NEW MEXICO OIL CONSERVATION DIVISION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10476

IN THE MATTER OF:

The Application of Yates Petroleum Corporation for amendment of Division Order No. R-2178, as amended, to include a carbon dioxide injection pilot project, two unorthodox injection well locations, and to rescind Division Order No. R-7821, Eddy County, New Mexico.

BEFORE:

MICHAEL E. STOGNER

Hearing Examiner

State Land Office Building

May 14, 1992

REPORTED BY:

DEBBIE VESTAL
Certified Shorthand Reporter
for the State of New Mexico

ORIGINAL

NEW MEXICO OIL CONSERVATION COMMISSION
EXAMINER HEARING
SANTA FE, NEW MEXICO
MAY 14, 1992 -- 8:15 A.M.

NAME	REPRESENTING	LOCATION
Maurice Trimmer	Bygan Co.	SF
DAVE BONEAU	YATES PETROLEUM	ARTESIA, NEW MEXICO
Bob Fant	Yates Petroleum	Artesia, N.M.
William F. Carr	Campbell, Carr, Berge + Sheridan	Santa Fe

A P P E A R A N C E S

FOR THE NEW MEXICO OIL CONSERVATION DIVISION:

ROBERT G. STOVALL, ESQ.
General Counsel
State Land Office Building
Santa Fe, New Mexico 87504

FOR THE APPLICANT:

CAMPBELL, CARR, BERGE & SHERIDAN, P.A.
Post Office Box 2208
Santa Fe, New Mexico 87504-2208
BY: **WILLIAM F. CARR, ESQ.**

I N D E X

E X H I B I T S

EXAMINER STOGNER: Call the next case, second one on the docket, first page, 10476.

MR. STOVALL: Application of Yates Petroleum Corporation for amendment of Division Order R-2178, as amended.

EXAMINER STOGNER: Call for appearances.

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe law firm, Campbell, Carr, Berge & Sheridan. I represent Yates Petroleum Corporation, and I have one witness.

EXAMINER STOGNER: Any other appearances? Will the witness, please, stand to be sworn.

ROBERT STEPHEN FANT

Having been duly sworn upon his oath, was examined and testified as follows:

EXAMINATION

BY MR. CARR:

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

A. Robert Stephen Fant.

Q. Where do you reside?

A. I reside in Artesia, New Mexico.

Q. By whom are you employed and in what capacity?

A. I'm employed by Yates Petroleum Corporation as a petroleum engineer.

Q. Have you previously testified before the New Mexico Oil Conservation Commission?

A. No, I have not.

Q. Would you briefly summarize your educational background and review your work experience for Mr. Stogner?

A. Okay. I graduated from Texas Tech University with a bachelor of science in petroleum engineering in 1984. Upon graduating I entered the employment of Arco Oil & Gas Company in Midland, Texas. I served in the reservoir and operations engineering group.

I had areas of responsibility in southeast Lea County, New Mexico, followed by an area of responsibility in southwest Kansas. And my final two years with Arco I served -- I was the operations reservoir engineer for a CO_2 enhanced oil recovery project in southern Oklahoma.

Q. Have you previously testified before regulatory agencies in other states?

A. Yes, sir.

Q. And what states have you been qualified in?

A. Both Texas and Kansas.

Q. Are you familiar with Yates' efforts to implement and enhance recovery project for CO_2 injection in the west Loco Hills Grayburg No. 4 Sand Unit?

A. Yes, sir.

Q. Is this your primary responsibility with Yates?

A. Yes. That was my primary responsibility upon being hired.

Q. And so you were actually hired by Yates to implement this and other CO_2 projects?

A. Yes, sir.

Q. Are you familiar with the application filed in this case and the wells that are involved in this matter?

A. Yes, sir.

MR. CARR: We tender Mr. Fant as an expert witness in petroleum engineering.

EXAMINER STOGNER: Mr. Fant is so qualified.

Q. (BY MR. CARR) Would you briefly state

what Yates seeks with this application?

A. We are seeking the authority to implement a CO_2 enhanced oil recovery pilot project in a portion of the West Loco Hills Grayburg No. 4 Sand Unit.

Q. Will you be doing this through wells at standard or unorthodox locations?

A. The wells we seek to drill, two injection wells, will be at unorthodox locations in Section 7, Township 18 South, Range 30 East. Well No. 9 we propose at 1980 feet from the north line and 40 feet from the west line. That's Unit E. And Well No. 10, which is 2455 feet from the south line and 50 feet from the west line, and that is Unit L. We also seek the rescission of Order No. R-7821 from February of 1985.

Q. And that order previously authorized a pilot project in this area?

A. Yes, sir.

Q. Why are these wells at unorthodox locations?

A. The wells are at unorthodox locations to fill out the patterns that we seek to inject into, the injection patterns.

Q. Are they also moved to get off a county

road?

A. They were also moved from their originally proposed locations because of conflicts on the surface with the county road and power lines.

Q. Now, Mr. Fant, Yates is not seeking certification in this case of this project under the New Mexico Enhanced Oil Recovery Act, are they?

A. No, sir.

Q. Let's just initially identify what has been marked as Yates Petroleum Corporation Exhibit No. 1.

A. That is the C108 application in this matter.

Q. By way of background, could you advise Mr. Stogner as to when the West Loco Hills Grayburg No. 4 Sand Unit was approved?

A. It was originally approved in 1958. I believe that would be October of 1958 on application of NuMont Oil Company for a pilot waterflood. That's Exhibit 1, page 8.

Q. And that was Order No. R-1267?

A. Yes, sir.

Q. When was this project actually expanded

and the waterflood approved?

A. The waterflood was expanded by order of 2178 in January of 62. That's Exhibit 1, page 9.

Q. What we're doing today is seeking to amend that order to include carbon dioxide injection?

A. Yes, sir.

Q. When did waterflood operations commence in this unit?

A. Waterflood operations commenced in July of 1963. Primary recovery for the unit was approximately 9 million barrels of oil. Waterflood recovery, ultimate waterflood recovery is expected to be an additional 14 million barrels, for total recovery of 21 million barrels.

Q. Where are you in the life of this waterflood project? Have you recovered virtually all the 14 million barrels at this time?

A. Yes, sir.

Q. What is the current production status from this waterflood?

A. Currently we're producing approximately 130 barrels of oil per day.

Q. Could you refer to page 10 in Exhibit

No. 1, the plat. And by referring to this, review the proposed project for Mr. Stogner.

A. Page 10.

Q. Would you go ahead, please.

A. Page 10 of Exhibit 1 is a plat showing the essentially two areas of review and the proposed pilot project. In the center we have two injection patterns indicating the wells that comprise the pattern with triangles for the proposed injection well locations; an inner circle of one-half mile radius showing the area of review for the project; and a two-mile radius also for the project.

Q. Now, what we have is two inverted five-spot injection patterns; correct?

A. Yes, sir.

Q. The southernmost pattern encompasses how many acres?

A. Twenty-two-and-one-half acres.

Q. North of that how many acres are involved?

A. The northern pattern encompasses ten acres.

Q. On the western side of the pilot project, there is a spot where there is no well

indicated. What is the reason for that?

A. We propose to drill that location as a producer when we see CO_2 breakthrough in any of the wells in the patterns.

Q. Could you summarize Yates' efforts to implement a CO_2 project in this area?

A. Briefly in 19 -- in the period of 1971 to 1974, the CO_2 project was originally considered. There were no sources of CO_2 at that time, and a micellar pilot project was proposed. In January of 1981 Yates proposed a CO_2 project within the unit.

In April of 1984 the working interest owners of the unit were balloted and approved a CO_2 pilot project. In February of 1985 the OCD approved a pilot project. That was Order No. R-7821. In October of 1985 Yates reduced the size of the pilot project down to one pattern.

In December of 1985 Yates began work for that pilot project. In April of 1986 work on that pilot project terminated due to economic considerations.

Q. How does the project, which is under consideration here today, compare to the project that the Division reviewed and approved in 1985?

A. There are several differences. To begin with the injection wells have had to have been moved from their original locations for surface considerations. As a result of that movement, the wells have changed not only just physical location, but sections: township and range and well name.

As a result of moving those, the area of review has shifted encompassing different wells that are within the area of review that have to be considered. The original order, or the R-7821 Order, was for two 22-1/2 acre inverted five-spot patterns.

What we propose in this application is a 22-1/2-acre inverted five-spot and a ten-acre inverted five-spot. We propose a ten-acre. It will allow us to receive data much quicker, obtain more data in a short period of time, and proceed with the project at a more rapid pace.

Q. Now, in addition to this, could you review for Mr. Stogner the changes that you have made in the basic operations of the project?

A. After reviewing the original proposal, I realized that, you know, in my experience that it would not work under the original proposal.

So many changes have been implemented within the actual operational aspects of the flood.

The original or the 1984 or 1985 approved order showed -- was approved for injection of CO_2 for a day and then water for one day. Now, operationally for me that will not work. I propose to inject CO_2 for two months followed by water for one month.

Furthermore, the injection rates, the approved injection rate was 40 tons of CO_2 per day. I believe we should seek 60 tons per day of CO_2 average rate. The water rates were 200 barrels a day. I propose 400 barrels per day in this one.

The injection pressures sought in the original order were 1200 PSI. I feel that we will more likely see, and from an engineering standpoint, we need up to 2,000 PSI upon proof that it will not damage the formation.

Q. Now, Mr. Fant, when you compare the C108 that was filed back in 1984 with the Division concerning a pilot CO_2 project within this unit and you compare that to the one that's before the Division today, in your opinion are we talking about the same project or a different

project?

A. No, sir. I feel we are talking about different projects. They are dramatically different in their operational aspects.

Q. It is more than just having to move the wells, the injection wells to a new location?

A. Yes, sir, much more.

Q. In fact, the overall approach and the project which you're proposing here today differs from what was previously approved not only in volumes and pressures but in the overall approach to the project in terms of the way you are going to be cycling the injection of CO_2 and water?

A. Yes, sir. It's dramatically different.

Q. Why is Yates now trying to implement a CO_2 project into the unit?

A. With the tax incentives that have become available under the Enhanced Oil Recovery Act, the economics of the project have improved. Furthermore, we are well into the life of the waterflood project, and I feel we need to do something with the wells.

Now, this is becoming almost essentially a point of we need to do something with the wells or we will never be able to do

anything with the project.

Q. There is a time when it's most efficient to implement a CO_2 flood in the life of a reservoir; is that not correct?

A. That is correct.

Q. If you go much beyond this point in time, are you sort of missing that window within which it can be effectively implemented?

A. Yes, sir. We would be missing that.

Q. What recoveries are you projecting for this particular pilot project?

A. The projections are approximately 65,000 barrels of oil for the pilot project over three years.

Q. And then if this pilot project is successful, what are Yates' plans in terms of expanding the project and anticipated recovery?

A. We are projecting a five-stage expansion of the pilot project throughout the Loco Hills, West Loco Hills Unit. We hope to recover approximately 14 million barrels of oil over the next 25 years.

Q. In your opinion if the CO_2 flood is not implemented in this unit, will these 14 million barrels ultimately be lost and never recovered?

A. They will be lost and not recovered.

Q. Now, what happens if the pilot project fails? What are you looking at in that circumstance?

A. We would be facing an approximate 104-well plugging program at a cost of around $4 million.

Q. All right. Let's go now to page 10, Exhibit 1, the plat. And you have previously indicated that is an orientation plat that shows the proposed pilot project?

A. Yes, sir.

Q. It shows the two-mile radius and also the one-half-mile radius showing the area of review?

A. Yes, sir.

Q. Shows the leasehold ownership in the area?

A. Yes, sir.

Q. Other than the Yates group, is Enron the leasehold operator within the area of review?

A. Yes, sir.

Q. Let's go now to pages 11 through 16 of Exhibit No. 1. Could you identify those for Mr. Stogner?

A. Okay. Pages 11 through 16 are a well-by-well tabulation of the well type, construction, date drilled, location, depth, and record of completion of each and every well within the one-half-mile area of review for this project.

Q. So this is the tabular information required by form C108?

A. Yes, sir.

Q. All right. Let's go now to pages 17 through 20. Would you identify those?

A. Pages 17 through 20 are the schematic drawings of all plugged and abandoned wells within the one-half-mile area of review as requested by the C108 application. It shows the schematic of plugging at the time that they were plugged.

Q. And there are only four plugged and abandoned wells in the area?

A. Yes, sir.

Q. In your opinion, having reviewed the plugging information, are the wells adequately plugged so as to avoid their becoming channeled for the migration of fluids from the injection interval?

A. Yes. Based upon this data, yes.

Q. Okay. Let's go now to page 7 of this exhibit and move back to that. Could you identify and review that for the Examiner?

A. Page 7 is a schematic drawing of our proposed injection well completions. I would like to make one proposed -- two proposed amendments to this. We had originally planned for 9-5/8-inch surface casing and 7-inch production casing in these wells.

Since that time, upon my review, I have proposed 8-5/8 inch surface casing and 5-1/2 inch production occasioning. It is my opinion that this will provide a better isolation of the injection zones by providing more cement sheath around the production casing.

Q. Now, you're going to use line tubing?

A. Internally plastic-coated tubing, yes, sir.

Q. And will the annular space on this well be filled with an inner fluid and a guage placed at the surface so that pressure in the annular space can be tested to comply with the Federal Underground Injection Control Program?

A. Yes, sir.

Q. Now, you have indicated you're going to be injecting into what formation?

A. The Grayburg No. 4 Sand.

Q. And what will be the source of the carbon dioxide that you're proposing to inject in this well?

A. Carbon dioxide will be trucked in from Denver City. It will be food quality, over 99 percent pure liquid CO_2.

Q. Again, would you review the volumes that you propose to inject?

A. We propose to inject 60 tons of CO_2 per day per well for two months in a cycle followed by a one-month injection period of water at a rate of 400 barrels per day per well average rates.

Q. Okay. What would be the maximum injection rate you would consider for both CO_2 and water?

A. I would propose 66 tons per day of CO_2 maximum rate and 500 barrels of water per day.

Q. Okay. Will the system be an open or closed system?

A. It will be a closed system.

Q. To inject these maximum volumes, what

pressure are you anticipating you will need?

A. I believe we will need anticipated pressure of up to 2,000 PSI.

Q. Now, this pressure exceeds a pressure limitation of 2/10 pound per foot of depth to the top of the injection interval, does it not?

A. Yes, sir, it does.

Q. Do you recommend that prior to injection you establish that formation can receive the injectants under this pressure by OCD witness step-rate test?

A. Yes, sir, I propose that.

Q. Would you request that the order also provide that should you need to go above 2,000 pounds, that a procedure be established that that increase could be approved administratively again after witness step-rate test to establish that a higher pressure would not cause formation parting or separation?

A. Yes. I would propose that.

Q. Are you going to be reinjecting produced water from this unit back into the unit?

A. No. The produced water from this pilot project will not be reinjected into the pilot.

Q. Do you anticipate any compatibility

problems with the water you're going to be injecting?

A. No, sir. This is the additional water that has been injected since the inception of the project.

Q. What is the source of that water? Where are you getting it?

A. It is from the Maljamar water system.

Q. What is Yates Exhibit No. 3 in this case?

A. It is a water analysis of the produced water and injected water.

Q. This is the same water that's been injected throughout the life of this waterflood?

A. Yes, sir.

Q. Are there any freshwater zones in the area?

A. There is one freshwater zone in the area.

Q. What is that?

A. That is the Roessler Formation in approximately 360 feet of depth.

Q. Are there any freshwater wells within a mile of either of the proposed injection wells?

A. No, sir, there are no freshwater wells.

Q. Now, you are going to be drilling both of the injection wells?
A. Yes, sir.
Q. You will provide logs of those wells to the Division as soon as they are obtained?
A. Yes, sir.
Q. Could you identify what has been marked as Yates Exhibit No. 2?
A. This is the affidavit of mailing showing the copies of notice to offsetting property owners and other working interest owners in the unit area and the surface owner and royalty owners.
Q. The only surface owner is the Bureau of Land Management; is that correct?
A. Yes, sir.
Q. And the only leasehold operator within one mile or within the area of review is Enron?
A. Yes, sir.
Q. And notice has been provided not only of the application by copy of the application, but notice of today's hearing has also been provided to both of these parties?
A. Yes, sir.
Q. Have you reviewed this proposal with

other governmental agencies?

A. Yes, sir.

Q. And what is the status of your negotiations with both the BLM and State Land Office?

A. The BLM defers approval until the OCD acts, and the State Land Office has approved the plan of development.

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

A. Yes, sir, I have.

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

A. No, sir.

Q. In your opinion would granting this application and implementation of the proposed CO_2 flood be in the best interests of conservation, the prevention of waste, and the protection of correlative rights?

A. Yes, sir, it will.

Q. Is it your recommendation that Division Order R-7821, which approved the pilot project that was abandoned back in 1986, that that order

be rescinded?

A. Yes, sir.

Q. Will approval of this proposed project be sought pursuant to the New Mexico Enhanced Oil Recovery Act at a later date and after rules have been adopted by this Division for such a procedure?

A. Yes, sir.

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

A. Yes, sir.

MR. CARR: At this time Mr. Stogner, we move the admission of Yates Petroleum Corporation Exhibits 1 through 3.

EXAMINER STOGNER: Exhibits 1 through 3 will be admitted.

MR. CARR: That concludes my direct examination of Mr. Fant.

MR. STOVALL: One question just in terms in anticipation of a question I might get from the court reporter. You referred to a micellar project.

MR. CARR: M-i-c-e-l-l-a-r.

THE WITNESS: Yes, sir.

MR. STOVALL: That's what I wrote

down. All right.

MR. CARR: It means soap, I think.

EXAMINER STOGNER: I have a few questions.

EXAMINATION

BY EXAMINER STOGNER:

Q. After breakthrough do you anticipate any problems with the salability of natural gas with the CO_2 cut natural gas?

A. Natural gas is not sold from the unit at this time. We have no gas sales. There is essentially no gas production from the unit. The GOR is below salable quantities.

Q. So any CO_2 that does break through will be in solution in the oil; is that correct?

A. Yes, sir.

Q. Okay. Now, did I hear you right that the produced water would not be reinjected; is that correct?

A. Yes, sir.

Q. Why isn't it?

A. The produced water we plan to use is the Maljamar water system. It is cleaner water, and it will require some less cleaning up. We will bring that in and use that water as the

make-up water for the pilot project.

Q. And where will the produced water from this project be injected or disposed of?

A. It will be reinjected in the remaining portion of the West Loco Hills Unit where we are currently injecting water at this time.

Q. Now, will this water contain any carbonic acids due to the CO_2 injection if there is breakthrough?

A. No appreciable amounts.

Q. Okay. Now, you talked about 2,000 PSI maximum pressure. Is that on both the hydrostatic head of the CO_2 and the water?

A. Yes, sir.

Q. Have you done calculations of what the bottom-hole pressure would be with a 2,000 pound surface pressure of the CO_2 and the water pool?

A. Yes, sir, I have done those calculations. I'll have to dig them out here.

Q. If you would. That would save me some calculating.

A. It would be, the bottom-hole pressure would be approximately 3,000 PSI with water at those rates. This is accounting for friction also. And it would be approximately 3,100 PSI

injection pressure with the CO_2, based upon the hydrostatic head of CO_2, our expected temperatures and pressure.

Q. Did I hear that right? 3,100 for CO_2 and 3,000 for water?

A. Yes, sir.

Q. That doesn't sound right. I thought water was heavier than CO_2.

A. My apologies. You are correct. It is the reverse of that.

Q. All right.

A. Right.

Q. Both those calculations include friction?

A. Yes, sir. I had my CO_2 and my water sides mixed up.

Q. Now, the maximum injection rate, you said, was 66 tons. Is that per well --

A. Per well.

Q. -- or project-wide?

A. Per well.

Q. Per well. Would both wells be taking half, or is there another percentage breakout of injection?

A. With the projected proposed injection

cycling, we would propose -- I am proposing two months of CO_2 injection followed by a month of water on an out-of-phase cycle. So you would have two months with one well on CO_2 and the other well on water and then one well with both wells on CO_2 and neither well on water. You would have the two out-of-phase with each other.

Q. Okay. So one would be on CO_2 at all times?

A. There would be at least one well on CO_2 at all times. From an operational standpoint that is much preferable to have a much more continuous operation.

Q. That's 500 barrels of water per well?

A. Per well, per day, yes, sir.

Q. You talked about the injection would be into the Grayburg No. 4 Sand. Do you have that shown on a log by chance?

A. I do not have it here at this time. That would be defined by the type log within the unit agreement as referenced in the C108 application.

MR. CARR: If you would like, Mr. Stogner, we could provide a copy of that to you.

EXAMINER STOGNER: Yes, if you would,

please.

THE WITNESS: Okay.

Q. (BY EXAMINER STOGNER) Now, your designation of that No. 4 Grayburg Sand, would the injection intervals take in all of that particular interval in both the injection wells?

A. Yes, sir. It would encompass the Grayburg No. 4 Sand, which is the entire unitized interval.

Q. Let's see, in looking at page 7, the perforations are to be at 2800 feet, plus the TD is 2850.

A. That is an approximate number on those perforations.

Q. Okay. How big of a sand thickness are we looking at in this Grayburg?

A. Approximately 24 feet.

Q. Twenty-four feet.

A. That would be a good number for a field-wide average and in this area also.

Q. Will there be any rework necessary for the producing wells that are going to be influenced by this injection as far as the reperforations or squeezes or anything?

A. The producing wells within the area are

all open-hole completions at this time, so there would not be any reperforating required. We have continued to work on these wells and repair the wellbores to establish mechanical integrity of these wellbores as witnessed by OCD representatives from Artesia.

Q. What is the open-hole interval in most of these wells? How big of a zone are we talking about?

A. Primarily the open-hole area is approximately -- they are open-hole from approximately 2725 feet to the base of the Loco Hills Sand of the -- excuse me, the Grayburg No. 4 Sand.

Q. And that would show up on the tabulation of the well data starting on page 11; is that correct?

A. Yes, sir. That is available in all of that.

Q. What zone lies immediately above the Grayburg No. 4, and will that be influenced any?

A. The Grayburg carbonate zones lie immediately above the zone, and we should not -- with the new injection wells that we are drilling and the repair of the old wells, we will

have isolation from those members. And they will not -- CO_2 should not enter those zones.

Q. So you have a Grayburg carbonate immediately above and immediately below the No. 4?

A. Yes, we have Grayburg immediately beneath it. My geologic column is a little bit off at this point.

Q. What I'm leading up to is you've got 24 foot of sand up here that you're going to be injecting CO_2 in, and then you've got producing wells that are open-hole. Any of these open-hole intervals, are they going to act as conduit of CO_2?

A. No, sir. They are nonporous zones, nonproductive zones.

Q. When were most of these wells, the producing wells immediately surrounding this area, when were they completed?

A. Most of their original completions were between approximately 1940 and 1945.

Q. With nitroglycerin shots, I would assume, for stimulation?

A. In most instances, yes, sir.

Q. Is waterflooding being initiated in any

other zones in this waterflood project, which surrounds this area, in anything else but the Grayburg No. 4?

A. No. The waterflooding in the West Loco Hills Unit is isolated to the Grayburg No. 4 Sand Unit, sand member.

Q. Do you have an approximate length of time in which you'll have CO_2 injection in this pilot project? Of course, that depends on the success rate, I'm sure.

A. We propose to inject 27,200 tons into the pilot. That will take approximately eleven months based on the injection cycles that I am proposing.

Q. Now, you say eleven months. That is when both wells are drilled and ready to take CO_2 water?

A. Yes -- well, no. That is eleven months from the first date of CO_2 injection.

Q. Do you plan to have both wells drilled and ready to inject simultaneously, or will you have one drilled and injected while the other one is being drilled?

A. Our proposals are at this time to drill the wells sequentially but not to begin injection

until both wells have been completed and step-rate tests have been run. And then both wells will essentially be placed on injection at the same time but drilled sequentially.

Q. Will it be necessary once these wells are drilled, the proposed injectors, to put a pump on them and take any fluids that -- will it be necessary to pump them before you start injecting?

A. You mean pump them from a producing standpoint?

Q. Yes. To maybe drain whatever liquids are in the No. 4 zone in the immediate area, or do you propose just to start injecting?

A. Certainly within the completion procedures, completion phases of these wells, we will be producing back somewhat some of the water. We will be producing that, and we will be analyzing the return fluids from those.

But our plans at this time are not to -- do not include placing these wells on pump, as you put it, to produce the wells to withdraw large amounts of fluid from the No. 4 sand member.

Q. Now, when I look at the map, I've got

shaded in the -- I don't know what you'd call that -- looks like a flask bottle pattern?

A. Keyhole, as some people call it.

Q. Okay, keyhole.

MR. STOVALL: I like the flask myself.

Q. (BY EXAMINER STOGNER) Flask, keyhole, whatever. What are the closest water-injection wells, and do they show up on this map that are outside this area?

A. Well, that are outside of the keyhole?

Q. Yes.

A. I mean the flask?

Q. Exactly.

A. Well, there are several water-injection wells that we have proposed to maintain pressure in the bounding areas to maintain the CO_2 within our project, such as the Tract 1, Well No. 4 in the southwest of the southwest of Section 7; Well No. 7 -- Tract 1, Well No. 7 and that well is almost in the center of the northwest quarter section.

I'm going to have to pull out a slightly different map to provide you with the file.

Q. What I'm leading up to, will these

wells continue to inject water -- and I think you answered my question -- to maintain the pressure around the area to keep the CO_2 within the confined bounds?

A. Yes, sir. We are bounding this pilot with what, for lack of a better term, we are calling barrier injectors to prevent the migration of CO_2 outside of the pilot project area.

Q. Now, will these barrier injection wells, will the injection, injectability as far as volumes and pressures, will those change any, or will you monitor those, or how will that be watched?

A. Most certainly they will be monitored for both rate and pressure, you know, basically with metering of the volumes going in and recording of the pressure for those injection volumes.

Q. Now, the barrier injection wells, is that freshwater, or is that reinjected water?

A. That water will be produced water from the entire West Loco Hills Unit.

Q. But the water that is to be injected in these two wells is the freshwater; is that

correct?

A. That is the freshwater from the Maljamar water system.

Q. And why do you use freshwater as opposed to reinjected water again?

A. It is the freshwater -- the other focus it gives us is the ability to track the breakthrough of our specific water. It allows us to understand whether channeling is occurring and what our sweep -- a better idea of what our sweep efficiency is within this reservoir under this new process. It is a measurement, a data gathering and measurement process.

Q. I want to go back and ask some questions, and you answered a few of them earlier in your testimony about the old proposal back in 85, Order No. R-7821. I'm a little confused. Was there actually work done in preparation of this particular project that this order -- when I say "this order," R-7821 authorized?

A. There was work performed on that project in terms of repairing wells, and they actually started repairing the wells in the pilot area in order to have wellbores with mechanical integrity -- they would do this prior to actually

implementing the flood. So that basically was step 1 of implementing that project, was to repair existing wells.

Before that was completed, though, oil prices dramatically fell in early -- late 1985, early 1986. And before they were actually able to drill wells, the project had to be -- that project was terminated.

Q. Let me make sure I've got the wells that are being influenced here.

A. Okay.

Q. The two injection wells will be the No. 9 and No. 10. And they're both located at the far western boundary of Section 7; is that correct?

A. Yes, sir.

Q. All right. Starting with this flask shape --

A. Uh-huh.

Q. -- I look in the northeast portion of it, there's a well No. 4. That's an existing well?

A. Are you speaking of the northwest corner?

Q. Yes. I'm sorry. The northwest

corner.

A. Yes. That is well No. 4 of Tract 13.

Q. Of Tract 13. So that would be the Loco Hills Grayburg Unit, Tract 13, Well No. 4?

A. Yes, sir.

Q. And then I move over east now to the northeast quarter. That looks like a No. 2?

A. Yes, sir.

Q. Okay. And then I move down south. That appears to be a No. 8 well?

A. Yes, sir.

Q. That's Tract 22?

A. No, sir. These wells are within Tract 1.

Q. Tract 1, okay. Now then, I angle off to the west -- I'm sorry, to the east a little bit, and continuing down south to Well No. 3.

A. Yes, sir.

Q. What's the identity of that well?

A. That well is Tract 1, Well No. 3.

Q. This is still in Tract 1?

A. Yes, sir.

Q. Okay. And then I go immediately west to a No. 1?

A. Yes. That's Tract 6, Well No. 1.

Q. Okay. Now, we close that flask up, moving to the north, looks like north, northeast, but there is no well there?

A. Yes, sir.

Q. But that is your proposed producing well once it is established or you're accomplishing what you want; is that correct?

A. Once breakthrough occurs in any of the existing wells.

Q. Okay. Now, you described this as a 22-acre inverted five-spot and a ten-acre inverted five-spot?

A. Yes, sir.

Q. I guess I'm not seeing that. Are you referring to Wells No. 4, 2, 8, and the proposed producing well as the ten-acre?

A. Yes, sir, that is the ten-acre pattern.

Q. And that would be dedicated to the No. 9, or those would all be influenced by the No. 9 injector well?

A. Yes, sir.

Q. And the No. 8 and the proposed well would also share in any breakthrough from the proposed 10 injection well; is that correct?

A. Yes, sir.

Q. Now, have these well locations that you've given me for these injection wells, have they been staked and permitted with the BLM?

A. No, sir, they have not been staked or permitted. But we have been out and spotted the locations for feasibility to make sure that we can do them from a feasibility standpoint on the surface.

EXAMINER STOGNER: Okay. Does anybody else have any further questions of this witness?

MR. STOVALL: Just one out of curiosity as much as anything.

EXAMINATION

BY MR. STOVALL:

Q. You're talking about 60,000 pounds of CO_2; is that correct?

A. Sixty tons.

Q. I mean, tons. Excuse me.

A. Yes.

Q. And you're trucking it in?

A. Yes, sir.

Q. How many trucks a day is that, just out of curiosity?

A. Sixty tons is approximately three trucks per day.

Q. Okay. I had no concept of how much a truck of CO_2 was.

A. A tank of CO_2 is approximately 20 tons.

FURTHER EXAMINATION

BY EXAMINER STOGNER:

Q. So you're going to have six trucks for the project since you need -- you said three trucks a day for each well?

A. Yes, sir.

Q. Okay. And that would be seven-day-a-week injection?

A. Yes, sir.

Q. Okay. Now, your water, I assume, is being piped in?

A. Yes, sir.

[A comment was made off the record.]

Q. I'm assuming that if you come in later and request the tax credit, you will have some economics at that time?

A. [Nodded.] Yes, sir.

EXAMINER STOGNER: He's shaking his head yes. Very sadly, I might add.

Are there any other questions of this witness?

MR. STOVALL: Mr. Boneau is smiling, Dr. Boneau. No questions.

EXAMINER STOGNER: Mr. Fant, you may be excused.

Mr. Carr, do you have anything further?

MR. CARR: We have nothing further in this case. And we will provide the log to you as quickly as we can get back to Artesia and get it to you.

EXAMINER STOGNER: If the log is in the immediate area, that's fine. If it is not, perhaps, in addition, if you could provide showing the No. 4 on one of the logs, if there is a complete log on one of these existing producing wells that is immediately being influenced.

I realize they're probably TD'd as such. We may not have a full Grayburg No. 4. But if you could provide that, and, Dr. Boneau, if you know, and of course, Mr. Fant, I direct that to you, too.

DR. BONEAU: There's a reasonably modern log on 13-11, which is pretty close. It's a little bit to the west.

EXAMINER STOGNER: I believe that is

shown on the map just directly west of the proposed producing well to be drilled. It looks like less than a quarter-of-a-mile, the No. 11 that you were referring to, Dr. Boneau.

DR. BONEAU: Yes, sir. That's been drilled within, like, the last -- within our lifetime, within the last ten or fifteen years. It has a log that young engineers like us can read.

EXAMINER STOGNER: If you could provide that log as opposed to the type log --

DR. BONEAU: That would be my suggestion as a log that might be useful to the Examiner.

MR. CARR: We will do that.

EXAMINER STOGNER: I would appreciate that. Thank you, Dr. Boneau, and thank you, Mr. Fant.

MR. STOVALL: Dr. Boneau's unsworn testimony about logs that we can read.

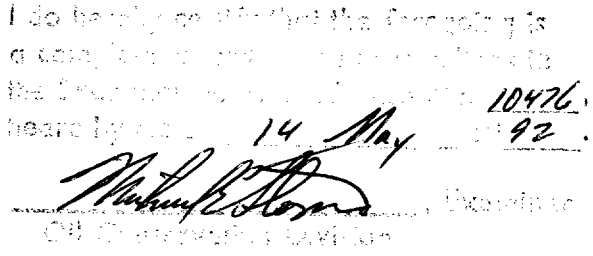
EXAMINER STOGNER: "Young engineers."

MR. STOVALL: Which part don't I fit, Mr. Stogner?

EXAMINER STOGNER: If there's nothing further in Case 10476, I'll take this case under

advisement. And this hearing is adjourned before we say anything else.

[And the proceedings were concluded.]



CERTIFICATE OF REPORTER

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

I, Debbie Vestal, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; 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 May 14, 1992.

DEBBIE VESTAL, RPR
NEW MEXICO CSR NO. 3