NEW MEXICO OIL CONSERVATION DIVISION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date JUNE 12, 1997 Time 8:15 A.M.

NAME	REPRESENTING	LOCATION
D.R. LAYTON	LAYTON ENERGY	LUBBOCK
PATRICK J. TOWER	ENRON	MIDLAND
BARRY ZINZ	"	"
RANDY CATE	"	"
BRENT LOWERY	COLLINS & WARE	MIDLAND

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:	)	CASE NO. 11,784
APPLICATION OF LAYTON ENTERPRISES, INC., FOR A WATERFLOOD PROJECT, LEA COUNTY, NEW MEXICO	)	ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

June 12th, 1997

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, June 12th, 1997, at the New Mexico Energy, Minerals and Natural Resources Department, Porter Hall, 2040 South Pacheco, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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I N D E X

June 12th, 1997
Examiner Hearing
CASE NO. 11,784

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E X H I B I T S

Applicant's	Identified	Admitted
Exhibit 1	7	20
Exhibit 2	12	20
Exhibit 3	19	20

* * *

A P P E A R A N C E S

FOR THE DIVISION:

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FOR THE APPLICANT:

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Santa Fe, New Mexico 87504-2208
By: WILLIAM F. CARR

* * *

WHEREUPON, the following proceedings were had at 8:23 a.m.:

EXAMINER CATANACH: All right. At this time we'll call first case, 11,784.

MR. CARROLL: Application of Layton Enterprises, Inc., for a waterflood project, Lea County, New Mexico.

EXAMINER CATANACH: Call for appearances in this case.

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe law firm Campbell, Carr, Berge and Sheridan. We represent Layton Enterprises, Inc., in this matter, and I have one witness.

EXAMINER CATANACH: Call for additional appearances?

Will the witness please stand to be sworn in?

(Thereupon, the witness was sworn.)

DONALD R. LAYTON,

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

DIRECT EXAMINATION

BY MR. CARR:

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

A. It's Donald R. Layton.

Q. Mr. Layton, where do you reside?

A. In Lubbock, Texas.

Q. By whom are you employed?

A. Layton Enterprises, Inc.

Q. And what is your position with Layton Enterprises, Inc.?

A. I'm president.

Q. Mr. Layton, have you previously testified before the Oil Conservation Division?

A. Yes, I have. I've testified several times over the past thirty years.

Q. And at the time of your prior testimony, were you qualified as an expert witness in petroleum engineering?

A. Yes, sir, I was.

Q. Have you also testified as an expert as a waterflood engineer?

A. Yes, sir, I have.

Q. Could you review for Mr. Catanach your experience with waterfloods?

A. My experience dates back 49 years in waterflood, starting with my father, who was a small independent. I worked with him for something like seven years prior to his selling his business, after that with the companies Ambassador, Anadarko and Shenandoah, all of who were heavily oriented in waterflooding at the time, and for the past 21 years in my own firm. And during that time I've held positions as project engineer, district engineer and

so on up the line, up to division manager and president of my own firm.

Q. Are you familiar with the Application filed in this case on behalf of Layton Enterprises, Inc.?

A. Yes, I am, sir.

MR. CARR: Mr. Catanach, we tender Mr. Layton as an expert witness in petroleum engineering.

EXAMINER CATANACH: Mr. Layton is so qualified.

Q. (By Mr. Carr) Initially, could you explain to the Examiner what it is Layton Enterprises seeks with this Application?

A. We seek to get approval for what probably is best described as a repressuring project. We're calling it a waterflood or a water injection, but it really is a repressuring project as well, in the sense that the reservoir is completely depleted, almost devoid of pressure, and pressure maintenance is not an option as a result of that.

We prefer to call it a waterflood, but in reality it may be repressuring. And we propose to do so by completing our initial injection well in the pilot area, in the Bough C Pennsylvanian formation and as well in the Devonian section. The Devonian zone will supply not only the necessary large water supply that we need, but the impetus through hydrostatic fluid level to perpetuate the

injection into the Bough C.

Q. What is the name of the injection well?

A. It's our Fox A State Number 5.

Q. And where is that well located?

A. It's located in Section 2 in 9-36 of Lea County, in the Allison-Penn Pool, incidentally.

Q. We're looking at an unconventional method of completing the injection well; is that right?

A. That's correct.

Q. And just generally summarize how you propose to complete this well for injection purposes.

A. We will complete the well, of course, with packer and tubing set above the Bough C, but below the Bough C we'll perforate the Devonian zone as well. The Devonian zone is a very prolific source of water. Occasionally it also produces oil, but not in this well. And it has a very steady and very uniform bottomhole pressure over the region which will supply a constant impetus for the hydrostatic injection into the Bough C.

The Bough C zone is a very porous and permeable zone which will accept water generally by hydrostatic pressure alone; no additional surface pressure is required.

Q. So both zones will be open below the packer?

A. Both zones will be open below the packer.

Q. And then the Devonian water will flow freely from

the Devonian into the Bough C --

A. That's correct, we'll have a crossflow from the Devonian to the Bough C.

Q. And then this will expedite, really, reservoir fill-up; is that right?

A. That's correct.

Q. Let's refer to what has been marked for identification as Layton Exhibit Number 1. Would you identify that for the Examiner?

A. Yes, that's just a letter Application filed with the OCD Form C-108, and it explains in general what our proposal is, what we plan to do.

And the 108 itself additionally contains the necessary required information by the rule of the data on offset wells or wells in the area of review, as well as the offset. And then detail, particularly schematic, on the P-and-A wells in the same area.

It also contains various maps, ownership maps, land maps and a structure map as well, and then defines our -- what we're calling our project area.

Q. And this is a new project?

A. It is a new project, yes, sir.

Q. Let's turn to what has been numbered pages 11 and 12 of Exhibit Number 1, and I would ask you to refer to page -- I guess page 11, and just identify for Mr. Catanach

the project area.

A. All right, the project area covers all of Section 1 and 2 in 9-36, the north half of Section 11, and then approximately three quarters, the south half and the northwest quarter of 36, in 8-36, and that would be in Roosevelt County.

Q. Who owns the leases that are involved in the project area?

A. Layton Enterprises owns all of the leases in the project area.

Q. Who are the royalty owners?

A. The Sections 1 and 11 are all federal leases. Sections 2 and 36 are all State of New Mexico.

Q. Let's go to page 12 in Exhibit Number 1, and I would ask you to identify generally the location of the project area in regard to the rest of the Allison-Pennsylvanian Pool.

A. Okay. The project area is generally the southwestern corner of the field, as I define it. It's something of a structural nose, geologically, the way it's laid down.

And it's separated by a -- what we term as a porosity barrier, which is not an uncommon situation in the Bough C trend, from the rest of the main part of the field. The porosity barrier is designated across page 12 of the

Exhibit 1.

Q. What is the current bottomhole pressure in the project area?

A. As of last month, a pressure bomb we ran, the bottomhole pressure was 55 p.s.i.

Q. And what has been the production to date from this area?

A. The project area to date has a cumulative of about 5.4 million barrels plus a sizeable amount of water, actually not a definite amount, and then also a sizeable amount of gas. And those figures are somewhat erratic and not reliable. The oil production is reliable.

Q. Okay. Can you estimate how much of the original oil in place has actually been produced?

A. Our estimate, based on our own conclusion and then that of, really, some other people who have made a study of this area, that probably a maximum of 35 percent of the original oil in place has been produced.

That would normally be considered fairly high for what I consider this to be. This is, pretty clearly, a solution gas producing mechanism, I think, and 35 percent would really be pretty good for that.

But this is an unusual reservoir, it does have high permeability, and it is possible, but we think that's a maximum figure, probably.

Q. Have you been able to estimate remaining reserves in the project area?

A. The remaining oil in place, then, would approximate 10 million barrels, and the recoverable reserves, by our own estimates, would be from 1 to 3 million barrels, possibly.

Q. Is it possible to estimate the amount of water that would be needed for reservoir fill-up?

A. We have, we think we're fairly close, and we're estimating 10 to 12 million barrels water for fill-up.

Q. Where would you get that quantity of water? Is it available in this area?

A. There isn't any water at all available in this area, essentially. This is why we have come to this resource in the Devonian. The Devonian has an almost unlimited and inexhaustible source of water.

Q. Would removing the volume of water you're talking about from the Devonian have any significant effect on the Devonian and the water within that formation?

A. I think not. The effect of removing that much water from the Devonian would be totally insignificant.

As an arbitrary figure, I just used a hypothetical case of, say, 10,000 acres. And using the 60-foot productive thickness, which I think is probably 25 percent of what actually exists, and 20-percent porosity --

again, it's much higher than that in some areas -- we would be looking in that small area of approximately a billion barrels of water. And the amount we're requiring for fill-up would be approximately one percent of that amount.

The -- Notably the field nearby, the Crossroads-Devonian field that has produced some 50 million barrels of oil, and presumably most of the water they've produced has been reinjected, but their bottomhole pressures are still fairly constant with what they were originally, as I understand it. I have not personally worked over there. But they still have lots of water, after taking 50 million barrels of oil and an amount of gas out of their area. So...

Q. Is there an adequate pressure differential, bottomhole pressure differential between the Bough C and the Devonian to effect the crossflow you're talking about?

A. We think there is. The hydrostatic fluid level with approximately a .445 gradient will give us a constant fluid level of approximately 1800 feet from that Devonian column of water. This affects about a 3400-p.s.i. gradient to the depth of the Bough C and, coincidentally, is just about the original bottomhole pressure.

The original bottomhole pressure of the Bough C reservoir in the Allison field was listed at 3363, and this hydrostatic level from the Devonian will just about match

that.

Q. Now, what is the current status of the Fox A State Well Number 5?

A. It's shut in.

Q. When was it drilled?

A. Drilled in 1991, as a Devonian test, and we have -- we tested 100-percent water at the time, shut it in. We worked it over subsequently twice, in an attempt to isolate the water, and were unsuccessful.

We've also tested the Bough C zone as a producing well, and it was uneconomic to produce it at its current level.

Q. At this time is the well abandoned?

A. It's just shut in. We don't like to say abandoned.

Q. Let's go to page 11 in Exhibit Number 1, the plat, and also at this time I would ask that you refer to what has been marked as Exhibit Number 2.

Exhibit Number 2, Mr. Catanach, is a -- just another version of the plat included in the original C-103, but it does include all leases within a two-mile area of the injection well.

Basically what does show, Mr. Layton?

A. This just shows the project area and the area of review, the location of the injection well, and then the

lease ownership on the adjoining areas.

Q. Do pages 7 through 9 of Exhibit 1 contain the data on all wells within the area of review which penetrate the injection zone?

A. Yes, they do.

Q. And that's the -- all data required by OCD rules --

A. Yes, sir.

Q. -- or C-108?

A. Yes, sir.

Q. Are there plugged and abandoned wells in the area?

A. Yes, sir, there are. There are five wells plugged and abandoned in that same area of review, and those are listed on page 10, the schematics. The data is in pages 7 through 9, and then the schematics are on page 10.

Q. Okay. Let's go to the last page of this exhibit and look at the schematic of the proposed injection well, and I'd ask you to, using this exhibit, review for Mr. Catanach how it is you plan to convert the well to injection.

A. All right, we plan to perforate the Bough C at the depths indicated on this particular sheet, sheet 17, 9648 to -66.

And incidentally, up in the blanks right above it there's an error. That says 9658, but we're going to perforate a little wider zone than that, as indicated opposite the schematic perforations.

Q. It would be 9648; is that --

A. 9648 to -66, 18 feet.

And then in the Devonian zone those perfs as listed from 12,450 through -92, not continuous: 12,450 to 12,460; 12,470 to 12,478; and 12,484 to 12,492. Those will be, then, completed together in that annular space below the packer.

We'll have packer and lined tubing, and the -- Incidentally, the tubing-casing annulus will be inhibited packer fluid and tested according to OCD rules and regulations in that regard.

Q. And injection is through lined tubing; did you say that?

A. Beg pardon?

Q. The injection will be through lined tubing?

A. Yes, through lined tubing. This is a -- This particular tubing that we've specified, Rice Engineering fabricates this, and it will be a fiberglass -- actually a fiberglass liner tube within the steel tubing, and the backed by an epoxy cement. It's a product we've used extensively, and a lot of others have as well.

Q. Are there other oil-productive zones in the area?

A. Only slightly. There's a small San Andres well on one of our leases in Section 11, is the only other producing zone in that area.

Q. Now, as part of this project, ultimately you will be producing some water; is that right?

A. That's correct.

Q. And what do you plan to do with that water?

A. For the time being, the amounts of water we have, we will continue with the existing Bough C disposal well that is located in Section 10, and we think that it complements the entire project to maintain that existing injection well, or disposal well. It will become part of our injection project, actually.

And furthermore, we think that there's more than adequate water probably available to us in the Devonian zone to implement our intended flood, our gravity flood.

Q. What volumes do you propose to inject or move into the Bough C formation?

A. We would like to see 2000 to 2500 barrels initially, going from the Devonian to the Bough C. We cannot honestly say that we'll be able to get that much. That's what we'd like to have to expedite fill-up, of course.

As times goes on and the reservoir becomes

charged in the vicinity of the injection well, we would expect to see a slow-up of those rates, and perhaps to 1000 barrels daily is what we expect.

And while we have no factual data to support this, our supposition is based partly on the experience we have in working with Bough C wells -- that is, in workovers, completions and the like. And then the disposal well itself has a capacity, we feel, like somewhere nearly in that range, with just gravity pressures and --

Q. We are seeking authority, though, for a maximum daily injection rate of 2500 barrels of water per day; is that right?

A. That's correct.

Q. Will Layton be conducting any injection-rate testings?

A. Yes, we intend to run, probably initially, just tracer surveys. These will be inverted tracer surveys of conventional equipment, but we'll be tracing the radioactive tracer material from the bottom up instead of the top down, as is the usual case. And this will be a calculated rate, then, based on the capacity of the annulus, which is a known factor. And then just a time-rate injection based on these radioactive tracers, probably, in my opinion, is as accurate, or more so, than metering equipment would be.

We plan to do this, probably, on a quarterly basis, at least for the first year, and then periodically thereafter for our own information. We think probably with those quarterly tests in the first year that we can establish a rate plot and pretty well determine about what our total volumes are going to be.

It will be a constant, of course, all the time. There will be no starting and stopping, and so because of that we think it's probably a pretty accurate method to determine both the current rate and the cumulative injection into that well.

Q. Will the system you utilize be open or closed?

A. It will be a closed system.

Q. And you'll be injecting by gravity only?

A. That's right.

Q. Do you have a water analysis of the injection fluid in your Exhibit Number 1?

A. Yes, sir, there are.

Q. And are those on pages 14 and 15?

A. I believe that's right. Let's see, 14 and 15 are the -- 14 is the Bough C/Pennsylvanian, 15 is the Devonian zone.

Q. Do you anticipate that there would be any problems with the compatibility of the fluids from the Devonian and the Bough C formations?

A. We don't anticipate any, and based on our chemical people who have done the analysis work for us, they advise us that they appear quite compatible to them, no treatment.

Q. Are there freshwater zones in the area?

A. Just barely. There is a small well in Section 2, and the analysis for that particular well is also here on page 16. It's a brackish fresh water, suitable for livestock, but...

Q. Is it from the Ogallala?

A. I'm making that assumption, but I really don't know what it's from. It's not the typical Ogallala that we see further south in Lea County. I'm more familiar with that, in that area, and that's pretty good water down there. This is not very good water; it's pretty brackish.

Q. And at about what depth are they producing?

A. Approximately 200 feet, as I understand it. But the well does not belong to us. It's a rancher's well, and I've got that information from him.

Q. And where is that well located?

A. It's in Section 2, and it's in the southeast-southwest quarter of Section 2. No, I'm sorry, southwest-southeast, I believe, of Section 2 is where it is.

Q. Has Layton Enterprises provided a copy of this Application to all leasehold operators within a mile of the

injection well?

A. Yes, we have.

Q. Have you provided a copy of the Application to the surface owner?

A. Yes.

Q. And that is the State of New Mexico?

A. The State of New Mexico is the surface owner, yes, sir.

Q. Have you examined the available geologic and engineering data on this area?

A. Yes, I have.

Q. As a result of that examination, have you found any evidence of open faults or any other hydrologic connections between the disposal zone and any underground source of drinking water?

A. No, I have not. There's --

Q. And attached as Exhibit 3 is a statement to that effect; is that right?

A. That's correct.

Q. In your opinion, will granting this Application result in the recovery of oil that otherwise will be left in the ground and wasted?

A. Yes, I do.

Q. In your opinion, will the approval of this Application otherwise be in the best interest of

conservation and the protection of correlative rights?

A. Yes, I do.

Q. Were Exhibits 1 through 3 prepared by you or compiled at your direction?

A. They were.

MR. CARR: Mr. Catanach, at this time we would move the admission into evidence of Layton Exhibits 1 through 3.

EXAMINER CATANACH: Exhibits 1 through 3 will be admitted as evidence.

MR. CARR: And that concludes my direct examination of Mr. Layton.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Layton, how many producing wells do you operate within the project area?

A. I believe we have just seven producing wells at the present time in the project area.

Q. Seven producing wells.

Are those pretty much scattered out within the area?

A. Yes, the -- They're in Sections 1, 11 and 2, 36. They're scattered all over. There's two in 36, just one in Section 1, one in Section 11, and we have three in Section 2.

Q. It's a fairly large project area for having just one injection well. Do you plan on converting additional injection wells?

A. Yes, we do. We have two additional similar wells in Section 1 that have been drilled to the Devonian. They never produced from the Devonian. There again, they're dry holes, 100-percent water. But they are available. One of them, we're now producing from the Bough C. But these two would be available to convert to similar hydrostatic-type injection wells with this Fox A 5.

That would be the -- I think those are noted on the map on page 12, the structure map. That would give us a fairly good coverage.

Now, while our plans initially are to just gauge the performance of the project and the -- We're not sure that it's advisable for us to wait until we actually get a definite response, and based on what we see with the performance of this initial well, we may wish to go ahead and convert at least one more similar well in Section 1 there to expand the project, just in the interest of time.

The time required for fill-up, it's anybody's guess, probably, at this stage. This is a rather unconventional reservoir to begin with, and it's an unconventional approach, so we have nothing to tell us what kind of timing we may be looking at for a positive response

on it.

Q. What kind of period of time are you looking at in terms of evaluating this first injection well?

A. Oh, six months to a year, probably.

Q. Is Layton the only working interest in this area?

A. That is correct, in the project area we have...

Q. Are there any different overriding royalty interest owners?

A. Oh, there are overriding royalties, yes, sir, in some of the leases. But we have 100-percent working interest in all of the leases within the project area.

Q. So how do you plan to -- Allocation of production would just be on a well-by-well and lease basis? I mean --

A. It's just on a lease basis, as it is now, yes, sir. This is not a unitized area at all, and it probably is not practical to attempt to do so because of the indefinite nature of the project itself.

Q. So you don't plan on unitizing?

A. We have no plans to do so at this time, no.

Q. If you had to pick out, maybe, an initial pilot area to start this thing, would you -- I mean, this initial injection well is probably going to only affect maybe a small area around it?

A. We think it will affect probably most of Section 2, which it's convenient in this case, because Section 2 is

all one lease, as it happens. That's a 640-acre state lease.

And that was part of the design for selecting that initial location. It gives us a good pilot area with no infringement on the lease lines or anything of that nature.

Q. If the Division chose to maybe limit the initial project area to that, maybe just Section 2, you wouldn't have a problem with that?

A. No, we wouldn't have a problem with it.

Q. Okay. And that is a commonly owned single state lease?

A. Yes.

Q. Okay. And you're estimating from the entire project area you may be able to recover 1 to 3 million barrels of oil through this process?

A. Pardon me if I just have to admit that that's not a calculated or a highly technical reservoir-engineered figure. That's just an approximation of 5 to 10 percent of the oil in place there, possibly, we're thinking, that -- what we think would be a more than attractive price to go after.

Q. The Box A State Number 5, that was originally drilled as a Devonian?

A. Yes, it was a Devonian test and drilled in 1991.

Q. Okay, so the -- Are those Devonian perforations -- Those are existing perforations in that well?

A. I'm sorry?

Q. Those Devonian perforations --

A. Yes.

Q. -- those are there?

A. Yes, they are there.

Q. Okay. The Bough C is not perforated?

A. Not at the present, no.

Q. And that well was drilled when?

A. 1991.

Q. And it's been shut in since 1991?

A. No, we've worked on it a couple of times, we've had a couple of workovers, and we had the -- we've tried the Devonian, to rework it twice, squeeze off the water and things like that. And we also produced it, or tried to produce it, from the Bough C for a time, and it was uneconomic.

And I'm sorry, I think I told you wrong on those perforations. The Devonian -- The Bough C perforations are there, not the Devonian.

Q. Okay, so you would perforate the Devonian?

A. Yes.

Q. Okay. The Devonian is not productive of oil in this area?

A. No, it isn't. We've -- Well, not in this well. Now, in this area it is, yes. We have a producing Devonian well in the southeast of the northeast of Section 1.

Q. I'm sorry, the where? Where?

A. Southeast of the northeast quarter of Section 1. That's approximately a mile and a half to the east there. We are producing from the Devonian in that well.

Q. Do you think that's going to have any adverse effect on the Devonian production?

A. No, I don't. As I stated earlier, I think the Devonian zone is so enormous in this area it seems to be everywhere. There may be voids within that reservoir, but I don't know of any personally, and I've never heard anyone say that they'd -- if they didn't make a well in the Devonian, they always had water.

And so it's a huge reservoir, and it seems to be over the entire area, all of that part of the state and into west Texas. And I don't know that it's continuous, but I suspect that it probably is.

And the -- That's one of the things that makes Devonian production as attractive as it is, of course, is that huge water drive reservoir, which water drive simply means the expansion of the water in place, and it provides the impetus to produce that Devonian oil from the structural highs then.

And the expansion that it requires to produce those volumes of oil are so slight compared to the total reservoir capacity that there's just no significant effect.

And there are Devonian-production reservoirs all over that area through there from which a lot of oil has been removed, of course, but still the bottomhole pressures are fairly constant there after these many years.

So the volumes we're talking about here are insignificant by comparison to the oil volumes that have been produced in other areas.

Q. What is the -- You've identified what you've termed a porosity barrier. Does that pretty much separate the two areas of the field?

A. Yes, it appears to. And this is not an uncommon feature. Throughout the Bough C trend the appearance of those porosity voids has been fairly common, and this appears to be another one, and it's evidenced by a string of dry holes, as you'll notice on the map on page 12.

And then our own experience in trying to recomplete one or two of those has convinced us that they are indeed void of porosity.

Further, our log analysis in the two areas of the field, you can see a definite change on the updip side of the reservoir, where the reservoir is a little bit different characteristic. It generally is more stratified

to the north there, two or even three productive layers.

This area that we're working with is apparently a single contiguous layer, and that's a fairly common occurrence, I think, for updip pinchouts, which, incidentally control the trap. In most of these Bough C trends, they were controlled generally by updip porosity pinchouts.

And in this particular project area we think that provides just what we need, probably, to contain this area for repressuring and secondary recovery, the porosity barrier across there.

Further, the productive capacity currently of this area of the field, as compared with the north end of the field is considerably different. We're still producing fairly good volumes of fluid in the north end of the field, and I think it's possibly characterized by perhaps better permeability and a thicker section up there.

But nevertheless, even with those considerations, it's just a different reservoir altogether, both by lithological analysis and performance.

Q. What is your current production?

A. In this project area, those seven wells are averaging like two barrels each daily. It's pretty poor economics at 10,000 feet.

Q. The proposed operation, you're going to be -- are

you actually going to be injecting some water down the tubing in this well?

A. No, not likely. We have that option to, of course, but we don't think we'll need to do that. And the small amount of water that we have now, we prefer to continue taking it to our disposal well down there, because we think that that is giving us at least some backup on the overall project there.

At some point in time, assuming that we do get adequate response and presumably sizeable amounts of water from this lease, then we'll probably need to reinject some of it into that same well.

Q. Would it affect the operation if you were to actually produce the Devonian water to the surface and then reinject it down the well, or how would that affect the project?

A. Just economically, is all. It would automatically scrub it as uneconomic, we think, to have to lift the water from the Devonian and then reinject it.

Q. Okay, the -- Now, as I understand it, you plan on running tracer surveys quarterly for the first year?

A. Yes.

Q. And you feel like you'll get a pretty good handle on volumes with these tracer surveys?

A. We feel like that we can make a plot that should

be reasonably accurate, because it's a constant operation.

Q. After the first year, what are you proposing to do?

A. We kind of play that by ear, I imagine, but we would run them periodically, but perhaps not that often, just for our own information to try to keep some handle on the water fill-up and the return volume and things of that nature, might look like.

Q. Do you feel like your bottomhole pressure in the Devonian formation is going to stay fairly constant?

A. Yes, sir, I do.

Q. So the only thing that might affect the amount of water is, as you get to fill up the reservoir it might take less water?

A. Yes.

Q. What are you estimating to be the time frame to fill up the reservoir?

A. That's really a hard call. With this single injector, of course, it's pretty long. As I mentioned earlier, we may not wish to wait too long to instigate an expansion of the project. If this appears to be working well and we don't see any immediate adverse effects of any kind from it, we may want to go ahead and add at least one additional well.

But the best estimate I could come up with, we're

probably looking at three years, I imagine, with -- even if we get all three of those wells going at some point in time, they're -- for a full fill-up.

Now, the nature of this reservoir may prohibit a complete and total fill-up. We just don't know how it's going to react, of course, because it's a very porous and permeable reservoir, and while it does have this porosity void at the upper end, it may be connected at some point, through some avenue, with the other parts of the field.

So to totally contain it might be a stretch of reservoir engineering there, to -- But in general, this particular part of the field is probably the most manageable of the Bough C that we've worked with.

We've worked with other areas of the Bough C, and because it is a fairly compact and uniform porosity and permeability and not a really excessively thick zone, we think that it's manageable and controllable, and we'll be able to see something like a conventional waterflood, although admittedly it has to be considered as more unconventional to begin with.

We have some evidence of this particular type of reservoir from other areas, like the Aneth field in Utah, is a very similar reservoir, geologically, at least. It's these algal-reef-mat type of deposition, and theirs is a thicker, larger reservoir than what we're dealing with

here, of course, but it's been a very successful flood.

The Canyon Reef in Scurry County, Texas, the Sack Rock unit, very well known, is also similar in a great many respects and, there again, has been an extremely successful project.

I might mention that both of those projects, however, pressure maintenance was initiated fairly early in the life of the field and probably contributed to their better than average success. They later expanded it to a full-blown waterflood, but they were started as pressure maintenance, and that's an option that we don't have here.

Q. Okay. Do you feel pretty comfortable with the quality of cement within this wellbore, especially behind the 5-1/2-inch casing?

A. Yes, we do. We drilled that well ourself, of course, and that's one of the things we do, is pump cement on casing strings. That's not always the case in some of the old wells we run into. But I think we pumped 2000 sacks of cement on that long string, something like that, and then...

Q. That cement top was -- How did you determine that?

A. I'm sorry?

Q. On the 5-1/2-inch casing, how was that cement top determined?

A. That is by calculation. We did some block squeezing to bring it on up.

We didn't think we were tight completely to the intermediate casing, so we did block squeeze in the San Andres area some time back, just to make sure that we had that tied back. On those deep wells we always like to tie the cement back to the intermediate casing if at all possible.

Q. Okay. Testing of the well should not be a problem, pressuring up on the casing, tubing casing annulus --

A. No.

Q. -- it shouldn't be a problem?

A. No, it was new casing, and the well is only six years old and it's in excellent condition.

Q. How will you guys determine if you have a tubing or casing leak? Do you think that that will be -- I mean, how will you know?

A. The only --

Q. A tubing -- Let me rephrase that. A tubing or packer leak, initially anyway?

A. The only way to know is pressuring the annulus, those tests, and we're doing those annually, of course, on injection and disposal wells. Now, the -- Just load the back side above the packer and pressure up, and of course

that tests your casing and tubing both, from the tubing casing annulus.

Q. You're doing that annually?

A. Yes, we have an annual --

Q. -- pressure test?

A. -- pressure test on those wells, yes.

Q. Okay, the Division only requires one test every five years.

A. Well, but I thought they were doing that a little more often. We have an inspection every year, now, on our disposal well.

Q. What they do on an annual basis is a Bradenhead test.

A. Well, Bradenhead test. But I thought they had expanded it, maybe, to an annular test as well. We did one this year, I know, is why I thought that, and --

Q. Now, the federal requirement is still one test every five years, so that's --

A. Every five years, okay.

Q. -- and as far as I know, that's what we're doing.

A. Just the same as the shut-in wells, then.

Q. Yeah.

A. Okay. Well, we can do it as often as is necessary, of course, but in this particular case we run heavy casing and a lot of cement, and I have no qualms at

all about testing that well.

Q. But in the interim period, between testing time, I mean, you -- a tubing or packer leak wouldn't be readily evident in the wellbore?

A. That's probably true, yes.

Q. Is there a potential for that to be harmful to something?

A. I don't know of anything that it could harm. Even if that occurred it would probably just go into the -- It would just commingle, in other words, with the main zone, that packer fluid on the back side. But it would just sit there hydrostatically.

We might lose a little bit of our packer fluid initially down to that 1800-foot level, but we have an 1800-foot fluid level from the Devonian and then a full column on the backside. So you might get a little vacuum reaction. You could check it in that manner, I suppose.

But it isn't much of a problem, really, to just periodically run our chemical truck by there and let them pump a little packer fluid. In fact, we've done that just on occasion to satisfy ourself and to keep the well full, is the main thing. When you fill them initially sometimes you trap air, and it's harder to fill them up.

But I don't think that would be a problem, at any rate. Even if we had a leak, with this gravity system

where there's no pressure involved, there isn't any other zone down there that we could have any adverse effect on.

Q. The -- Have you actually done a calculation to show what the pressure will be at the Bough C formation from the Devonian?

A. I just calculated it, yes, based on --

Q. Based on --

A. -- based on our known hydrostatic fluid level from the Devonian and the approximate pressure gradient form that water, and...

Q. For initial injection wells such as this one, the Division generally allows a pressure of .2 p.s.i., down to the top perforations.

A. Uh-huh.

Q. That would put the approved pressure limit in this well somewhere around approximately 2000 pounds, but you're planning on injecting essentially at 3400 pounds?

A. Uh-huh.

Q. Do you think that's going to result in fracturing of the Bough C?

A. No, I don't. I thought that pressure was calculated from the surface.

Q. That's true, that doesn't take into account hydrostatic pressure.

A. Uh-huh.

Q. That's right.

A. That's irrespective of hydrostatic, I believe, and --

Q. So that would be essentially --

A. The waterfloods that I've been involved in where that rule applied, it was .2 pounds times the depth, was your maximum allowable surface pressure, and then that in addition to the hydrostatic.

Q. Okay, so you'd be safe in that respect?

A. Yes, we're well under the parameter limit, I believe.

Q. What happens if you do have a problem in the wellbore, you develop a casing leak or tubing leak? How do you fix it? How do you go in there and shut off the Devonian water?

A. Well, it would depend on, of course, what the actual problem was, I guess, but we just have to go in and set a -- probably a temporary bridge plug and -- while you repaired the casing. That could be set above, actually, both zones, I suppose, depending on where it was or what the problem was. But you can do that just by setting bridge plugs, either retrievable or drillable, either one, and isolate those zones while you're working and repairing casing.

And of course, as far as a tubing leak, that

wouldn't entail anything other than just tripping the tubing itself, tubing and packer, and repairing or replacing them and...

Q. Ultimately when you plug this well, those two zones will be isolated?

A. Yes. Yes, I think that would be a requirement, probably, of any plugging program. We hope that's a long time off.

Q. Do you have any problem -- I mean, do you have any concerns about the casing -- It's approximately 3000 feet of casing between the perforated intervals. Do you have concerns about what the water might do to the casing down there?

A. I don't have any real concern. I can't say exactly what may happen.

But just to make a case, possibly, there are a great many wells producing from the Devonian out in that part of the country, with a very high fluid level, most of which is Devonian water, of course. Generally the practice is to skim off the top of those, and they've produced a lot of those wells for 30 or 40 years now, with little or no casing problem in those particular wells.

And I'm assuming that this would be no different from a producing well in that regard. We're just moving one fluid across it all the time, and it's not exposed to

any oxygen at all. That, we've found, from a corrosion standpoint, is the most detrimental thing that there is, usually, is, you're more apt to have a problem up near the top of the well, in a well that's exposed to the atmosphere with oxygen.

This Devonian water doesn't appear to be highly corrosive at all, and we've taken that up with our chemical people too. And while any brine water is corrosive to a degree, if it isn't implemented with some other conditions such as oxygen or mixing it with some other source of adverse water condition, then you're not likely going to have a very serious problem.

But the problem does exist with corrosion anytime you're handling brine, of course, but we think it's probably insignificant. And this is 23-pound, N-80, 5-1/2 casing that's in that well, and the likelihood of it being a problem is far down the road, probably more years down the road than the project would be expected to last, based on the existing producing Devonian wells in that area.

Q. Is there any Morrow production in this area?

A. Any --

Q. -- Morrow?

A. We had a little show when we drilled that well in a zone that might have been called Morrow, but it was uneconomic. We tested it along after the first Devonian

test and plugged it off as uneconomic. It made water and just a very small amount of gas, but we did have a little show down there, was all, and --

Q. So this Bough C is the only zone in the Pennsylvanian that produces?

A. That's right, uh-huh.

EXAMINER CATANACH: Well, I can't think of anything else. I think that's all I have.

MR. CARR: That concludes our presentation in this case.

EXAMINER CATANACH: There being nothing further in this case, Case 11,784 will be taken under advisement.

(Thereupon, these proceedings were concluded at 9:23 a.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 11784, heard by me on January 12 1997.

David R. Catanach, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

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

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

WITNESS MY HAND AND SEAL June 14th, 1997.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1998