STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

Case No. 6580

IN THE MATTER OF CASE NUMBER 6580)
APPLICATION OF CONOCO, INC.,)
FOR AMENDMENT OF DIVISION ORDER)
NO. R-6157.)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING
BEFORE: JIM MORROW, HEARING EXAMINER

Thursday, April 18, 1991
10:15 a.m.
Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Division on April 18, 1991, at 10:15 a.m., at Morgan Hall, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before: Gail D. Vinson, CCR, Certified Court Reporter Number 297, for the State of New Mexico.

FOR: OIL CONSERVATION DIVISION

BY: GAIL D. VINSON, CCR
Certified Court Reporter
CCR No. 297

I N D E X

April 18, 1991
Examiner Hearing Case No. 6580 (Reopened)

E X H I B I T S

A P P E A R A N C E S

FOR THE DIVISION: ROBERT G. STOVALL, ESQ.
General Counsel
Oil Conservation Commission
State Land Office Bldg.
310 Old Santa Fe Trail
Santa Fe, New Mexico 87501

FOR CONOCO INC: KELLAHIN, KELLAHIN & AUBREY
Attorneys at Law
BY: W. THOMAS KELLAHIN, ESQ.
117 N. Guadalupe
Santa Fe, New Mexico 87501

Q. Do you know how you acco

MR. STOVALL: Application of Conoco, Inc., for amendment of Division Order No. R-6157 and Division Administrative Order PMX-153, Maljamar Carbon Dioxide Injection Project, Lea County, New Mexico.

EXAMINER MORROW: Appearances?

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

EXAMINER MORROW: Okay. Will the witness please stand and be sworn.

ROBERT BEAMER,

was called as a witness and, having been first duly sworn, was examined and testified as follows:

EXAMINER MORROW: Go ahead, Tom.

MR. KELLAHIN: Thank you, Mr. Examiner.

Mr. Examiner, Conoco seeks an amendment to Order Number R-6157 and the accompanying administrative order dealing with the carbon dioxide project in the Maljamar MCACO2 unit. I've provided you with a copy of Order Number R-6157.

What we're seeking to do is to make specifically clear in this proposed order the operational practice that Conoco has used with regards to the carbon dioxide project.

This project has got a considerable life to it. It started off in a primary producing status as a consolidated effort of various leases. It's gone through waterflood operation and ultimately tertiary CO2 project.

The original concept for the carbon dioxide project contemplated the reinjection of produced hydrocarbon gases and natural gas liquids back into the reservoir. That plan of operation has been previously approved by the Division and the Commissioner of Public Lands, and is one that continues to be justified in the opinion of Conoco.

However, in reviewing Order R-6157, we became concerned that Ordering Paragraph Number 1, found on Page Number 2, speaks only to the injection of carbon dioxide in water. And while we had the understanding that we could reinject the produced hydrocarbons that were a nonsaleable product and at the point in time that they became economic, in fact, could recover those hydrocarbons and

ultimately sell them.

We are seeking before you today clarification of that, reconfirmation that it's an appropriate thing to do, that it is in the best interests of conservation. It ultimately causes no waste and there's no impairment of correlative right

subject of a
prior case before the Oil Conservation Division for Phillips Petroleum Company. They have a similar tertiary CO2 project in their Vacuum Grayburg-San Andres Pool in that unit. And by Order Number R-6856-A, issued in September of last year, the Division then accomplished the same thing for Phillips Petroleum Company.

We have outlined in our application the chronology of events with regards to Conoco's case. I have as my principal witness today Mr. Bob Beamer. Mr. Beamer is a petroleum engineer whose primary responsibility is this carbon dioxide project in the Maljamar.

And he's here to discuss with you in detail the operational aspects of the project and his engineering conclusions that the reinjection of this produced hydrocarbon gases and the liquids is

in the best interest of everyone's correlative rights and ultimately will not cause waste of the valuable resource, and can be produced at such time as it's economic to do so.

So with those introductory remarks, I'd like to call Mr. Beamer and have him present his -- and display some exhibits.

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Beamer, for the record would you please state your name and occupation?

A. My full name is Robert E. Beamer. I'm senior staff engineer for Conoco in the Midland, Texas, division office.

Q. Mr. Beamer, on prior occasions have you testified before the division as a petroleum engineer?

A. No.

Q. Summarize for us your education.

A. Received a BS and MS degrees in petroleum natural gas engineering from Penn State University in 1958 and 1960.

Q. Subsequent to graduation would you summarize your employment experience as a petroleum

engineer?

A. I've been employed by Conoco since graduating from Penn State, beginning employment in March of 1960. I've worked various staff and supervisory engineering positions, various locations throughout the United States, and some international. Presently working the Maljamar CO2 project since August of 1989.

Q. Summarize for us your specific responsibilities with regards to the Maljamar project?

A. My specific responsibility is to analyze the reservoir behavior and monitor the performance, serve as the reservoir management coordinator on our project team.

Q. Have you studied the Maljamar project in order to reach conclusions with regards to the application before this Division?

A. Yes, I have.

Q. And pursuant to that study have you

A. Yes. I've prepared -- been associated with preparation of the exhibits that we'll discuss today.

MR. KELLAHIN: Mr. Examiner, I tender

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GAIL D. VINSON, CCR

Mr. Beamer as an expert petroleum engineer.

EXAMINER MORROW: We accept Mr. Beamer's expert qualifications.

Q. Let me ask you, Mr. Beamer, to unfold what is Exhibit Number 1. Locate where we are.

A. The MCA Unit is located in the Maljamar field in Lea County, southeastern New Mexico. This map outlines the MCA Unit with the bold black outline. Covers some 8,040 acres . Within that unit area we have designated our active CO2 project areas. The blue outlined area is our stage one area which contains some fifteen CO2 injection wells.

Q. What does stage one mean?

A. Well, that was the initial stage of operation for our expanded CO2 project. We subsequently expanded that with stage two development to include nine additional CO2 injection wells beginning in January of 1990.

Our CO2 injection wells are designated on this map by the open hexagons. The open triangles that you see are the continued waterflood injection wells. The legend at the bottom right corner of the exhibit designates the other facility locations, etc., the red dots refer to our production header

locations throughout the field. The green squares are our tank battery locations.

And the blue diamond is the site of the Maljamar gas processing plant which is operated by our Natural Gas Department. The red diamond in the south of Section 21 there is the site of our recycle dehydration and compression facility.

Q. When we look at the display you've got certain areas identified as expansion. What does that mean?

A. Those are areas where we see the potential for future CO2 injection, all contingent upon the results of our stage one and stage two activities.

Q. Mr. Beamer, have you prepared a summary for the Examiner of the various orders and approvals associated with your project that you have received from the Oil Conservation Division?

A. Yes, Exhibit 2 is a summary of past orders.

Q. Let's turn to the book, the red book of displays. Let me have you turn to what is marked as Exhibit Number 2.

Lead us through, without describing each and every one of the orders -- leads us through a

summary of the key orders and es.

This same topic was the

3 A.

issued in November of 1942, Order Number 485, and it approved the Maljamar Cooperative Repressuring Agreement, known as the MCRA, which essentially authorized a pressure maintenance program by rejection of the produced gas from the reservoir underlying the cooperative participating area.

From that date through late 1962, there were a series of five supplements to that order, essentially designating operatorship of the area. And also you'll note in mid-1950 two orders authorizing a pilot waterflood program followed by an expansion of that project, culminating in late 1962 with Supplement 5, which essentially unitized the interest in the Grayburg-San Andres reservoir underlying the current MCA unit outline.

And then Order R-2403 in December of 1962 approved that Supplement 5, and the initial plan of operation which covered the waterflood operation.

Q. When we get to October of 1979, that's the Division Order Number R-6157 that approved the CO2 pilot program?

A. That's correct. And that pilot project

then was operational during the early 1980s with actual CO2 injection occurring during the period of -- I believe it was May 1983 through December of 1983. That pilot project was analyzed within the company and consequently a plan of operation was developed, designated here as revised plan of operation of November 20th, 1987.

That's of particular concern to our meeting here, because in our opinion that details very specifically what our plans were for the development of the project including the reinjection of the produced gases from the project area.

Q. Let's turn now to Exhibit Number 3, Mr. Beamer. Would you identify and describe that exhibit?

A. Exhibit 3 is a copy of the plan of operation that I just referred to. This is a copy of a letter to the BLM and to the Commissioner of Public Lands in 1987. And as I said before, it details very specifically what Conoco's plans were for the development of the expanded CO2 project.

Q. Is there any portion of that Exhibit Number 3 that specifically addresses the reinjection of produced hydrocarbon gases?

A. There is.

Q. Where do we find that?

A. On Page 2, at the bottom of that Page 2, the final paragraph which I believe is highlighted on your exhibit. If I could just quote those few sentences: "We stated in our plan of development and as the CO2 flood progresses significant quantities of CO2 appear in the produced gas. CO2 recycle facilities will gather the high CO2 content, produce gas from the pro
prepared certain exhibits and displays?ehydrate the gas f the reservoir. "

And then following to the next page, "the design of the CO2 recycle facility is based on complete recycle of all produced gas from the CO2 flood areas".

Q. Has Conoco implemented that plan of operation with regards to the reinjection of produced hydrocarbon gas?

A. They have.

Q. Summarize for us that operational aspect of the project. When did it commence and why was it done?

A. We'll get into that in some more detail as we go through the exhibits. But, essentially, Conoco was aware from the very beginning that

reinjection of the produced gases would be required as a matter of course, fairly early in the project life. And they developed their recycle facility, dehydration and compression facilities, beginning just very quickly once our stage one operation began in January of 1989.

That recycle facility was completed and operational then in March of 1990, at which time we did begin the reinjection of the produced gases from our stage one and stage two project areas.

Q. What was the basis for Conoco's recognition that you would have to reinject the produced gas?

A. Primarily it was a consequence of the Maljamar gas plants, acid gas sweetening capacity. Going into the project, our project development team was aware that that gas plant could handle an incremental rate from our project of only 500 MCF per day of CO2. Our modeling work indicated to us that we would exceed that relatively low limit of CO2 production from the project area within a short period of time, within six months to a year. And in fact, that did occur.

Q. Have you provided verification to the Examiner about the other regulatory agencies

approving your revised plan of operation. Is that shown in the display book?

A. Yes. Exhibits 4, 5 and 6 -- I'll speak to number 4 first, is a copy of the approval received from the Commissioner of Public Lands, November 6, 1987, to our revised plan of operation which did, as we discussed just a minute ago, discuss the detailed plan of development for the CO2 project.

Exhibit Number 5 is the received approval from the BLM. And then Figure 6 -- Exhibit 6, is a copy of the approval of the plan of development from the Hobbs local NMOCD office received November 16, 1987.

Q. I made mention to the Examiner of Phillips' recycling project of CO2 in their vacuum CO2 project. Are you familiar with that project, Mr. Beamer?

A. I've reviewed their case of -- I believe it was Augusvents in the life of

the project?
ur recycling operation employed

by Conoco similar another dissimilar to the Phillips situation?

A. In my opinion, it's very similar. As I recall the Phillips case, their need for recycling

was caused by limiting gas processing capacity at their gas plant. And when they exceeded a certain percentage of CO2 in their produced gas stream, they were forced to go to a reinjection program versus the option of shutting in their operation.

Q. And is that similar to your situation?

A. Yes.

Q. Let's turn now to Exhibit Number 7, if you will, and identify and describe that display?

A. Exhibit 7 is a table that summarizes the status of our unit operation in February of 1991. It breaks down the unit operation as to area under active waterflood operation, continued active waterflood operation, and that area which comprises our stage one and stage two active CO2 project areas.

Q. Review for us, using this as a display, the status of the CO2 project operation as shown on the table?

A. Currently our stage one and stage two areas, as I mentioned earlier, have a total of 24 CO2 injection wells. Our CO2 pattern is an inverted nine-spot pattern, 80-acre pattern areas, so that this active CO2 project then comprises about 1920 acres total. Roughly 24 percent of the total

unit area. Within that project area we have -- during the month of February we had 97 active producing wells and 20 active CO2 injection wells. Our allocation --

EXAMINER MORROW: Did you say 24 earlier, or --

A. We have a total of 24 injection wells, but during the month of February, 20 of those wells were actively injecting CO2.

Q. What portion of the reinjected gas is CO2? Is there a percentage, or what volume of reinjection is -- represents the CO2 gas?

A. Well, we'll see that a little bit later. But during the month of February, for instance, the produced gas rate from our CO2 area was approximately 2.1 million cubic feet per day. This rate, as you'll note down under the injection portion of the table, was the rate that was reinjected into our CO2 project.

Of the total production rate of 2.1 million per day, in February that was composed of about 62 percent of CO2.

I might just summarize briefly the injection rate in the unit during February. Of course, our water injection continues at about

duction batteries, and
compress and ding a rate of
20.6 million cubic feet of pure CO2 from a Cortez pipeline system, combining our produced gas rate of 2.1 million cubic feet per day, average, during the month, for a total CO2 injection rate of 22.7 million cubic feet per day.

Q. Let's turn now to Exhibit Number 8. Would you identify and describe that display?

A. This is a summary of our projected recoveries from the unit. Primary waterflood recoveries noted are very well established from past performance. We feel very comfortable with those projections.

And we see ultimate recoveries from primary operations of about 18.2 percent of the original oil in place. Waterflood recovery should approach 23.8 percent of the original in place for a total recovery of -- something like 41 percent of the original oil in place.

The CO2 estimated or projected recoveries are shown for the stage one and two areas. And just for added input, we've noted the potential recovery from the expansion area. We have no firm plans at this time to go to that expansion area, so I'd just prefer to speak to the active area at this time.

Projected slightly greater than 21.5 million barrels of oil to be recovered from our CO2 operation. These estimates are based on modeling work that was done after calibrating a model based on our pilot operation that was run back in the early 1980s.

Q. Let me have you turn to Exhibit Number 9. Would you identify that, please?

A. Exhibit 9 is simply a plot of the historic production and injection performance of the NCA units since 1963.

Q. Would you take a moment and look at the oil production curve and show us significant changes in unit operations?

A. The oil production curve is designated by the black solid boxes. Note that peak oil production rate from the unit occurred in 1972 at about 17,000 barrels per day. That was the result of an in-flow drilling program that began in the early 19 -- or the late 1960s, rather, whereby they in-fill drilled to develop the field from 40 acre spacing to 20 acre spacing. And also it's the result of the expanded waterflood program. A fairly classic response to the waterflood operation and also a very pronounced decline -- established

decline, following the peak rate.

You'll notice, beginning in the 1986, 1987 period, a flattening of that decline. That was caused by some new well drilling, but primarily the result of some concentrated well work activity that was done in preparing for our CO2 project. Quite a concentration on remedial work activity.

You'll noticet of 1990, yes.

Q. How is yord is our projection of the normal waterflood operation decline in the unit. And that corresponds to the established decline seen prior to the 1986 flattening. And we've defined this -- it so happens that that's approximately 8 percent per year decline rate.

And we've defined that decline then as waterflood recovery. Anything greater than that decline resulting from our EOR operation will be considered EOR reserves or recovery.

Q. Have you attempted to project the potential incremental oil that you can attribute to the CO2 project?

A. Yes.

Q. Is that shown in the form of display?

A. The next exhibit, Number 8, shows that.

Q. I think so we're up to 10.

A. We are, 10?

Q. Yes, sir.

A. I'm sorry. This plot does show our projections of future recovery from the unit. As I mentioned in Exhibit 9, the dashed black line is the projected recovery from an ongoing waterflood operation. That is declining at an average rate of 8 percent per year.

The upper curve, the blue with the crosses, represents the total expected production from the unit, which will include the waterflood recovery, plus the incremental oil to be recovered from our stage one and stage two operation.

Q. This is a projection for only the stage one and stage two areas?

A. Projection for only stage one and stage two.

Q. What have you estimated in terms of additional barrels of oil to be directly attributable to the CO2 injection for the project in stages one and two? Do you have a projection for that --

A. Total recovery is expected to be about 21.6 million barrels of oil. The plot indicates that we've projected a significant response to our

operation beginning in late this year, expecting that oil production then to peak at about 4700 barrels per day. Currently our unit production is averaging 2600 barrels per day.

Q. Can you summarize for me the data that's used for the simulation?

A. Well, simulation was based on response seen in the pilot project that was run essentially during 1982-83 and 84. That data served to calibrate a TDC Model, the modeling work was done in our modeling group in Houston. And they took the results of that -- it was -- the simulation work was done on a pattern type balance -- or pattern type analysis. And then a program was written to composite that to estimate recoveries for the project areas.

EXAMINER MORROW: Let me interrupt you with a question before you go any further. When did you start
17,000 barrels per day. We're purchasStage one was begu January of 1989.

EXAMINER MORROW: Okay. So most of what you -- you haven't experienced really any recovery that you attribute to your CO2 project.

THE WITNESS: Nothing significant. You

can see on Exhibit 10 here, we do show the actual unit production for 1989 and 1990. That's shown with the black star. It's just barely above the normal waterflood decline rate.

EXAMINER MORROW: Okay, good.

Q. (By Mr. Kellahin) maybe now, Mr. Beamer, is a good time to go to Exhibit Number 11 and have you show the history of your CO2 injection?

A. Exhibit 11 does show the history of the CO2 injection beginning in January of 1989. With the injection into 15 wells, fairly stable injection rates through 1989. The increased rate beginning in January of 1990 then was the result of expanding the project to include stage two, with an additional nine injection wells.

The red curve represents our recycle operation in terms of percentage of the total injection rate. So that in March of 1990, for instance, when we began the reinjection operation recycle, we were cycling roughly 4.2 percent of the total CO2 injection rate. This is increased, and during February we were recycling approximately 10 percent of the total injection rate.

Q. What percentage of the total injection

volumes does the recycled gas represent? Is that the 20 percent?

A. 10 percent.

Q. Ten percent, I see, okay.

A. That's 10 percent.

Q. So that's how to read this. Is that -- the total gas reinjected then, that portion of that gas is 10 percent in February of 1991?

A. That's right. The black curve is in units of millions of standard cubic feet per day, which in February was about 22.5 million cubic feet per day. The recycle rate was 10 percent of that.

Q. What factors determine the necessity of recycling the total produced gas stream from the CO2 injection area?

A. Well, as I mentioned earlier, the gas plant was capable of handling approximately 500 MCF a day of additional CO2 production from our project area, with their existing sweetening capacity. We exceeded that rate sometime in mid-1989 and were forced to divert the production from four of our wells out of the gas plain inlet at that time because of high CO2 concentration and relatively high gas rates.

In the interim then, between August of

the dashed black line from

1990 onwa

1989 and March of '90, we built the recycle facility. And once it was operational then we were able to divert all of the produced gases from our project area through that recycle facility for reinjection combined with the purchased CO2, back into the Grayburg-San Andres reservoir.

Q. By August of '89 then, you have reached the capacity of the plant to handle the CO2, and you began to recycle the gas?

A. We did not begin the recycle operations until the plant was operational in 1990. In the interim period, we had to divert the gas production from those -- there were four wells involved. We diverted that gas and, in fact, that gas had to be burned up the gas plant's flare stag, to preserve roughly 50 barrels-a-day production.

Q. Okay.

A. So we were forced to burn that gas until we were able to recycle it.

Q. Let's turn now to Exhibit Number 12, Mr. Beamer and have you identify and describe that exhibit?

A. Exhibit 12, and the following Exhibit Number 13, are schematic diagrams of the field facilities used in the processing of the produced

gas stream. The red circles designate our field header facilities where groups of individual wells are combined for testing purposes and distribution to the tank battery areas where the liquids and gases are separated.

From the tank batteries gases are taken off from the various operation vessels, including vapor recovery units, metered and sent to the gas plant for processing and sales.

Exhibit 12 is the schematic of the pre-recycle operation.

Exhibit 13 then -- it is the schematic representation of the facilities following the start-up of the recycle operation, the primary difference being in that the production from our CO2 areas now flow directly to a new battery set up at our Battery 2, which we designate as CO2 battery. So that four header systems now flow to the CO2 battery, all produce gases from the CO2 project area, then are separated at that facility, taken through a low pressure system to the recycle plant where those gases are dehydrated and compressed to roughly 2200 pounds, to be combined with the purchased CO2 stream for reinjection.

Q. Turn now to Exhibit Number 14, please,

and identify that for us?

A. Exhibit 14 is a plot of our recycle history beginning in March of 1990. The red curve is the recycled gas rate in millions of standard cubic feet per day. The black curve, the upper curve, is the CO2 content of that recycled gas. Beginning in March of 1990, our initial recycle rate was about one in a quarter milliostage one.

THE WITNESS: eased to the presented level of about 2.1 million cubic feet per day.

CO2 content in that recycled stream has increased from roughly -- looks like 45 percent to the current 62 percent of that total recycle stream.

Q. Do you have an explanation as an engineer as to why we're seeing the percentage of the gas stream up to 62-plus percent CO2, while we have yet to see significant response in the project area to the CO2 injection?

A. The majority of our CO2 production is associated with a minimum number of wells. Actually, we can identify six wells. And if you would turn to Exhibit 15, I've shown the location of those six relatively high gas producing wells. They're somewhat randomly located across the unit area. The red circles designate those as producing

in excess of 50 MCF per day per well.

Actually in February the total rate -- the total produced rate from those six wells totaled 1.4 cubic feet per day at an average CO2 content of 89 percent. Ninety-one of the 97 wells in this CO2 project area, are producing at rates less than an average of 8 MCF per day per well and are producing essentially zero CO2 content.

So this high CO2 content, from a relatively high rate, affects the overall average quite significantly.

Q. Can you avoid the necessity of reinjecting the hydrocarbon gases that have the CO2 in them by simply shutting in these six wells that produce substantial quantities of carbon dioxide?

A. Could we?

Q. Yes.

A. Well, we could at the expense of shutting in the oil production.

Q. You don't see any operational necessity to do that then, do you?

A. No.

Q. Do you see in pattern developed with the high CO2 producing wells to cause you to be concerned that you have an ineffective CO2 flood in

stages one or two?

A. Not really. It's evident that we have some problem wells. And the main benefit from this is that we see the majority of our gas is still remaining in the reservoir. The bulk -- the vast majority of our producing wells, roughly 93 percent of the unit are producing with no CO2, after two years of operation. We think that is very significant in that the CO2 displacement process must be working as we projected it to be.

Q. Let me direct your attention to Exhibit Number 16. Would you identify and describe that display?

A. Exhibit 16 is our projected CO2 and recycle requirements. Again, based on the modeling work that was done for this project. The purchased CO2 requirement is shown in the solid black boxes,

n 25

red. All of these are in terms of millions of standard cubic feet per day injection rate.

The total then of the recycle plus the purchase is shown in the blue star plot, which is the upper plot. We've projected that we will have to purchase CO2 through the year 2,002, it looks like. At which time our recycle rated should be

sufficient to carry the process.

I've also shown on this plot the actual rates observed during 1989 and 1990. The actual total injection rate is shown with the black star, and you can see that it pretty much overlays the projection. The actual recycle rate is slightly above our projection, but not significantly so, so that we have a fairly high comfort factor here that our process is proceeding about as expected.

Q. Turn to Exhibit 17, and identify and describe that display?

A. Exhibit 17 is the summary of the gas analysis of the various extremes that we're injecting into our project. The left column, of course, is the component within these given streams. The Cortez pipeline percentage is the analysis of the pure CO2 that we purchase, greater than 98 percent pure CO2, with minor contaminants. The recycle stream analysis taken at our recycle facility in early February showed an analysis of approximately 70 percent on that day of CO2 with methane being the next highest percent.

We've calculated then, based on the average February rates shown at the bottom of this table -- we've calculated the combined gas analysis

stream that we were injecting during the month of February. And we know that the CO2 content in that combined stream is -- or for February, at least, was greater than 95 percent. And we feel that this is representative of our current operation.

Q. Let's turn to Exhibit Number 18. Would you identify that display and describe its contents?

A. This is a table that shows the relationship of minimum miscibility pressure of our reservoir system versus CO2 impurities, if you will. It's important that the MMP of this combined CO2 reservoir oil system be less than the reservoir pressure, so that admissible development processes will develop as the CO2 moves through the reservoir. This table shows that the MCA reservoir accrued pressure in the order of 1140 pounds, which was determined from lab work done in our research lab.

This is comparable to the Phillips MMP that was reported in their hearing last year. We feel that the two reservoirs are very analogous, both of them being in the Grayburg-San Andres system and in the same geographic province, really.

Going down the column of CO2

n cubic feet per

day. That has incr

percent CO2, for instance, with a 10 percent methane

concentration.

We estimate the MMP for that particular system from some published correlations out of the referenced paper to be on the order of 1440 pounds. Again, this is consistent with the increases in MMP that the Phillips vacuum system recognizes for that type of contaminated CO2 stream.

The significance of this is that this is quite a bit lower than the MCA average reservoir pressure. We're seeing average pressures out there now on the order of 2500 pounds. Of course, our pressures in the injection well bore regions are even higher than that. So that we feel very comfortable with this relationship that we should not see any breakdown at all in our admissible displacement processes as we come down the CO2 purity, down to as low as 90 percent CO2 content.

And based on our laboratory work and projections, we do not see our combined stream analysis dropping below a 90 percent CO2 content.

Q. What is your opinion as a petroleum engineer concerning potential loss of recoverable hydrocarbons by the reinjection of the hydrocarbon gases back into the reservoir with this recycling

process?

A. Well, based on the effects, the relationships that we see here on MMP versus contaminated CO2 streams, there should be no loss at all. The reinjection of the produced hydrocarbon gases will not affect the existing displacement at all and it should not affect the recovery from this project at all.

Q. Will the reinjection of the hydrocarbon gases also provide or add to the miscibility process?

A. Yes. Essentially they are miscible with the reservoir crew.

Q. Has Conoco examined the economic feasibility of building or installing the necessary facilities so that you can market the hydrocarbon liquids and gases that are being produced and recycled now?

A. We have looked at it, not in any great detail as yet. Our Natural Gas Department has tentatively begun such a plan for 1992. The detailed economics of that plan have not been analyzed.

We have a similar CO2 project ongoing in western Texas, where they are planning a natural gas

liquids recovery plant later this year. And they want to look at the results of that before they commit to the investment required to build such a plant here at Maljamar.

18 if you will. The recycle requirement is sh the economics of a liquids recovery plant require significant gas throughput. We don't have that yet. We are considering it. The recycle facility has been designed to accommodate a liquids recovery plant in the future, if that looks like it's going to be economical.

Q. Has the past operation of reinjecting the produced hydrocarbons caused waste, in your opinion?

A. No, it has not.

Q. And has it impaired the correlative rights of any owners to the minerals?

A. No.

Q. Will the continuation of that process constitute waste in your opinion?

A. No, it will not.

Q. And will it potentially impair or violate the correlative rights of any of the owners?

A. No.

Q. When we turn to Exhibits 19, 20 and 21, what are we looking at in the exhibit book, Mr. Beamer?

A. Exhibit 19 is a copy of the letter of notification of this hearing to the attached mailing list, which is essentially all interested operators within one mile of our project area.

In addition to this list -- oh, and as well, the copy of the letter was sent to all working interest owners in the unit.

In addition, I understand that a copy was sent to the BLM and to the Commissioner of Public Lands.

MR. KELLAHIN: Mr. Examiner, Exhibit Number 22 is the supplemental certificate showing notices to the Land Office and the BLM.

That concludes my examination of Mr. Beamer, Mr. Examiner. We would move the admission of Conoco Exhibits 1 through 22.

EXAMINER MORROW: Exhibits 1 through 22 are admitted.

(Conoco Exhibits 1 through 22 admitted into evidence.)

EXAMINATION

BY MR. MORROW:

Q. Mr. Beamer, do you expect that the reinjected hydrocarbon gas will eventually be recovered, or will it be lost in the reservoir?

A. I would say a portion of it will be recovered. I can't tell you what percentage of that. As this process continues, of course, we will be recycling continuously and a good portion of recycle stream, or the fluid stream will continuously recycle through the reservoir. A portion of it at the very end of the unit, very likely will remain in the reservoir. But I don't know what percentage of that.

Q. How much oil do the six CO2 producers produce combined total production, do you have that approximate number?

A. We're talking in terms -- I don't have [illegible] of 90 mail that to you or call it to you.

Q. Okay. When it was necessary to burn the gas from the four wells that you talked about, was that coordinated with the Hobbs office; do you know?

A. Well that was coordinated through the gas plant and with --

Q. Excuse me just a minute. The Hobbs office of OCD is what --

A. I personally can't answer that, because I don't know. I would say that it conformed to the permits of the gas plant.

Q. Do you know how you account for the reinjected gas, the percent of CO2 on your production report, your monthly production report?

A. In terms of reporting to the state or --

Q. Yes, sir, both the injected volume and the amount of it that is hydrocarbon gas and the amount that is --

A. I don't know that breakdown is reported. We report total gas injected into each individual well. But I don't believe we report the percentage recycled.

Q. The gas produced from the waterflood area, that --

A. That continues.

Q. Does that continue to go through the Maljamar plant?

A. It does, yes.

Q. Twin injection wells on the Exhibits one, what -- tell me about those, if you would?

A. Specifically, sir?

Q. 33, 55 and 45. I wondered why you had two of them in one place?

A. 33 55 and 45 -- oh, that's in the waterflood injection area. I really can't answer that. I would suspect that one was a relatively recent -- well I know from the number that 33 55 was a relatively recent completion, as opposed to 45. I would suspect that it replaced that particular well. Although 45 shows it to be active, I can't --

EXAMINER MORROW: All right. I believe that's all the questions I had. Mr. Beamer, you may be excused.

THE WITNESS: Okay. Thank you.

MR. KELLAHIN: That's all we have.

EXAMINER MORROW: Case 6580 will be taken under advisement.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 6580 heard by me on April 18 1991.

Examiner
Oil Conservation Division

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

REPORTER'S CERTIFICATE

I, GAIL D. VINSON, CCR, a Certified Court Reporter and Notary Public, DO HEREBY CERTIFY that I

Our current gas production is relatively

ore

the Oil Conservation Division; that the foregoing is a true, complete and accurate transcript of the proceedings of said hearing so taken and transcribed under my personal supervision.

I FURTHER CERTIFY that I am not related to nor employed by any of the parties hereto, and have no interest in the outcome hereof.

DATED at Santa Fe this 20th day of May, 1991.

GAIL D. VINSON, CCR
Certified Court Reporter
CCR 297, Notary Public