into the subject well.

Essentially that's it.

Q All right, sir. I would ask you to turn over two pages. There is a land plat. Part of Roman Numeral V of Form C-108 requests a map which identified all wells and leases within two miles and also seeks a one-half mile radius circle indicating an area of review.

Are those two circles reflected on Exhibit "A"?

A Yes, that is correct.

Q All right. Roman VI on the application form seeks information on all wells of public record within the area of review, the one-half mile radius circle, which penetrate the proposed injection zone.

Are there any wells within that half mile radius circle which penetrated the injection zone?

A No, there are no wells which penetrate the proposed disposal interval in the Devonian.

Q All right, sir. Item Roman Numeral VII on Form C-108 seeks information about the proposed operation of the injection well.

Would you summarize the information shown for us, please?

A Yes, I can. Mobil proposes to operate at an average rate of 9000 barrels a day. Our anticipated maximum rate is 12,000 barrels a day.

Our system for disposal will be a closed system. Our anticipated average injection pressure is 200 pounds and our anticipated maximum injection pressure would be 2390.

Additionally, we had Exhibit B and I would like to turn to Exhibit B-1, which is in the packet.

Q There is a page marked B-1 in the upper righthand corner, is that correct?

A Yes, that's correct.

Q All right, sir. It's about four or five pages back, Mr. Chairman.

What is Page B-1, Mr. Hamner?

A Exhibits B-1 through B-6 are simply water analysis reports that were done on the various zones which we intend to gather fluid from. Specifically, B-1 states it is a water analysis report on the Abo.

Exhibit B-2, the following page, is a water analysis report again.

Exhibit B-3, for example, is on the Glorieta.

Exhibit B-4 is on the Upper Penn, and so forth.

Q All right, sir, if you would at this time, please address Exhibit C to the application, please.

A Exhibit C is the compatibility test of the proposed disposal zone water, Devonian water, with the mixed produced water which we intend to put in the wellbore.

There is a letter attached to this by NL Treating Chemicals. It is also labeled at the top of the page as Exhibit C.

Basically, it states that the mixing of the fluids will produce carbonate and calcium sulfate scale and that a chemical treating program will be required to

control the scale.

Q Okay. Is there anything else with regard to the items set forth in Roman Numeral VII, Mr. Hamner?

A No.

Q All right, I would ask you to turn to that section of the application denominated Roman Numeral VIII. Would you summarize the information contained in that section of the application, please?

A Roman Numeral VIII is basically the geological data on the proposed injection interval provided by the Geology Department. We are talking about a Devonian interval. It is a faulted anticline. Again, the geological name is the Devonian, Siluro-Devonian.

The thickness, the average thickness if 500 feet. The depth, average at top of pay is 12,000 feet. Additionally, the overlying fresh water zones, the Ogalalla at 300 feet and the Santa Rosa at 1400 feet. Also, there are no fresh water zones immediately underlying the injection zones.

Q All right, Mr. Hamner, Section Roman Numeral IX of the application form seeks information on the stimulation program of the injection well. Is that set forth?

A Yes, it is.

Q Very generally, what was the stimulation program?

A The stimulation was conducted on February the 27th of this year. It was done on the Lower Devonian from an interval of 11,950 through 13,718 feet.

The well was acidized with 15 percent hydrochloric acid, 14,000 gallons of that, plus 10,000 pounds of rock salt in the scenario as follows, A through E.

Q All right, sir, without going through those with specific descriptions, Item Roman Numeral X of the application form requests copies of logs.

Are the logs which are available on file with the Oil Conservation Division?

A Yes, sir, that is correct.

Q Item Roman Numeral XI of the application form, Mr. Hamner, seeks a chemical analysis of fresh water from wells within one mile of the injection zone.

Were any such fresh water wells found?

A Yes, it was. There was one.

Q All right. And is an analysis of the water from that well attached?

A Yes, it is. It's in the packet.

Q And that is marked as Exhibit D to the proceeding, is that correct?

A That is correct.

Q All right, sir. Item Roman Numeral XII seeks an affirmative statement.

I would ask you to refer to the material submitted Roman Numeral XII and would you read that into the record for the Commission, please?

A Yes, I will. MPTM has examined the available geological and engineering data and finds no evidence of open faults or any other hydrological connection between the Devonian zone and any underground source of drinking water.

Q All right, sir, and attached at Exhibits E and F are the Proof of Notice rquired by the application procedure, is that correct?

A Yes, sir, that's correct.

Q All right. Do you have any other information which is contained in what's been marked as Mobil Exhibit Number Nine which you wish to discuss with the Commission at this time?

A No, I do not.

Q All right, Mr. Hamner, at this time we're going to hang a copy of what we have marked as Mobil Exhibit Number Ten to this proceeding.

Mr. Hamner, while they're hanging that, let's look back at Item Roman Numeral XI on the application form. The statement which -- I'm sorry, Roman Numeral XII,

which you read for us, MPTM is the abbreviation for Mobil Texas New Mexico, Inc.(sic), is that correct?

A Yes, that is correct.

Q Now, I'd like for you to get down, please, and address Mobil Exhibit Ten and describe that for us, please, sir.

A Exhibit Ten is a well log display showing two logs of the Mobil State 27 Well-2 (sic).

The log on the left is a gamma ray neutron log. It was run in 1959 originally on the well, and the log that we have displayed on the right is a tracer survey which was run in March of 1988.

I'd like to point out on this particular log on the right, the tracer survey, that it shows fluid entering the open hole interval from 12,038 feet through 12,096 feet.

Also indicated on the log is a pumping temperature survey, which is depicted by this line, and what we note from that is the dramatic increase in temperature at 12,100 feet, which clearly demonstrates that there is no fluid exiting the wellbore below that depth.

Q For -- for clarification, Mr. Hamner, the yellow highlighted area, which is also hachured on the trace survey log, is the area of the wellbore which the tracer survey indicated was taking water during the testing of this

well, is that correct?

A Yes, that is correct.

Q And that depth is what, one more time, please, sir?

A The depth of the interval that is taking fluid is at 12,038 feet through 12,096 feet --

Q And that -- and that was the only zone within the open hole interval in this well which accepted fluids, is that correct?

A That is correct.

Q If there had been channeling behind pipe in this well, would the tracer survey have recorded that channeling behind cement?

A It would have shown it clearly.

Q And did it show any channeling behind pipe in this well?

A No, it did not.

Q All right, sir. Anything else you wish to discuss with us with regard to Exhibit Number Ten?

A Not really.

Q All right, sir. At this time I'd like for you to resume your seat, if you would, please, and I would ask you to look at what we have marked as Mobil Exhibit Number Eleven to this proceeding.

All right, sir, very briefly, for the

Commission and those in attendance, what's reflected on Exhibit Number Eleven?

A Exhibit Eleven shows a summary of the various disposal options considered to handle the produced fluid from the North Vacuum Abo Unit and the Vacuum San Andres Pool, plus a miscellaneous production.

The options are listed in the order from least expensive to the most expensive from top to bottom. The numbers given reflect the applicable expenses associated with each scenario and that is mentioned under Item One under note at the bottom of the page of the exhibit.

Q And the first possible disposal alternative shown is the disposal alternative for which Mobil is seeking approval today, is that correct?

A Yes, sir, that is correct. That is the case scenario at the very top of the page, which indicates a total operating expense of 5.28-million. Furthermore, a total expense plus investment column indicates 7.18-million.

Q And this is the least expensive disposal alternative you have been able to discover, is that correct?

A That is correct.

Q Could you describe for the Commission the reason for choosing the least expensive disposal alternative?

A Yes, I can. It is obvious that the lower

the operating expenses in producing a field, the longer the field can be operated and therefor the more reserves that can be recovered.

Q Mr. Hamner, you've conducted this engineering study and the study of the economics of the various disposal alternatatives. Have you formed an opinion on whether or not choosing a more expensive disposal alternative would result in waste as defined by the State of New Mexico?

A Yes, I have.

Q And what is that opinion?

A My opinion on that is that if a higher expense scenario is chosen, the field life will be reduced due to the high operating expenses, and the amount of reserves to recover will be less.

Q Mr. Hamner, you have conducted a petroleum engineering study. You have concluded that you know the zone in this well in which fluids will be accepted. Do you believe that the approval of the application of Mobil in this case will result in the prevention of waste and the protection of conservation of natural resources within the State of New Mexico?

A Yes, I do.

MR. PEARCE: I have nothing further of the witness at this time, Mr. Chairman.

MR. LEMAY: Yes, thank you, Mr. Pearce.

Mr. Neal.

CROSS EXAMINATION

BY MR. NEAL:

Q Is your name Hamner?

A Hamner.

Q I'm sorry I didn't get it earlier. How long have you been a reservoir engineer?

A Three and a half years.

Q How long -- you heard the previous witness testify to a 10,000-barrel-a-day injection rate.

A That's correct.

Q How long will you be able to inject in this area reflected on your Exhibit Ten before you start encountering the same problems that you now have in the North Vacuum Field?

A First off, sir, it's completely unrelated.

Q That's not my question. Have you made a study?

A Yes, I have.

Q And will it -- how long will it take to fill the area that this salt water disposal is going to go

into?

A That's very difficult to say. What we're looking at basically is, for example, as I defined with a half mile radius, you can put in better than 5, 5-million barrels.

Q To your knowledge was any such study made at the time of the North Vacuum Abo Unit start?

A Not to my knowledge.

Q That has been a disposal problem since its inception, has it not, the water production?

A I am not very sure about that, that statement.

Q Are you familiar with the Vacuum Salado study?

A Yes, I am.

Q And what is that study reflecting as to the excessive amount of water that's underground?

A It reflects basically that we have seen and determined salt water flows as being drilled primarily by Texaco. It shows us that there is some type of communication, via wellbore, or some other means, which we have tried very, very hard to find, and it's very difficult to find that, and there is some communication and we do think that -- that we have taken action steps back to (unclear) to control that problem.

Q And isn't it a fact in the past before this same Commission that that same type of testimony that's been given here today, which is the no communication, had in fact occurred between the formations?

A I'm not really sure about that.

Q All right, you don't know.

A No.

Q All right, this line of the Vacuum designated as the pool outline, does that have anything to do with a sealed unit, or anything like that? In other words, the water can't flow any further?

A No, it doesn't have anything to do with that. It's basically a regulatory pool outline.

Q All right. Now, you do not know the effect of what this -- of your proposed well, how far out that it will reach as far as water filling up the formation.

A There are qualifications to that. I think basically what we are showing today and what I personally believe, is that the water will not migrate to the northeast, specifically.

Q Have you made such a study?

A I have worked with the Geology Department and shared the information. I believe that.

Q All right. If, you heard him testify earlier and you agreed with what he told us?

A Yes, I did.

Q All right. Now, are you familiar, directing your attention to Exhibit One, are you familiar with the Blanks waterflow which is just to the northwest of this pool?

A No, I am not.

Q The well was originally drilled within the last couple of years, being designated as -- this -- this well right here located in Section 21.

A No, I'm not.

Q You're not familiar with that?

A No.

Q Were you aware that they had a 6-inch line of water going for over a week? If it hadn't been for Buffalo water, that the -- it would have flooded a substantial area of state grazing leases?

A No, I'm not.

Q Are you aware of that?

A No.

Q You have kept your right-of-way proposed strictly on state land, is that correct?

A That's how it's depicted, yes.

Q And you intend to seek, if this application is approved today, appropriate right-of-way.

A That's correct.

Q What is the economic value to Mobil for the right-of-way?

A As we stated before in Exhibit Eleven, it's the most economic way that we can lower our operating expenses.

Q In other words, your operating expenses by use of this injection line and this pipeline, will make a difference of total operating expense of 5.28-million as compared to the Mobil 27 waterflood, is that correct?

A Under the first column, yes, that's correct.

Q As reflected (unclear).

A Yes, that's true. That also indicates the fact that the two scenarios that you're looking at are entirely different spectrums.

One is trucking all the produced water which, obviously, is the most expensive thing to do.

Q All right, so you've got a varied selection in there, haven't you?

A That's correct.

Q Now, have you told us about how much you're going to expend and how much you're going to invest, now tell us how much of a profit will it be?

A We're not trying to relate what we're doing in profits. What we are showing here in Exhibit Eleven

what we're testifying here to today is basically the savings that we show from entering the first scenario that have, for the pipeline.

Q All right. Are there any studies that were made in your company to show what the economic profit will be in the extension of the life of the Vacuum Unit by this installation and the expenses?

A No, as I say, not from a profit scenario. We are -- what's indicated and what I have shown here as testified, is just the savings that are expected on the operating expenses, specifically.

Q Do you -- do you mean to tell me that your management does not know by the expenditure of some $11-million whether or not they're going to make a profit?

A Basically what we're saying is that we have a situation where we're trying to control some of the problems that we have with the Salado waterflow. We are making steps ahead to handle that problem and what we've done is gone to the best system that we know how, and that's -- that's via the pipeline, get the well and operate as well as we can --

Q And you're doing this completely without regard to profit?

MR. PEARCE: Mr. Chairman, I believe the lawyer asked the witness if he knew of a study

and I believe the witness said he didn't know of a study.

We can keep this banter up for an extended period of time but I don't believe it will change the witness' answer.

MR. NEAL: If the Court please, this is a very important factor of whether or not he has testified as to the economic benefit and prevention of waste.

He's also testified by doing this he would extend the leases. They're not going to do that unless there's some profit and he earlier testified, Mr. Whelan, that he was the man to tell us about it.

MR. LEMAY: When it comes to profit, I think the witness had earlier testified there would be a savings.

Where are you going on this? Do you want dollar figures, or where, Mr. --

MR. NEAL: I'm not sure. Where I'm going is that this expenditure is for a profit, which by the injection of this is an economic benefit solely to Mobil, also, not just the royalty owners, which we're entitled to prove.

MR. LEMAY; Well, I'll allow a few more questions. I think he's answered to the best of his ability.

You may continue, if you have a --

Q Were you in any meetings with management as to the final decision of whether the approximate -- the figures evolving of how much this would continue the revenues of Mobil from the production of the North Abo Vacuum Unit?

A Your implication is for profit in that scenario. I'm not aware of anything like that.

Q Well, will it prolong the life of the production involved in the North Vacuum Unit?

A Based on the scenarios that we have, it is the method that will prolong the life the longest, is the point that we're trying to make.

Q For production.

A That's correct.

Q And why do you produce oil and gas?

A Hopefully to make a profit.

Q Thank you. Now, this lease, you heard your associate testify that this well had been abandoned.

A That's correct.

Q Do you know when it was abandoned?

A Yes, sir, I do.

Q When was it abandoned?

A May of 1969.

Q What was done to perpetuate that particular State lease if this well was abandoned and nonproducing in 1969?

A I'm not aware.

Q Do you know of any disclosures or anything made by Mobil to the State Land Office as to the nonproduction upon this parricular State lease?

A I'm not aware of anything.

Q Do you know the State lease number that this acreage covers, or this lease covers?

A No.

Q Do you know whether or not it's a State lease?

A Yes, I do.

Q But you don't know the number.

A I don't the number offhand.

Q Is it available to you in your records.

A I'm sure we could research that, yes, sir.

Q All right. Now, are you familiar with the various leases in the North Vacuum Abo Unit?

A Basically, yes.

Q All right. Involving the disposal of water in this proposed location does not involve any water from the south field of the Vacuum Devonian Field.

A As iterated before, that's correct.

Q It is completely from other leases, that is, State, private, and Federal leases contained in the North Vacuum Field.

A Basically, to my knowledge, that's correct.

Q In other words, the North Vacuum Abo Unit is not 100 percent State leases, oil and gas leases?

A To the best of my knowledge it's State leases, but I could be wrong in that.

Q Well, there's private leases in there, too.

A Okay, that's -- that's what I was saying. I think it's mostly State.

Q Now, are you familiar with the North Vacuum Abo Unit as to the operations of Mobil?

A Yes, I am.

Q And in relation to the outline which you have, are your wells just scattered throughout or are you more on the south side or the north side, or what?

A I would classify them as scattered.

Q Okay. Who are the other operators in this Unit?

A Mobil operates the North Vacuum Abo Unit, as well as the Vacuum Grayburg-San Andres Pool.

Q In other words, you're responsible, then,

for all of this unit.

A That'x correct.

Q You're the operator. And this cost that you're talking about would then be prorated between the other members of this unit?

A In some manner. That has not been worked out completely up to now.

Q So the expenditure that you're showing is a total expenditure, not just the expenditure of Mobil.

A The expenditures that we have depicted are 100 percent liability Mobil expenditures.

Q And you do not anticipate getting any contributions from any of the other operators.

A As I said, I don't know those details.

Q Do you know whether or not (unclear)?

A There will probably be some additional effort made but I don't know as of this point.

Q Okay. Now, the build-up of the water pressures in the Vacuum Abo Unit has been the subject of considerable study for the last few years, has it not?

A That is incorrect. The build-up of the pressures in the Vacuum Grayburg-San Andres Pool has been -- they've been basically the point of interest, the San Andres interval.

Q But the water pressure build-up is in

this unit.

A That's correct.

Q And the -- what is the effect of -- and tell me as a layman out here in the general public, what's the effect of all that build-up in water pressures underground?

A I think we've been working on that for ten years, as I recollect in the Salado formation, work that's been done and, obviously, there's been some -- some zone communication but that's -- that would be my estimation of your question.

Q And is there any Ogallala formation in this area?

A I'm sorry? Could you repeat the question?

Q Ogallala, is there any Ogallala formation, water-bearing formation in this unit?

A Yes, there is.

Q And that's the main, principal source of water in southeastern New Mexico, Texas and other states?

A To the best of my understanding.

Q What periodic tests have you -- or have you made a suggestion or recommendation to the Commission as to periodic tests to maintain the veracity of your tracer information which you made, if this is approved?

A We haven't indicated to the Commission any sequence of tests over a period of time that we would follow. I'm' sure that that will be indicated by the Commission.

Q And if a build-up of this pressure should occur in the area of the disposal well, then that would put substantially a question as to how long this would remain as presently reflected in March, 1988.

A Anything is a possibility.

Q Well, if you get more pressure up there you're going to have more possibility or probability of a failure in your cement.

A I think what -- what geology is, and what we've looked at here and as demonstrated on the gamma ray neutron logs, is that there are other porosity intervals indicated there. My present opinion on the matter is that potentially there would be fluid moved downhole as opposed to up, because there are tight streaks indicated, if you look at the logs, basically, behind the casing shoe and above the interval where the fluids are going.

Q Is it a fair recommendation or a statement that in this disposal that we keep talking about here, you're actually disposing of a waste product, are you not?

A I'm not really sure if you're calling produced fluids a waste product.

Q What good does it have for anything?

A I suppose it could be used in some manner for reinjection or whatever, but that's all I know.

Q If it gets on the surface it's going to kill grass and other things of that nature, isn't it?

A I suppose so.

Q It will.

A I'll agree with that.

Q Now, geology is just like medicine or anything else, it's not an exact science is it?

A It's on interpretive science. It's based on the skills of the person who is interpreting it, interpreting the work.

Q Right, and you get the various information and from that you form your opinion as to the probability or possibility that something under the ground that you can't see may or may not be there.

A That is correct to an extent. There are many things that you can collect that we have technical information that give you factual evidence. There are some things that are implied, sure.

Q Well, not being facetious, but we don't drill 100 percent of dry holes, do we?

A No.

Q And we don't drill 100 percent wet holes,

do we?

A There are some.

Q Some, drilling 100 percent wet holes for oil and gas?

A Oh, okay, I didn't understand what you were saying. I thought you meant 100 percent water-producing wells, or something.

Q I'm talking about oil and gas, that's what (unclear).

A Right.

MR. NEAL; That's all.

MR. LEMAY: Additional questions of the -- Mr. Pearce?

MR. PEARCE: If I may just very briefly.

REDIRECT EXAMINATION

BY MR. PEARCE:

Q Mr. Hamner, I would ask you to refer back to what we've marked as Mobil Exhibit Number Nine and I'd like to refer you to that section of the report which responds to Item Roman Numeral Eight. Do you have that before you?

A Lithologic detail, yes.

Q And during questioning Mr. Neal had a

question to you about the Ogallala formation, do you recall that?

A Yes, I do.

Q What's the average depth of the Ogallala in this area?

A Approximately 300 feet.

Q And what is the proposed injection depth in this well?

A We're looking at a depth of 12,038 feet, top.

MR. PEARCE: Nothing further, Mr. Chairman, thank you.

MR. LEMAY: Thank you, Mr. Pearce.

Additional questions of the witness?

MR. BROSTUEN: I have some.

QUESTIONS BY MR. BROSTUEN:

Q Mr. Hamner, I'd appreciate it if you could discuss the tracer survey, how it was performed, the testing that was involved in that, injection rate and pressures, and so on and so forth.

A Okay I can start off by -- would you like me to explain a little bit what the tracer survey is or just

how it was conducted?

Q I understand tracer surveys, perhaps, unless --

A Okay.

Q -- you want to go into that.

A No, that's okay. The specific test that was done on this well was done by bringing water out on location. Basically, we had essentially 200 barrels of fluid, produced fluid which came from the subject unit which we have depicted on the map there.

We took that fluid and we pumped it down the wellbore. We had a tracer log after a period of time of pumping, where you gain stable rates and pressures. We ran the tracer tool downhole. Basically it's operated, as you know, by emitting small radioactive slugs and checking with the tool, which is essentially a gamma ray tool, and looking into where the formation indicates radioactively hot, is showing where the fluid is going.

This was done up and down the wellbore and we have determined from that analysis that the fluid is entering from 12,038 through the 96 feet, 58 feet.

Q So you injected essentially -- you injected essentially 200 barrels of fluid, is that correct?

A That's correct and --

Q -- with a radioactive tracer?

A That's correct.

Q Into -- and your indications were that all of the fluid was going into the upper dolomitized zone immediately below the base of the casing.

A Yes, sir, that's correct.

Q Would you expect that if you had injected, say, a larger quantity, increasing pressures, that your tracer survey would have come out somewhat differently?

A That, that could be a possibility, yes, sir.

Q That the results of, say, a larger test, as far as volumes of pressure were concerned would indicate that the lower intervals would take liquid.

A That is a distinct possibility.

Q And under the injection that you're proposing to do, that would be a strong likelihood with the disposal of the fluids and the volumes you're proposing to use?

A We ran the, if I may, we ran the test that we have information on the board here at 5 barrels a minute. What we're looking at, essentially, for an average rate, would equate to approximately 7 barrels a minute, so in fact they are very, very close to what we expect to operate at, and that's essentially why we ran the test that way.

Q Mr. Hamner, that's correct. Would you expect, though, as the pressures were increased in the

reservoir, in the event, well, as your pressures in the upper interval which would be taking fluids were to increase, then your fluid would begin to move downhole and there could be a crossflow?

A Yes, sir, I think that's very possible.

MR. BROSTUEN: Thank you very much.

QUESTIONS BY MR. LEMAY:

Q To follow up a little bit, Mr. Hamner, on that tracer survey, would you inject under pressure or does that take it on a vacuum?

A As I said, we tried to simulate the operating conditions that we expected for our average volumes and we essentially had, I think, basically, about 50 pounds pressure. The well is essentially taking the fluid on vacuum and we -- we tried, as I say, we tried to simulate the conditions that we expected to operate under average conditions, and see what would happen in the wellbore environment under that condition.

Q One other question, on your Exhibit Number Eleven you show total operating expense. Do you have a period of time?

A Yes, sir, that's basically over a ten year period.

Q Do you consider that pretty much the life of your North Vacuum Abo Unit or -- or just a dollar discounted past period of time.

A We ran this particularly on just flat prices. We did no escalations. It is a flat price scenario. It was done over ten years. That was what we felt was the best of our ability to predict the water volumes that we would be producing from the Abo and from the San Andres, and that's the reason why we stopped at ten years.

Q I might ask you, do you have any alternative plans assuming increased pressure in this zone? I understand there's been no withdrawal from the zone, is that correct, to your knowledge?

A Not to my knowledge.

Q So you've got maybe virgin zone and it's an extensive zone, I assume, because it's Devonian. By injecting volumes, have you got a pressure which you do not want to exceed for certain -- for safety reasons? I think it was testified that 2390 pounds was the maximum pressure that you expected to inject at?

A Yes, sir, that's basically going with the 0.2 psi rule that's followed by Commission standards.

Q With the wells that are surrounding this unit, what -- excuse me, the Devonian wells in the area, you have other choices, too, in terms of injecting fluid, or do

you plan to keep this as your disposal well, or are there contingency plans to use other wells in the area of this well?

A We are -- we are looking at, hopefully, if we can achieve this well, additionally there's another wellbore on the same lease, the State 27 lease. It's another well which is not TD'ed as deep in the Devonian. That is, that is one possibility, is to use that wellbore for additional disposal capacity.

Basically, the reason that we are coming so far away, as depicted on the map of the North Vacuum Abo and the unit outline, is that we had tried at a very expensive cost to put water in the Devonian. We were unsuccessful.

We tried, and we do operate, the Bridges State Well No. 511, which is a disposal well in the lower Grayburg. The well is very marginal, it takes about 500 barrels a day, so we have no options in operating a well, a disposal well, within the North Vacuum-Abo Unit outline. We had to go elsewhere. Do you have any logs at all on the cement job you have on this well and indications that you got a good cement job?

A We don't have a bond log or any of the typical cemnt bond logs that were run through the long casing string, no, not to my knowledge.

MR. LEMAY: Additional questions of the witness?

RECROSS EXAMINATION

BY MR. NEAL:

Q May I ask, for my education, the 2390 pounds, why would you ask for that if you're not intending to use it?

A We were just labeling it as the maximum, just solely because it is the 0.2 psi per foot maximum. We do not intend by any means to go to that pressure, hopefully.

Q All right. Would you have any objection, then, if the Commission, if it approved it, to reduce that pressure down to, say, 800 pounds, or 500 pounds?

A Personally I have no objection. That's someone else's decision.

Q What is the effect when you get -- to these salt water disposal wells -- when you have to operate in the 2000/2300 pound range?

A What is the effect?

Q Yes. How does the water get in?

A It's -- it's -- if you operate at that pressure, I would presume that since the well is on vacuum now, there would be some pumping apparatus that would be

used to get the water in the wellbore.

Q Do you have any pumping cost or anything like that involved in the Exhibit Eleven?

A Not for the -- not for the scenario that you're speaking of.

Q All right. Now, is this line going to gravity flow or will it require to be pumped?

A There's very (not understood) difference that will give it a head. At the Vacuum Devonian South Field there will be pumps that will be run to transfer the water at the rates we desire, that's correct.

Q But it will -- basically it's gravity flow, then.

A That's -- that's correct.

MR. NEAL: Thank you.

MR. LEMAY: Mr. Pearce?

MR. PEARCE: Very briefly, if I may, Mr. Chairman.

REDIRECT EXAMINATION

BY MR. PEARCE:

Q Mr. Hamner, I'd like for you to turn with me in Exhibit Number Nine to the section denominated Roman Numeral III. Are you with me?

A Yes, I am.

Q I'm looking at III-A.-Sub Part 2., and I find that a temperature survey was apprently run to determine the top of cement in these wells.

A Yes.

Q All right. Mr. Hamner, are you aware of why the Commission has historically adopted the 0.2 psi per foot standard for injection wells?

A Not specifically, no, I'm not.

MR. PEARCE: I don't have anything further, Mr. Chairman.

MR. NEAL: My I ask one more question?

RECROSS EXAMINATION

BY MR. NEAL:

Q The cementing program that you've outlined on III-A-2. of the exhibit, was something that was done back in 1958 or later, or earlier.

A To the best of my -- to the best of my knowledge it was done when the well was originally completed.

Q But not since 1988 but when the original well was drilled and completed --

A Yes, I believe --

Q -- whenever that was.

A That's right, 1959, yes.

Q But in response to Mr. -- the Commissioner, there has not been any recent cement survey made.

A Not to my knowledge.

Q Thank you.

MR. PEARCE: Nothing further, Mr. Chairman.

MR. LEMAY: Additional questions of the witness?

If not, he may be excused.

Do you have any additional witnesses, Mr. Pearce?

MR. PEARCE: No, Mr. Chairman. I have nothing further at this time.

MR. LEMAY: Let's take a fifteen minute break and return and we can hear a little bit of the other side.

MR. NEAL: We won't take long.

(Thereupon a recess was taken.)

MR. LEMAY: Shall we resume? Mr. Comeau? Mr. Neal?

MR. NEAL: Mr. Chairman, I'd like to call Mr. Squires.

LARRY SQUIRES,

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

DIRECT EXAMINATION

BY MR. NEAL:

Q You are Larry Squires, the President of Snyder Ranches, and you've filed a protest to the Mobil application, is that correct?

A That's correct.

Q Now, Mr. Squires, I direct your attention to what has been marked Mobil's Exhibit Eight and ask you if you're familiar with the Vacuum Devonian South Field area and the North Vacuum Abo Unit?

A Yes, I am.

Q And is a portion of the south field on your operating ranch?

A Yes, it is.

Q That's the area designated as the Vacuum Devonian South Field?

A Yes.

Q On Exhibit Eight?

A Yes, that's right. That area is about 95 percent within our ranch boundary.

Q Do you own in fee the surface of the northwest quarter of the northwest quarter of Section 26?

A Yes, I do.

Q Is that subject to an oil and gas lease that you recently executed?

A Yes.

Q Have you at any time consemted for Mobil to use any part of your property that is situated in the northwest/northwest of 26 for any purpose?

A I have not consented. They have never asked.

Q You did give permission for them to make a survey, I believe.

A Yes. Their engineer asked to sample our water well in the area and I said certainly, go right ahead.

Q At this time are you consenting to the use of any of your property for any purpose?

A No, I am not.

Q When I say "your property" we're talking about the deeded property.

A That's -- that's correct.

Q The other property in the area is State lands?

A That's correct.

Q And you have a state grazing lease.

A That's correct.

Q And did you make an objection to Mobil for using the State lease, using this property without permission from the Land Commissioner?

A I certainly did. As I understand it, they, prior to operating a salt water disposal well, they must apply to the Land Commissioner and get a salt water disposal lease even for the use of the surface.

Q Now, to the northwest of the area reflected in Exhibit One, are you familiar with any drilling of any wells, wells with waterflows?

A Yes, I am.

Q Where was that located?

A The well that I'm familiar with is the well that Blanks Energy drilled approximately a mile and a half northwest of this area in December of 1985.

Q What transpired at that point?

A They encountered a waterflow somewhere within the salt section, as I -- and that flow flowed a six-inch stream of water for better than ten days continuously.

They filled about a 10-acre buffalo wallow or depression or lake, as you might want to call it, and there was water trucks hauling water from that area for at least ten days, day and night.

Q Now, that particular location is not

within the North Vacuum Abo Unit, is it?

A No, it is not.

Q So that there are other areas that have been -- from an underground pressure water standpoint -- that have developed other than in the North Vacuum Field.

A That is correct.

Q When that water gets away from the waterflow, it goes on the surface.

A That's correct.

Q And that's damaging to the land.

A Yes, it is. It destroys the land. Union's disposal well down in Section 35 in this area here, back in 1958 or '59, they had a break in their salt water disposal well in their line or some accident occurred, and it's been a good thirty years and there's still no cover. The land is still denuded from this water.

Q In addition to owning the surface in Section 26, you also own the minerals.

A In the northwest of the northwest of Section 26 Snyder Ranches, Incorporated, is surface owner and mineral owner.

Q And have you given Mobil any permission to change any characteristic of any type on the surface or on the minerals of that particular 40?

A No, I have not. Hanley Petroleum

presently has that 40 acres leased.

MR. NEAL: I pass the witness.

MR. LEMAY: Mr. Pearce?

CROSS EXAMINATION

BY MR. PEARCE:

Q Mr. Squires, if I may, I want to be sure I understand what Blanks' well you're talking about. I find a well denominated the Blanks Energy No. 1 Atlantic Richfield, and then it says 401 Lee State, which appears to be located in the northeast quarter of Section 21. Is that the well you're talking about that had the flow?

A I'm not sure whether that was the well or not. The well is just off of my ranch about a half a mile into my neighbor's ranch and I wasn't nearly as concerned with it as I would have been if it was in my ranch.

Q Well, is your ranch Section 22?

A Certainly is.

Q You said that you had leased your minerals underlying the northwest quarter of the northwest quarter of Section 27 to Hanley Petroleum, is that correct?

A No, it's not correct. It's northwest-northwest of Section 26.

Q I'm sorry, I apologize, thank you, sir. That is correct, it's Hanley Petroleum?

A Right, Hanley Petroleum.

Q When did you enter into that lease with Hanley?

A I don't recall, about a year ago.

Q And have they drilled on that lease?

A No, they haven't drilled on it but I drilled on it once.

Q I see in the northwest/northwest of 26 a well denominated the Sharp No. 1 Snyder Ranch, TD 4600. Is that the well you drilled?

A Yes, sir, that's the well we drilled.

Q When did you drill that well?

A I don't recall. It's been about three years ago. We tested the Queen, Queen formation in that area, and we found it to be tight.

At that time we considered going on and checking the San Andres but we were advised by some Texaco people that we might encounter an extensive waterflow, so we plugged and abandoned the well.

Q And when we were discussing the Blanks Energy well, I believe you testified that the waterflow out of that well was from the salt section, is that correct?

A All I know is the rancher was standing there and I saw millions of gallons of water being deposited. I'm not sure what formation it came from.

That well now is operated by Maralo as a salt water disposal well, I do know that.

There is a salt water disposal well operated by ARCO about the same location there, too, and as I understand it, ARCO is putting water in the San Andres formation in that area and Maralo is putting water in the 10-11,000 foot range.

But we're very concerned that the Commission would allow water or that anybody would want to pump -- pound water in the ground in an area that's had that kind of history.

Q Do you know how long ARCO has been operating their disposal well in that area?

A Years and years and years.

Q And if you indicate --

A Sinclair used to operate it. It was primarily Sinclair that started it and then they changed their name to ARCO.

Q Okay. If you indicated to me, I didn't catch it, and I'm sorry, do you know what zone that ARCO well --

A I think it is the San Andres but not being a geologist, I can't say. I guess I don't know for sure.

Q You -- you said, as I understood your

testimony, that aboaut 95 percent of the Vacuum Devonian South Field is overlain by -- by your ranch, is that --

A That's correct.

Q Are there other lands reflected on Mobil Exhibit Number Eight which are overlain by your ranch?

A Well, I'd have to get my ranch map and draw it on that map to make sure, but since I don't have that map with me, I'm not sure.

Most of that land with the pipeline on is -- our north boundary is approximately in this area here.

MR. PEARCE: He is indicating a line, the intersection of 18 South and 19 South as being the northern boundary of his ranch, approximately.

A Yes.

Q Okay. How do you -- can you give me an indication of what the western boundary of the ranch is?

A A mile west of this Buckeye Road.

Q I'm sorry, I'm not familiar enough --

A The highway on down here --

Q -- to know. Are you roughly where the Buckeye --

A If I could have one of these other exhibits, I could tell you exactly where it was.

Q Oh, I'm told that possibly this structure map, Mobil Exhibit One, shows the road. I don't know

whether it does or not. Let's uncover it.

A This is highway right here.

MR. PEARCE: For the record, there is a double solid -- solid line with approximately an eighth of an inch of space between them reflected on Exhibit Number One, which apparently is the Buckeye Highway.

A That's correct. Our ranch boundaries are north and south along this section line up to this point. Then goes 4 or 5 miles to the west along this section line.

Q Okay. Were you present, Mr. Squires, when there was some testimony about the economics of salt water disposal?

A Yes, I was present.

Q And did you look at what was marked as Mobil Exhibit Number Eleven, which summarized possible disposal alternatives?

A Yes.

Q And the least costly disposal alternative reflected on that exhibit was the proposed injection well and pipeline?

A That's correct.

Q Do you recall what the second most least -- second least costly disposal alternative was?

A Certainly. Dispose at permitted surface disposal.

Q Where is the closest permitted surface disposal facility to the North Vacuum Abo Unit?

A I would imagine that the Laguna Gatuna Salt Water Disposal Lake would be the closest.

Q Approximately how far is that?

A Fifteen miles, as the crow flies; twenty, somewhere in that range.

MR. PEARCE: Okay, one moment, please, Mr. Chairman. If you'll excuse me, Mr. Squires.

Nothing further, Mr. Chairman, thank you.

Thank you, Mr. Squires.

MR. NEAL: If the Commission please, may I ask one question? I apologize, I'll need one question, Mr. Chairman.

MR. LEMAY: I understand.

MR. NEAL: Most lawyers make that statement sooner or later.

MR. LEMAY: At least one.

REDIRECT EXAMINATION

BY MR. NEAL:

Q Mr. Squires, were you present when there was any testing going on in this proposed location -- well for disposal?

A Yes, I was.

Q And was that during their injection of some water into the -- a formation?

A Yes.

Q What, if anything, did you observe?

A Well, I observed they had several frac tanks there and they had a triplex pump hooked up and hooked up the wellhead and are pumping water, and the pump man that was there with it, I inquired to him as to how much pressure it was taking to put -- to take the fluid in the well and he said it had been averaging between 480 to 500 pounds; that it was taking 10,000 barrels a day, and they were testing the well, and it was taking the water at about 500 pounds.

Q There was no indication of it being on a vacuum; it was being pumped?

A Oh, no, sir, there was not.

RECROSS EXAMINATION

BY MR. PEARCE:

Q Very briefly, if I may touch on that same area, Mr. Squires.

When you observed this testing being conducted, have you asked anyone to make calculation of the amount of pressure it would take to overcome the friction in the wellbore?

A Yes, I have.

Q And what --

A It was indicated --

Q -- what was the friction pressure?

A It was indicated to me that they had 3-inch pipe in it and they planned to put 4-1/2-inch pipe in it and they expected it to go on a vacuum, but as I understood the earlier testimony, that the testing went on a vacuum and it wasn't on a vacuum when I was there.

Q I'm sorry, that -- that approaches what I'm getting to.

Of the 400 to 500 pound pressure that you were told was being done during the testing, do you know how much of that pressure resulted from friction in the pipe during that injection test?

A I was told that it was all a result of it.

MR. PEARCE: Nothing further, Mr. Chairman. Thank you.

MR. LEMAY: Additional questions of the witness?

QUESTIONS BY MR. BROSTUEN:

Q Mr. Squires, I'm still trying to determine the location of the well that you mentioned had flowed,

drilled by -- what's the name of the company?

A Blanks Energy?

Q Yes. Could you show me --

A I think I --

Q -- where that was?

A -- can show the right well, but --

Q Is that the well in the northwest of the northeast quarter of Section 21? The No. 1 Atlantic Richfield 401 Lee State that was mentioned earlier or --

A I'm trying to determine. I know where it is from our north fence. It was -- I believe it is, yes, sir, I believe it's this well right here in Section 21.

Q Thank you. That's all I have.

MR. LEMAY: If there are no further questions, the witness may be excused.

MR. NEAL: Mr. Comeau will present the last witness.

MR. COMEAU: We'll call John Shomaker.

Mr. Shomaker has been sworn.

JOHN SHOMAKER,

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

DIRECT EXAMINATION

BY MR. COMEAU:

Q Would you state your full name and address, sir?

A My name is John W. Shomaker. My business address is 3236 Candelaria, Northeast, Albuquerque.

Q And what is your occupation?

A I'm a consulting hydrogeologist.

Q Can you tell me what a consulting hydrogeologist does?

A Yes, sir, he studies and interprets the movement of water in the ground.

Q Could you briefly summarize your academic background, please, Mr. Shomaker?

A Yes, sir. I have a Bachelor's degree in geology from the University of New Mexico and a Master's degree in geology from the University of New Mexico; a Master's degree in liberal arts from St. John's College; and a Master's degree in hydrogeology from the University of Birmingham in England.

Q And how long have you been a consulting hydrogeologist?

A Since 1973.

Q All right. Since your original graduation from college, could you briefly sumamrize your work ex-

perience for us, please?

A Yes, sir. I was a hydrologist for the United State Geological Survey from 1965 until 1969; a geologist for the New Mexico State Bureau of Mines and Mineral Resources from 1969 until 1973.

Q And since you became a consulting hydrologist, could you describe the natuare of your work?

A Yes, sir. I've done a variety of groundwater investigations having to do with water rights, groundwater contamination problems, and problems related to groundwater flow.

Q Have you published in the field, sir?

A Yes, I have.

Q Could you tell us approximately how many articles?

A I think 28 articles, of which 7 have to do with groundwater and somewhat over 40 technical reports in public records on groundwater subjects.

Q In publications or in various professional journals?

A Yes, or in the public record.

Q And are you a member of various professional organizations relating to your occupation?

A Yes, I am.

Q Have you been accepted as an expert

witness in various court and administrative proceedings in New Mexico, including proceedings before the Oil Conservation Commission?

A Yes, I have.

MR. COMEAU: Mr. Chairman, I would tender Mr. Shomaker as an expert in hydrogeology.

MR. LEMAY: His qualifications are acceptable.

Q Mr. Shomaker, what were you asked to do in connection with this Mobil application for a salt water disposal well?

A I was asked to review the application and form an opinion as to whether groundwaters would move onto the lands of Snyder Ranches as a result of the injection of waters as contemplated in the application.

Q And were you able to form an opinion?

A Yes, sir, I have formed an opinion.

Q Okay, could you tell us what that opinion is.

A Yes, sir, I believe there's a strong probability that water is going to move across the boundaries of Snyder Ranches lands into those lands.

Q As a result of Mobil's injection of salt water?

A Yes.

Q Now you heard the testimony, did you not, of Mr. Whelan to the effect that there is a fault which bisects the northwest quarter northwest quarter of Section 26.

A I heard Mr. Whelan's testimony.

Q And I take it it's your opinion that there is no real question that salt water -- or that water will migrate onto the Snyder Ranches lands that are southwest of the fault.

A It's my belief that that's the case.

Q All right. Do you have any opinion or any view as to whether waters will migrate onto Mr. -- Snyder Ranches lands that are northeast of the fault?

A It's my opinion that there's a strong probability that pressures will increase on the northeast side of the fault and that the increase in pressure will result in hydraulic gradient -- a change in hydraulic gradients that will cause waters to move onto the Snyder Ranch lands.

MR. COMEAU: That's all I have of this witness.

MR. LEMAY: Thank you, Mr. Comeau.

Mr. Pearce?

MR. PEARCE: One moment, Mr. Chairman.

CROSS EXAMINATION

BY MR. PEARCE:

Q Mr. Shomaker, very briefly, we've heard some testimony about some other injection wells in the area of the proposed injection. Do you remember when there was some discussion about it?

A I've heard the testimony, yes.

Q In the course of your study in preparing for this matter, did you investigate any of those other injection wells in the vicinity?

A No.

Q You do not -- am I correct in assuming from that answer that you do not have any information with regard to the current salt water disposal well located in the southeast quarter of Section 35, is that correct?

A That's correct.

Q You do not know anything about rates of injection or injection pressures in that well?

A That's right.

Q You do not know how long that well has been used as an injection well?

A That's correct.

Q You were present when Mr. Squires testified that there are two injection wells currently in the northeast quarter of Section 21, is that correct?

A I heard Mr. Squires' testimony, yes.

Q Would your answers be the same with regard to information on the injection rates and injection pressures on those two disposal wells?

A Yes, sir.

Q Do you know what zones any of those three wells inject into?

A No, sir, I don't.

Q Do you have any information available to you which would indicate that any fluid injected into any of those wells has migrated out of zone during the course of injection over their lives?

A No, sir, I don't.

Q Have you gathered any information with regard to the water production rates of any of the wells in the Vacuum Devonian South Field?

A No, sir.

Q You indicated that you had come to a conclusion, I believe, that over the course of time, and please correct me because it's important for me to understand what you said, that pressure would build up in the injection zone if this well was allowed to be used as an injector and in your opinion would force the migration of fluids across that fault? Did I understand you to say that?

A I believe my testimony was that I believe

that pressures would rise on the opposite side of the fault as well as on the side of the fault which contains the injection well. That would imply that some fluids would move across the fault.

Q Do you have any indication of --

MR. LEMAY: John, we can't hear you. Can you speak up a little?

MR. BROSTUEN: Would you repeat the last question and his response?

Q I am asking you with regard to your conclusion about whether or not if the proposed disposal is used as an injection well, whether or not fluids would cross the fault.

Your response was, please?

A I believe my answer was that I think the pressures would rise on both side of the fault, which would imply, I believe, some movement of fluids across the fault. I think my testimony was to the effect that I believe there would be an increase in pressure on the northeast side of the fault and that in turn would -- would induce an increase in hydraulic gradient toward the Snyder Ranch lands.

Q Have you made any investigation or calculation so that you can indicate to us at what point that hypothesized result might occur?

A No, sir, I have not.

Q Have you made any study or calculation to determine how much fluid would need to be injected into the porposed disposal well to have that result?

A No, sir.

Q Have you made any study to indicate to you what pressure increase would result in the Vacuum South Devonian Field from any particular quantity of disposed fluids put into the injection well?

A No, sir.

Q You cannot indicate to the Commission or anyone else whether or not there would be a pressure effect in the Vacuum South Devonian Field, for instance, from the injection of 10,000 barrels of fluid?

A I have not made any calculation on it.

Q Have you made any calculation as to any other quantity of fluid hypothesized to be injected into that well and the resulting pressure?

A No, I haven't.

Q Mr. Shomaker, you have testified that you have written a number of papers and reports. Did any of those papers or reports deal with the Devonian formation or similarly situated deep zones?

A I don't recall that any of them had to do with the Devonian. There have been reports dealing with

deep zones, yes.

MR. LEMAY: What? I can't hear you.

A There have been reports dealing with deep zones but not with the Devonian, as such.

Q In the course of preparing for this hearing did you review the Roswell Geological Society report which was introduced as Exhibit Five to this proceeding?

A Yes, sir, I did.

Q Prior to this hearing, then, you were aware of where that particular report hypothesized that fault to be found, is that correct?

A Yes, I was.

Q Did you attempt to verify the location of that fault as shown on that exhibit?

A No, sir, I did not.

MR. PEARCE: One moment, please, Mr. Chairman.

Q Mr. Shomaker, in the course of your preparation for this hearing have you reviewed any well logs of any wells in this area?

A No, sir.

Q Have you made any calculations, estimates, or reviewed any data which would indicate the expected porosity and permeability expected to exist in the Devon-

ian formation in this area?

A I've reviewed the information that's in the Roswell Geological Society publication and the information that's in the application.

Q Any other information you reviewed?

A No, sir.

Q Mr. Shomaker, do you have any information available to you other than has been discussed by the witnesses at today's hearing to indicate whether or not a proposed injection zone in the State Section 27-2 Well is offset by permeable or impermeable zones on the downthroun side of the fault?

A I think it's a good geological inference that there are other permeable zones and the fault may not offset precisely the same zones opposite each other throughout its length. In other words, I think there's a probability that other permeable zones may be offset against the injection zone and I also think it's reasonable to believe that once injection begins other permeable zones along the southwest side of the fault may experience an increase in pressure.

Q Have you done any log analysis in any wells in this area to determine whether or not those porous zones in the injection well are offset by porous or nonporous zones across the fault?

A No, sir.

MR. PEARCE: Nothing further, Mr. Chairman, thank you.

Thank you, Mr. Shomaker.

MR. LEMAY: Mr. Pearce.

Mr. Comeau?

MR. COMEAU: Just a couple of things, Mr. Chairman.

REDIRECT EXAMINATION

BY MR. COMEAU:

Q Mr. Shomaker, you recall Mr. Pearce asking you whether you had done any studies or made any calculation of injection rates and pressures in order to form your opinion. Do you recall that?

A Yes.

Q And do you recall that you answered no?

A Yes, sir.

Q Were -- was it necessary for you to make any of those studies or calculations in order to form your opinion?

A No, sir. I believe that -- that it's quite reasonable that increase in pressure is required to inject 9000 barrels a day, given the permeabilities that are indicated from the application.

For that reason I believe it's reasonable to assume that some increase in pressure at the injection well will be required.

Q So the information you relied on is the same information that Mobil has provided to the Commission.

A The information I relied upon is the information that was in the application they have in the exhibit that was submitted.

MR. COMEAU: That's all.

MR. LEMAY: Additional questions of the witness?

MR. PEARCE: Nothing, Mr. Chairman. Thank you.

MR. LEMAY: If there is nothing further, you may be excused.

MR. NEAL: He was the last witness. We have no closing.

MR. LEMAY: Anything further in Case 9337?

Any statements?

MR. PEARCE: I would like to, if may, Mr. Chairman, just a moment, please.

MR. LEMAY: Do you want to do some closing statements?

MR. NEAL: I'll waive if he'll

waive. If he talks, I'll come on after him.

MR. PEARCE: I'm going to talk, Mr. Neal.

MR. NEAL: I want to talk.

MR. LEMAY: Do you want to talk second, Mr. Neal? Are orders important or not?

MR. NEAL: Well, I think he goes first. He's (unclear).

MR. LEMAY: Mr. Pearce.

MR. PEARCE: Thank you, Mr. Chairman. Commissioners, we're before you today seeking approval of a routine application for disposal of produced water into a nonproductive zone.

That productive zone is at a depth of more than 12,000 feet, separated by some 11,700 feet from the fresh water zone that has been discussed today.

Mobil seeks to transport that water from another area, which it believes needs to have some relief.

Mobil proposes to inject this water at a very low pressure if at all.

Mobil's study, the study of the Roswell Geological Society, the seismic data purchased by Superior Oil, the velocity survey purchased by Superior Oil,

all indicate a major fault to the northeast of the proposed injection well with a throw of some 350 feet.

An analysis of the logs of the wells in this area indicate stratification with impermeable dolomites and impermeable limestones and two porous zones of dolomite.

One of those zones we know was sealed because it was an oil trap and it is up against that fault.

The other of those zones is the projected injection zone.

We have demonstrated to you that if you look at the logs and if you take the throw of that fault, that proposed injection zone is offset by impermeable rock as well as a sealing fault, which has been demonstrated to exist by the oil production in the area.

Mobil has done tests to demonstrate to you the exact part of the formation in which the water will enter. That is a zone from 12,038 to 12,096 feet. That test was conducted under conditions very similar to the average injection conditions at which Mobil will be operating this well.

There has been some discussion of the exact placement of that fault. I'll leave it to the Commission to determine the accuracy with which that can be

determined and the result.

We have shown you that the water can be injected into this Devonian zone; that the Devonian zone will take the water. We have demonstrated to you that approval of this application will result, absolutely will result in the prevention of waste and the conservation of this state's resources.

This Commission exists to accomplish those purposes.

Mobil therefor requests that its application to convert the State Section 27-2 Well to a Devonian salt water disposal well be approved. We request that the approval in that order provide for a period of six months from the approval of all right-of-way and easement and permitting approvals which are necessary to begin.

We cannot give you a date certain. We do not know how long that process will take.

After that process is completed, it will be necessary to secure supplies and arrange facilities. We therefor ask that the term of time begin at some reasonable period of time after all necessary approvals are granted.

Thank you, Mr. Chairman, and Commissioners.

MR. LEMAY: One thing, sorry, I

do --

MR. PEARCE: Mr. Chairman.

MR. LEMAY: -- note your Exhibit Eight through Eleven have probably not be admitted into the record.

MR. PEARCE: Mr. Chairman, if I've neglected to do that, I appreciate your reminding me.

I would move the admission of Exhibits Eight through Eleven.

MR. LEMAY: Without objection those exhibits will be admitted.

Thank you, Mr. Pearce.

Mr. Neal.

MR. NEAL: If the Commission please, Counsel, in all his (unclear) keeps referring to this as a very simple salt water disposal application.

I am saying to this Commission that there is no such thing as a simple disposal system.

All of us who live in southeastern New Mexico and this area of the country are very concerned about the disposal of waste in relation to our groundwater, our surface lands, and our underground waters, and it behooves this Commission to impose much more regulatory supervision of the numerous disposal wells in the Permian Basin for the protection of our state lands and our

private lands.

One of our fundamental, to my thinking, and I get red-headed when I talk about this, but one thing that I think is very important in this case, and it's our position, doesn't have anything to do with the size of Mobil, the size of Snyder Ranches, but Snyder Ranches owns some property, the surface and the minerals, and we are entitled to keep anybody off of that property without our consent, and in my judgment, that is the American way.

Now because Mobil, or any other oil producer, or any other major company, because we are little, we've got a little bit of property up there that may not mean anything to them, it's still our property, and we've got the right to protect it, and that's what we're doing here today.

We think it's undisputed that there's going to be an encroachment of some sort on our property without our consent, and we're telling you we don't want you to authorize that, nor do you have the jurisdiction to do it.

Now if they can keep it off our property and keep it on the State property, fine, that's between them and the Land Commissioner. That's not any of our business, except it's our obligation as a State lessee to see that we have no surface waste occur, also, which is what

we've done.

Now, in all -- they tell me and I see all these exhibits and everything and I would call your attention to a lawsuit that is presently going on in Lea County involving a simple salt water disposal well where the operator saw fit to move some packers and now we have ruined a producing well and it could very easily have been a very productive fresh water formation. Mr. Sexton is well aware of it.

And yet they come in and they say, don't ever worry, where we're going to put this there's never going to be a problem. In other words, out of sight, never a problem.

We are already -- the reason they've got to move from where they've been disposing this water, is because they some way or another they never thought would happen, they have now contaminated, built up a pressure that obviously, from somebody's concern, is a problem or they wouldn't be moving.

We'll have, without any really study in this area, but we do know that there's been some disposal by other companies in the South Vacuum, the effect of it we don't know yet, except we do know that they've already encountered one waterflow. What's their waterflow going to do, are we going to have another one?

Now, they are -- just because -- Exhibit Eleven is a good example. We want to do this because this is the cheapest way. That's their whole story. That's their whole reason for this pipeline, it's the cheapest way. They never gave you any figure, because they didn't (unclear).

What's their profit figure? Maybe the second alternative, maybe the third alternative, is a profitable deal and would have been a reasonable return. We don't know. They've got those figures but they didn't see -- didn't produce -- didn't present them.

I'm saying to you that it's your obligation to the State of New Mexico and the people is to go further than what's been presented here, protect Snyder Ranches little bitty piece of property out here, including the minerals, and if they can keep it off of us, that's between them and the Land Office and the State.

But protect us; we're entitled to it. Don't authorize an underground risk factor.

And our case is very simple: This is my backyard. You have not asked me to go on my backyard. Now you just stay off of it until we get -- consent to it, and that's our whole lawsuit, and we want them to stay away from us. It's just that simple.

Thank you.

MR. LEMAY: Thank you, Mr. Neal.

Additional statements, comments in the case?

The Commission will take it 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

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

30 March 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Mobil Producing Texas & New Mexico, Inc. for salt water disposal, Lea County, New Mexico. CASE 9337

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Charles E. Roybal
Legal Counsel for the Division
Oil Conservation Division
State Land Office Building
Santa Fe, New Mexico 87501

For the Applicant:

MR. STOGNER Call next Case Number 9337.

MR. ROYBAL: Application of Mobil Producing Texas & New Mexico, Inc., for salt water disposal, Lea County, New Mexico.

MR. STOGNER: At the applicant's request this case has been continued to the Commission hearing scheduled for April 21st, 1988. I believe that is scheduled to be heard down in Morgan Hall in this office -- in this building, I should say.

(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. 9337, heard by me on 30 March 1988.

Examiner
Oil Conservation Division