BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
October 8, 1969

EXAMINER HEARING

IN THE MATTER OF:	
Application of Coastal States Gas Producing Company for special pool rules, Lea County, New Mexico.	Case No. 4222

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 4222.

MR. HATCH: Case 4222.

Application of Coastal States Gas Producing Company for special pool rules, Lea County, New Mexico

MR. HINKLE: Clarence Hinkle; Hinkle, Bonnard and Christy, Roswell, appearing on behalf of Coastal States and we have two witnesses I would like to have sworn.

MR. UTZ: Let me ask for appearances first. Do we have any appearances?

MR. LEACH: Yes, sir. My name is Guy Leach, and I am with the Oil Development Company of Texas, in Amarillo, and I also represent Santa Fe-Pacific. And I have come to observe the proceedings, and I may want to make a statement later.

MR. UTZ: And what was the other company besides Santa Fe-Pacific?

MR. LEACH: The Oil Development Company of Texas.

MR. UTZ: All right. Swear the witness.

(Witness sworn.)

CARROLL STATON

the witness, called by Mr. Hinkle, having first been duly

upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HINKLE:

Q. State your name, residence and by whom you are employed?

A. My name is Carroll Staton, employed by Coastal States Gas Producing Company, in Midland, Texas, as senior geologist.

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

A. Yes, sir, I have.

Q. Your qualifications as a geologist are a matter of record with the Commission?

A. They are.

Q. Are you familiar with the application of Coastal States in Case 4222?

A. Yes, sir, I am.

Q. What is Coastal States seeking to accomplish?

A. We are seeking to get special field rules for the West Sawyer-San Andres Field of northern Lea County, New Mexico, which will provide for eighty-acre spacing, eighty-acre allowables and special patterns of well locations.

Q. Have you made a study of the West Sawyer-San Andres pools?

A. Yes, sir, I have.

Q. You are familiar with all the wells that have been drilled in that area?

A. Yes, sir, I am.

Q. And also the surrounding area?

A. Yes, sir.

Q. Have you prepared or has there been prepared under your direction certain exhibits for introduction in this case?

A. Yes, sir.

Q. Refer to Coastal States Exhibit Number One and explain what that is and what it shows?

A. Exhibit Number One, designated in the lower right-hand corner of the title block is the West Sawyer, contoured on the Pi marker, contoured interval, twenty-five feet, is a structural map, showing the West Sawyer-San Andres Field and the surrounding areas of the northeastern Lea County, New Mexico.

As presently defined, the structural configuration of this field, as shown on this exhibit, is one of a gently plunging knolls, plunging in a southeast direction at a rate

of approximately fifty feet per mile.

The West Sawyer Field is separated from the Sawyer and San Andres Field, the nearest producing area from the equivalent --

Q. And the Sawyer is the one in the north --

A. Northeast part of the Exhibit One, yes.

MR. UTZ: Excuse me a moment. Do you need a set of the exhibits to look at?

MR. LEACH: I would appreciate it.

Q. (By Mr. Hinkle) You have testified that this contoured on a Pi marker. What is a Pi marker?

A. The Pi marker is a structural marker that exists in the San Andres Dolamite section, approximately one hundred and fifty feet from the so-called slaughter pay -- it's a stratographic feature that carries for wide distances and is a well recognized -- correlation marker, that provides a tool to contour these areas on a structural pattern.

Q. It's commonly used in contouring the San Andres?

A. That's right. It's a better marker than the top of the San Andres, for example, in that it is nearer to the pay.

Q. All right, go ahead.

A. The Sawyer Field that we have discussed is the

nearest -- San Andres production to the West Sawyer-San Andres Field, and as you can note on Exhibit One, the horizontal distance from the West Sawyer Field is approximately three miles and there are dry holes on the southwest part of the Sawyer Field that show that we have a separation of the producing areas.

Now, future development of the area will probably reduce the horizontal distance but the connection of the two fields is not expected in light of what we presently know.

Also shown on Exhibit One is the ownership of the leaseholder interest in an immediately around the West Sawyer-San Andres Field.

Coastal States Gas Producing Company, their leasehold interests are shown by the yellow coloration.

The discovery well of the West Sawyer-San Andres Field, in Coastal States Number One Santa Fe, located in the southwest quarter of the southwest quarter of Section 33 of Township 9, Range 37 East, is indicated by the red dot.

Q. Does this also show other wells that have been drilled?

A. Yes, it does. At the present time Coastal

States Gas Producing Company has drilled and completed five wells in the West Sawyer-San Andres Field, and of these five wells, four are presently producing oil at varying rates and one has been converted to a salt water disposal well.

Q. Which one is that?

A. The salt water disposal well is the Number Two Santa Fe, in the southeast quarter of the northwest quarter of Section 33, as you will designated on Exhibit One, it's shown as a producer, with a -- with an arrow, and designated "SWD" for the salt water disposal well.

Q. Has any other company drilled any other wells in this area except Coastal States?

A. Sun has drilled a well to the field pay in the southeast quarter of the northeast quarter of Section 32 -- this well is down, casing has been run and various tests have been run on the well, but no completion has been filed at the present time.

Q. I notice that a location has been shown in the northwest quarter of Section 4 --

A. This location is in the southeast quarter of the northwest quarter of Section 4 of ten south, Range 37 east -- that is the Number One Federal Four -- Coastal States

has run pipe on that well, and is presently attempting completion.

And in addition, a well located in the northwest quarter of the southeast quarter of Section 33 -- the Number Three Santa Fe is actively drilling at the present time.

Q. By Coastal States?

A. Yes, sir, by Coastal States.

Q. And does it look like the well in the northwest of Section 4 will be a producing well?

A. Core analysis of the pay section and the Number One Federal Four would tend to indicate that it is capable of producing.

We have run pipe and we will make additional attempts to complete it at the present time.

Q. Are these wells producing any water at the present time?

A. Mr. McGraw will testify of the specific nature of the fluid production; I understand they do make water.

Q. Do you have any further comments with respect to Exhibit One?

A. No, sir.

Q. Now, refer to Exhibit Number Two and explain what that shows?

A. Exhibit Number Two is entitled "A Diagrammatic Cross Section of the West Sawyer-San Andres Field", and is an additional tool to show the third dimension of these same -- when we present the geology of an area, we are limited to illustrating it on the basis of two dimensions -- this is merely a section hung on a sub-sea point of minus five hundred, as you will notice on Exhibit Two, showing the regional or the correlations across the area of the West Sawyer-San Andres Field.

As you will notice on the insert location plat, these wells are numbered, as they are numbered above each of the log sections pertaining to the individual wells -- it's not a section that goes across in a particular manner, but it's a matter of locating the wells with relationship to their sub-sea point.

Q. This includes all of the wells?

A. All of the wells in the area, yes, sir.

Q. Now, what does this show in effect?

A. It shows that the zone of porosity, in the San Andres, that is productive, in the West Sawyer Field, is laterally equivalent over the area, that there is a possibility

that the porosity pinch-out in the west direction are an indication that in the up-dip direction to be -- possible gas cap does exist.

Q. Does it show a continuity of the pay section throughout the present limits of the West Sawyer Pool?

A. Yes, it does.

Q. Do you have any trouble correlating the pay zone in these different wells?

A. No, sir. As you will notice, the Pi marker that we have referred to is a point that carries across the area of the wells -- the West Sawyer-San Andres Field well and, particularly, on this cross section and the pay porosity probably would be equivalent to the slaughter zone as it has been defined elsewhere in New Mexico and west Texas, is similarly shown to be existing over the area of the West Sawyer-San Andres Field.

Q. Does this cross section indicate that the pool is based on structure or as a stratographic trap?

A. The structure is of very little consequence -- it's a matter of a trap being existence by virtue of an up-dip porosity pinch-out -- which is stratographic in nature.

Q. Do you have any further comments with respect to this?

A. No, sir.

MR. HINKLE: We would like to offer in evidence these exhibits.

MR. UTZ: Without objection, Exhibits One and Two will be entered in evidence.

(THEREUPON, Applicant's Exhibits One and Two, inclusive, were admitted into evidence.)

MR. HINKLE: That's all of the direct of this witness.

CROSS EXAMINATION

BY MR. UTZ:

Q. Mr. Staton, what does this Exhibit Two show with regard to the gas cap situation that you spoke of?

A. It shows on the left of the diagrammatic cross section that a well drilled by Tenneco, in Section --

Q. Six?

A. Six, Township 10 south, Range 37 east, Number One on the cross section was completed as a gas well with a potential calculated absolutely open flow of one and a half million cubic feet per day.

This well did not produce for any length of time, and has been subsequently abandoned.

Q. That is the only well that has encountered substantial gas?

A. I understand that the Sun Company in Section 32 is producing hydrocarbonates with a high GOR.

Q. That's not one of the wells on the --

A. It is on the cross section -- no, I beg your pardon, sir. It is not on the cross section, because the log of the well has not been released to the industry.

MR. HINKLE: That's the one that is in the process of being completed at the present time?

THE WITNESS: Yes, sir.

Q. (By Mr. Utz) Do you know what kind of a test they got on this well?

A. I've heard reports that the GOR is as high as forty thousand has been experienced.

Q. And there is a possibility that this might be an associated pool?

A. I haven't considered that at the moment, to this time.

Q. But you will consider future evaluations of the pool?

A. Yes, sir. As Mr. McGraw will testify, our oil production is -- with GOR is approximately five hundred to one.

Q. Mr. McGraw will testify as to the pool rules?

A. As to what we would hope for.

Q. What you are asking for in the pool rules?

A. Yes, sir.

MR. UTZ: Any further questions of the witness?

I might mention this location down here, in Section 4 --

A. Yes, sir.

Q. (By Mr. Utz) You are not drilling that yet?

A. We are down -- pipe has been run.

Q. Otherwise?

A. And it's possible that this morning we have perforated it. But we have also stated the location in Section 33 in the northwest quarter of the southeast quarter, which does not appear on this plat, by virtue of its having been staked -- and the rig skidded from the Federal Four -- in drilling over the weekend, and I didn't have an opportunity to put that on -- but the well is active in the northwest southeast of Section 33 -- the Number Three Santa Fe.

Q. I believe you mentioned at the beginning of your testimony another San Andres pool; was that the Sawyer?

A. Yes, the Sawyer, which is principally gas production.

Q. It was your testimony that to the best of your knowledge at the present time there is no connection between the two?

A. The field is separated by a horizontal distance of some three miles and by dry holes on the southwest part of the Sawyer Field.

MR. UTZ: Any further questions of the witness? You may be excused.

MR. HINKLE: The next witness is Jack McGraw.

(Witness sworn.)

JACK McGRAW

the witness, called by Mr. Hinkle, having first been duly sworn upon his oath was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HINKLE:

Q. State your name, residence and by whom you are employed?

A. My name is Jack McGraw, and I work for Coastal States Gas Producing Company in Midland, Texas, as a divisional petroleum engineer.

Q. Have you previously testified before the Oil

Conservation Commission?

A. Yes, I have.

Q. And your qualifications as a petroleum engineer is a matter of record with the Commission?

A. Yes, sir.

Q. Are you familiar with the West Sawyer-San Andres Pool?

A. Yes, sir, I am.

Q. Have you made a study of that area?

A. Yes, sir.

Q. And of all the wells that have been drilled?

A. Yes, sir.

Q. And are you familiar with the production and history of all the wells?

A. Yes, sir.

Q. Have you prepared or has there been prepared under your direction certain exhibits for introduction in this case?

A. Yes, sir, I have. Exhibit Number One --

Q. Number Three --

A. I mean, Number Three -- excuse me. Exhibit Number Three is a plat of the field, and also shown on this plat underneath or near the well location is the initial bottom hole pressure of each well that was completed in the reservoir.

As has been previously testified, the West Sawyer-San Andres Field was discovered by Coastal States with completion of our Santa Fe Number One, located in the southwest quarter of the southwest quarter of Section 33, Township 9 south, Range 37 east.

This well was completed through perforations at forty-nine forty-four to fifty, fifty-three to sixty, and sixty-five to sixty-eight.

It was potentialed on comp for one hundred and sixty-nine barrels of oil and eighty-six barrels of water per day, on January 14, 1969.

At this time, a bottom hole pressure bomb was run in the hole immediately after completion of the well, prior to running the pump.

The well was shut in for seventy-two hours, and we feel like we got the static reservoir pressure, the initial static reservoir pressure, in the reservoir -- it was fifteen hundred and sixty pounds at that time.

Since the completion of the Santa Fe Number One, the following wells have been completed:

The Santa Fe Number Two, which is in the southeast quarter of the northwest quarter of Section 33, Township 9, Range 37 east -- it was completed in March, March the 10th,

1969 -- potential for ninety-two barrels of oil and ninety-two barrels of water per day.

Now this well experienced a severe pressure decline -- a production decline, and was later, along about August, was converted to a salt water disposal well in the lower San Andres zone, below the producing interval.

The bottom hole pressure on this well was attempted, but was not obtained properly, due to a pressure leak at the surface. It leaked off the pressure and it didn't record it properly.

The next well drilled was the Ad Long Number One, in the northwest quarter of the northeast quarter of Section 5, Township 10 south, Range 37 east, and was completed on April the 8th, 1969, potential for sixty-three barrels of oil and ninety-five barrels of water pumping.

The initial static reservoir pressure in this well was fifteen twenty-seven, taken on April the 8th.

The next well was the State Sawyer Number One, located in the northwest quarter of the northeast quarter of Section 4, Township 10 south, Range 37 east. It was completed on June the 25th, 1969, at a potential for two hundred and twenty barrels of oil and seventy-four barrels of water pumping.

The initial static reservoir pressure in this well was fifteen eighty-five.

The next well drilled was the Marr Number One in the southeast quarter of the southeast quarter of Section 33, Township 9 south, Range 37 east. -- completed on September the 10th, 1969, potential for ninety-five barrels of oil and ten barrels of water pumping.

The initial reservoir pressure in this well was fourteen seventy-two, approximately one hundred pounds less than the initial pressure in the Santa Fe One.

The Sun Oil Company well was completed or was drilled following this, however, a completion has not been filed on the well.

Q. The information was not available?

A. It was not completely available -- they have not revealed certain test information to us on this well.

Q. What is the drop-in pressure there between the well located in the southeast and southeast thirty-three and the initial test well indicate, if anything?

A. Of course, this is very early in the life of the reservoir, and there are certain inaccuracies in bottom hole pressure bombs. However, we feel that this is a significant pressure difference and it indicates a trend that

will be very evident as time goes on, if it, in effect, is indicating what we think that it indicates.

Q. Would that also indicate that it will drain a wide area?

A. Yes, that drainage in the area is over an extensive area.

Q. Do you have any further comments with respect to this exhibit?

A. No, sir.

Q. How does this field compare with other San Andres Pools in Lea County and in Roosevelt County?

A. We feel that the West Sawyer Field is comparable, at least in depth, in oil gravity, in reservoir characteristics, to several of the other major San Andres Fields in north Lea County, southern Roosevelt County, and in portions of Chaves County.

Namely, these fields are the Flying "M" San Andres Field, which is located about twenty miles to the west, the Chaveroo-San Andres Pool, which would be about twenty-five miles northwest; and the Cato-San Andres Field, which is about another forty miles west.

Q. Is there eighty-acre spacing in the proration units of the Flying "M"?

A. Yes, sir. The pressure trend that we see in this field is similar to what we noticed in the early life of the Flying "M" Field, and at that time further pressure information was obtained and eighty-acre spacing was obtained for the Flying "M"-San Andres Field.

Also following the obtaining the eighty-acre spacing for the Flying "M"-San Andres Field, the Todd-San Andres Field, which is about fifteen miles northwest of the West Sawyer Field, also obtained eighty-acre spacing for the San Andres.

Q. Do you know of any studies that have been made to compare these pools, as far as their characteristics and range factors are concerned?

A. Yes, sir. There was recently a technical article published and I will refer to that in just a moment.

The current pressure trend in the West Sawyer Field indicates that one well will drain in excess of eighty acres.

The same trend was noticed in the early life of the Flying "M" Field, and after additional development had taken place, drainage was clearly demonstrated.

In July, 1965, permanent field rules were established in the Flying "M" Field, designating eighty-acre

spacing, with eighty-acre allowables, for the San Andres formation.

Following this, eighty-acre spacing was also established in the Todd-San Andres Field of southern Roosevelt County.

After the rather exceptional drainage radius of a given well in the Flying "M"-San Andres Field had been clearly and definitely established, several other operators, including Pan-American Petroleum Corporation, who was actively engaged in developing the Chaveroo and Cato-San Andres Fields, in the same general area, set out to determine the effective drainage radius of a well in each of these fields.

A technical paper was published by Mr. D. L. Groves, and Mr. B. F. Abernathy, with Pan-American Petroleum Corporation, reporting the results of interference tests that were conducted by them in the Chaveroo and Cate-San Andres Fields of New Mexico. And also the Dean Wolfcamp Fields of Rincon County, Texas.

The title of the paper is "Early Analysis of the Fractured Reservoirs Compared to Later Performance."

The paper was presented at the forty-third annual fall meeting of the Society of Petroleum Engineers, of A.I.M.A., in October, 1968.

The paper is rather lengthy, but I would like to quote from one paragraph of the abstract.

I quote -- "The ability to drain areas considerably larger than current well density has been proven in the three fields studied by production and pressure data. In the Chaveroo Field, drainage of greater than eighty acres was proven with pressure data. Interference tests in the Cato Field, indicated drainage of six hundred and forty acres per well. These three pays -- plays will be economically unattractive due to excessive drilling.

In the future, economic failure in this type of reservoir can be avoided or reduced by applying the techniques discussed in this paper in selecting a well density, which will be economically attractive" -- unquote.

Q. Do you have any further comments with respect to Exhibit Three?

A. We certainly feel that this West Sawyer-San Andres Field falls into this category.

Q. Now refer to Exhibit Four and explain that to the Commission?

A. Exhibit Number Four is a graph showing the total field production history to date.

It also shows the time that each well was completed

and the effect of completing the well on the total field performance.

Q. Any further comments with respect to this exhibit?

A. No, sir. Not at this time.

Q. Have you had made an economic study of this area?

A. Yes, sir. We have. This particular field -- we have been dealing with the San Andres in north Lea County and Roosevelt County for some time and so we decided, when we first started developing this field, that we would get a reservoir data, so we do have a PVT analysis on the reservoir fluid, we have cored every well that we have completed, and we do have good reservoir information.

Exhibit Number Five shows the average reservoir characteristics from core data, and from our PVT analysis of the reservoir fluids.

Exhibit Five also shows the economic evaluation, based on a forty-acre density, and eighty-acre well spacing.

Q. What does this show to the porosity --

A. The average porosity from core analysis, so far, is eight point two percent.

The water saturation is thirty-five percent, the formation volume factor, from PVT data is one point two four two.

The recovery factor is estimated from experiencing Flying "M" and other San Andres Fields, to be twelve point five percent.

The net pay is approximately twenty feet.

Then, we go into economic factors, which includes the price of the oil, which is two seventy-eight per barrel, trucking charge of nine cents, operating costs, including salt water disposal cost, taxes and so forth, of about fifty cents a barrel.

This leaves a net working interest income of approximately one dollar and sixty-eight cents.

Q. Does this indicate the recoverable oil in place per acre?

A. Yes -- in utilizing the core data and the recovery factor, we have calculated eight hundred and thirty barrels per acre of recoverable oil.

This is also in agreement with the previously mentioned technical paper, that was presented on the Cato and the Chaveroo Fields.

Q. What about the estimated recovery on the forty- and eighty-acre basis?

A. We feel that based on this information, the recovery for a forty-acre well will be thirty-three thousand

two hundred barrels.

This would yield a total net income of fifty-six thousand dollars. The development costs, per well, has averaged sixty thousand dollars in the area.

Therefore, a ratio of income to investment of less than one or less than pay out will be achieved on forty acres.

However, on eighty acres, we will receive an acceptable pay out condition.

Q. Which is one point eight six?

A. One point eight six, yes.

Q. Would your company consider drilling a well on each forty acres in this area?

A. No, sir, we would not.

Q. In view of this economic study?

A. Yes, and the development to date has been on eighty-acre development patterns.

Q. Do you have any recommendations to make to the Commission with respect to the adoption of special pool rules?

A. Yes, sir. Coastal States is requesting temporary field rules, designating eighty-acre spacing with eighty-acre allowables.

We are further requesting that each well be located

in the northwest quarter or the southeast quarter of a governmental quarter section, and that all wells be located within two hundred feet of the center of a governmental quarter quarter section.

Now, there is one exception to this. The initial well, the discovery well within the field, was drilled off the -- off this pattern and we would like to ask that this well be granted an exception to the rules, but that all additional wells drilled in the pool adhere to these spacing rules.

MR. HATCH: Which well was that?

THE WITNESS: The Santa Fe Number One in the southwest of the southwest of thirty-three.

Q. (By Mr. Hinkle) That's the discovery well?

A. That's the discovery well, yes.

Q. You are asking for temporary field rules?

A. Yes, sir. We would like to get temporary field rules for one year, during which time we will gather additional information to prove conclusively that one well will drain in excess of eighty acres.

Q. Do you contemplate that Coastal States will drill additional wells during this one-year period?

A. Yes -- if these spacing rules are adopted, we will

continue our development in the area, as long as we are able to make a -- to make an economical well.

Q. In your opinion, will the adoption of special field rules along the lines you've recommended be in the interest of conservation and the prevention of waste?

A. Yes, sir -- very definitely.

Q. And it will tend to promote the greatest ultimate recovery of oil and gas?

A. Yes, sir.

Q. When you filed this application, did you notify all of the offset owners in the area?

A. Yes, sir. We -- as the Commission probably remembers, filed for this case I think about four months ago, and notified everyone at that time.

And then, following that, we drilled the two poor wells, which is the Santa Fe Number Two, which we have later converted to salt water disposal; and the Ad Long Well and we decided, after drilling those two, that maybe we didn't need any rules -- but we did finally get started to drilling again and began to get better wells, and so, we filed the case and renotified all of the operators in the area and have discussed it with them.

Q. Do you have waivers from any of the operators?

A. Yes, we have waivers from Bell Petroleum and also I was told by phone that we have one from Sun in our office this morning.

Q. Where does Bell have acreage?

A. Bell's acreage is in Section 5 -- the south half -- most of the south half of Section 5.

Q. And where is the Sun acreage?

A. The Sun acreage is in the thirty-two -- the northeast quarter.

Q. Let me get those letters --

A. I just have the one.

MR. HINKLE: We would just like to file with the record the statement from the Bell Petroleum Company.

Q. (By Mr. Hinkle) Do you have any further comments with respect to any of these exhibits?

A. No, sir -- not at this time.

MR. HINKLE: We would like to offer Exhibits Three, Four and Five in evidence.

MR. UTZ: Without objection, Exhibits Three through Five will be entered into the record of this case.

(THEREUPON, Applicant's Exhibits Three through Five, inclusive, were duly admitted into evidence.)

MR. HINKLE: That's all the direct I have.

CROSS EXAMINATION

BY MR. UTZ:

Q. At the present time, Mr. McGraw, you have four producing wells?

A. Yes, sir, that's true.

Q. Now, I understood that one of them was pumping; are they all pumping?

A. Yes, sir -- all are pumping.

Q. What kind of GOR's do you have on these wells? Do you have a record of that?

A. Yes, sir, we do. I do not have it in the form of an exhibit, but I guess our ratios -- when we run our PVT data, we put a tester on the Santa Fe Number One, the discovery well, and we got a real accurate production test and gas-oil ratio. And the gas-oil ratio on that was five hundred and sixty-three cubic feet per barrel.

Now, since that time, there is not a gas market in the area, so casing head gas is flared, but we measure it periodically, and it appears to be -- still appears to be in the five hundred range.

Q. Is that the only well you have a GOR on?

A. Yes, sir -- that I could report to you.

Q. How much does that well produce in oil?

A. The Santa Fe One?

Q. Yes.

A. About fifty to fifty-five barrels a day at this time.

It also makes about fifty to fifty-five barrels of water per day.

This is also approximately true with the State Four Number One in the northwest of the northeast of Section 4, and the Marr Well -- they all seem to be -- at least, the wells that are economically attractive will level off around fifty barrels a day -- although, some of them produce quite a bit more than this for the first month or so.

As you can see, if you look at Exhibit Four, you can see that completing the Ad Long and the Santa Fe Two did not change the field producing rate appreciably --

Q. Yes --

A. However, when the Sawyer State Number One was completed, then we went up to an additional fifty to sixty barrels a day -- seventy barrels a day.

The curve does not reflect the Marr Well production -- it wasn't available at that time.

Q. What's the point one two five and your volumetric calculations?

A. This is our recovery factor.

Q. Well, I just couldn't see it --

And you testified that that was about a normal recovery factor for the pools in this area?

A. Yes, sir. It has proven to be for the Flying "M"-San Andres Field, which has somewhat better permeability characteristics in this field.

The primary recovery there is going to be pretty close to that. However, if we do have the Flying "M" under secondary -- under pressure maintenance operations -- now, and practically, all the primary has been recovered.

Q. Do you think this field will lend itself out to secondary recovery?

A. This is one of the reasons for asking for the fixed well spacing.

We feel that if it is developed in an orderly manner, that we will definitely try to recover some secondary oil from the reservoir if it does continue to develop and we can see enough total oil in place to justify the initial expense.

MR. UTZ: Any further questions of the witness? You may be excused.

Do you have any further testimony?

MR. HINKLE: That's all we have.

MR. UTZ: Any statements?

MR. LEACH: Yes.

MR. UTZ: You have a statement?

MR. LEACH: Yes, sir.

MR. UTZ: All right, sir.

MR. LEACH: My name is Guy Leach, and I am, I guess, a senior geologist, with the Oil Development Company of Texas. And I also represent Santa Fe Railroad Company.

And we own undeveloped, adjacent leases and mineral in the West Sawyer-San Andres Field.

We are generally in agreement with Coastal States' application. However, due to the present small amount of development, we respectfully request the Commission to allow as much flexibility as possible within the framework of the eighty-acre unit, in locating the future wells.

We believe that this flexibility will protect the correlative rights and the operators and mineral owners.

Thank you.

MR. UTZ: Any other statements?

The case will be taken under advisement.

(WHEREUPON, the hearing stood in a brief recess)

I N D E X

E X H I B I T S

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, CA FENLEY, Court Reporter in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand this 20th day of November, 1969.

CA FENLEY - COURT REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4222 heard by me on Oct. 16, 1969.

New Mexico Oil Conservation Commission, Examiner

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
September 30, 1970

EXAMINER HEARING

IN THE MATTER OF: Case 4222 being reopened pursuant to the provisions of Order No. R-3850, which order established 80-acre spacing units for the West Sawyer-San Andres Pool, Lea County, New Mexico, for a period of one year.	Case No. 4222

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

MR. NUTTER: Call Case 4222.

MR. HATCH: Case 4222. In the matter of Case 4222 being reopened pursuant to the provisions of Order No. R-3850, which order established 80-acre spacing units for the West Sawyer-San Andres Pool, Lea County, New Mexico, for a period of one year.

MR. HINKLE: Clarence Hinkle, Hinkle, Bondurant, Cox and Eaton, appearing on behalf of Coastal States Gas Producing Company. Mr. Examiner, we have one witness, Jack McGraw, who previously testified in the original hearing in October of 1969, in connection with these special pool rules.

Jack will give some engineering information and then the Oil Development Company is also interested in this area. In fact, the Oil Development Company and Coastal States own practically all of the wells in the pool and Oil Development will go ahead then and give some information with respect to the geology and some further information in support of Coastal States recommendation that these rules be continued in effect.

(Witness sworn.)

(Whereupon, Coastal States Exhibits 1 through 5 were marked for identification.)

JACK McGRAW

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, your residence and by whom you are employed.

A My name is Jack McGraw. I work for Coastal States Gas Producing Company as division petroleum engineer in Midland, Texas.

Q Have you previously testified before the Commission?

A Yes, I have.

Q And your qualifications as petroleum engineer are a matter of record with the Commission?

A Yes, they are.

Q Did you testify originally in connection with this case in October of 1969?

A Yes, I did.

Q Have you made a continuing study of this area --

A Yes, sir.

Q -- since that time? Have you prepared or has there been prepared under your direction certain exhibits

for introduction in this case?

A Yes, sir, they have.

Q Refer to Exhibit 1 and explain what this is and what it shows.

A Exhibit 1 is a plat showing the field as it now exists. At the time of the last hearing there were 6 wells either producing or in the process of completing. Since that time, 8 wells have been drilled and completed, 3 by Coastal States and 5 by Oil Development Company of Texas.

Two dry holes were drilled in Section 8 and 9 approximately one mile south of the existing production. At the present time, Oil Development Company has 3 locations staked, 1 in the northwest quarter of the northwest quarter of Section 33, 1 in the northwest quarter of the southeast quarter of Section 28 and the third 1 in the southeast quarter of the northwest quarter of Section 34.

This plat also shows the bottom hole pressures as measured by an Amerada bomb in several of the wells. This pressure was measured in most cases on the wells immediately after completion and after a 72 hour build-up.

Q Do you have any further statement with respect to Exhibit 1?

A No, sir, not at this time.

Q Refer to Exhibit 2 and explain that.

A Exhibit 2 is a graph of the total field production. This graph shows that -- it also shows the completion date of each well. The field was discovered in January of '69 and is presently producing at the rate of 13,692 barrels of oil per month. Cumulative production to 8-1-70 is 128,362 barrels.

Q Now, refer to Exhibit 3; explain that.

A Exhibit 3 is a plat showing the structural position of each well and its current producing rate in both oil and water. Also shown is the present producing gas-oil ratio for each well.

If you study this map, you will note that the producing gas-oil ratio does appear to be a function of the structural position of the well. The 2 wells that are located at or above the minus 775 contour line are producing at high gas-oil ratios.

Coastal States Adlong Number One in the northwest quarter of the northeast quarter of Section 5 and Sun Oil **Company's** State One S located in the southeast quarter of the northeast quarter of Section 32, both these wells have in the neighborhood of 7,000 to 1 gas-oil ratios, Coastal's

Well having 7100 and Sun's having 7400.

Q Would that indicate a gas cap or presence of a gas cap near it?

A Yes, it does tend to indicate this.

Q What are the contours drawn on, what formation?

A This map is contoured on the Pi marker which is approximately -- this is a geologic marker that is commonly used to contour on in this area and it's approximately 200 feet above the pay zone.

MR. NUTTER: Mr. McGraw, I am missing the contour intervals.

THE WITNESS: Yes, sir. You might notice one of them is minus 725, the furthest one to the -- they are at 25-foot intervals. Minus 750 and then minus 775.

MR. NUTTER: Okay. Fine. Thank you.

THE WITNESS: You might also note that Oil Development Corporation's Number Four Well, which is in the northwest quarter of the northeast quarter of 33, is near this line and it produces with a 2180 GOR. All other wells have very low gas-oil ratios. In fact, some of them too small to measure, but they range from 100 to 350.

MR. NUTTER: Do you see any correlation of water production in the structural position here?

THE WITNESS: Yes, sir, some. Well, for instance, the figure that is shown on the map, the first number shown is the oil rate and the second number shown is the water rate in barrels per day and you might notice the Oil Development Corporation Well in -- well, the one east of Section 33 there is producing 39 barrels of oil and 150 barrels of water per day.

MR. NUTTER: That's about the lowest well structurally.

THE WITNESS: About the lowest. Some of these other wells at one time may produce more water than they do now. The water has descreased to some extent.

MR. NUTTER: I see.

Q (By Mr. Hinkle) Do you have any further comments with respect to Exhibit 3?

A Well, I might add that this indicates that possibly a gas cap exists up-dip in the reservoir. Completion information on the Sun Well in Section 32 further substantiates this theory.

Their well is presently producing from perforations at 4975 to 79 which is the very bottom of the productive interval and they did this in order to avoid having a higher gas-oil ratio. The well had previously been perforated at

4917 to 46 which is the comparable interval that other down-dip wells are producing from and at that time their well had a gas-oil ratio of 42,900 to 1.

MR. NUTTER: What is that interval, 4917 to what?

THE WITNESS: To 46.

MR. NUTTER: And the GOR was --

THE WITNESS: 42,900. This will be a little better -- more information will be presented on this later in the geologic testimony.

A cross section will be presented which will show the normal completion interval in the area.

Q (By Mr. Hinkle) Okay. Refer to Exhibit 4.

A Excuse me. This zone was -- in Sun's Well, this zone was squeezed off and the well is presently producing from the lower zone. A reservoir fluid study I conducted on a sample from Coastal States Santa Fe Number One indicated the northwest quarter of the northeast quarter of 33, is near this line and it produces with a 2180 GOR. All other wells have very low gas-oil ratios. In fact, some of them too small to measure, but they range from 100 to 350.

MR. NUTTER: Do you see any correlation of water production in the structural position here?

Commission.

A Exhibit 4 is a data sheet showing the volumetric calculations and economics for both the 40-acre development plan and an 80-acre development plan. With the rock and fluid properties shown, the estimated recovery for a 40-acre location is 33,200 barrels. For an 80-acre location, 66,500. With the operating costs and development costs shown a pay out cannot be achieved on 40 acres. A ratio of income to investment of 1.57 can be achieved on the 80-acre location.

Q You use a recovery factor of twelve and a half percent. Where does that come from?

A This is a factor that is used for San Andres reservoirs in this area and it has been used by us in other reservoirs.

Q Pretty uniformly. Any further comments with respect to 4?

A Not at this time.

Q Refer to Exhibit Number 5.

A Exhibit Number 5 is a graph of the producing rate of Coastal States Santa Fe Number One Well. This is the discovery well in the field.

This graph shows that the well has accumulated

28,668 barrels to 9-1-70, and has established approximately a 30 percent per year decline. If this well continues to decline at this rate, it should recover an additional 37,000 barrels for a total recovery of 65,668 barrels. This is almost 100 percent of that calculated to be recoverable for an 80-acre location by volumetric calculation.

Q The amount that actually has been produced as shown by Exhibit 5 is substantially the amount of oil which you estimate to be in place and producible from 40 acres, is it not?

A Yes, sir. It has already recovered 85 to 90 percent of that calculated to be recoverable from 40 acres.

Q Would this tend to indicate that one well, then, would drain more than 40 acres?

A Yes. We feel this indicates that the better wells in the field are draining in excess of the 40-acre location.

Q Have you conducted any interference tests to determine the drainage factors in this area?

A Yes. An attempt was made to conduct an interference test in the field. Three of the better wells were pulled and bottom hole pressure bombs were run. A 72-hour

build-up was obtained on the following wells: Coastal States Santa Fe Number One, the discovery well and Coastal States Santa Fe Number Three which is in the northwest quarter of the southeast quarter of Section 33 and Oil Development Company's Santa Fe Number One which is in the southeast quarter of the southwest quarter of Section 33.

You will note that this includes the oldest well in the field and consequently the one with the highest cumulative recovery. The Santa Fe Number One was about 28,700 barrels and also a relatively new well with much less cumulative recovery.

Oil Development Corporation Santa Fe Number One has accumulated approximately 6,000 barrels. Coastal States Santa Fe Number Three was also chosen because it is relatively a good producer and has accumulated a substantial amount of oil approximately 28,000 barrels also.

It was our opinion that by selecting these wells and obtaining the static reservoir pressure in each well that if one well can drain an excess of 80 acres, the bottom hole pressure in each well will be influenced by the production from the offset wells and consequently the static reservoir pressure would be approximately equal even though the recoveries from each of these wells was vastly different.

The following information was obtained. The bottom hole pressure on Coastal States Santa Fe Number One was found to be 477 pounds after 72 and a half hours and it was still building at the rate of 3 PSI per hour. Bottom hole pressure on Coastal States Santa Fe Number Three was 575 pounds after 73 hours and it was still building at the rate of 4 PSI per hour.

The bottom hole pressure on the Oil Development Company's Santa Fe Number One was 264 PSI after 70 and a half hours and it was still building at the rate of 2 PSI per hour.

After we graphed this pressure build-up data, we found that we could not extrapolate it to the static reservoir pressure with any degree of accuracy because we had not left the bombs in the hole long enough.

It was determined that from 7 to 30 days would be required to get reliable data and since these 3 **weeks** contribute a large portion of the production from the field and this production could not be made up, it was not feasible to obtain the necessary data for reliable information.

It is our opinion that the recoveries obtained to date from the better wells indicate they have almost produced that oil calculated to be recoverable from 40 acres

by volumetric calculations and that if they continue at the indicated decline rate they will recover that calculated to be recoverable from 80 acres.

It is, therefore, our opinion that one well will efficiently and effectively drain 80 acres in this reservoir.

Q From your study of the West Sawyer Field and all the information available, could you recommend that you go back now and put a well on each 40 acres?

A No, sir. I could not recommend to my management that we drill the inside locations at all.

Q What are your recommendations to the Commission with respect to continuing the special pool rules?

A It is our recommendation that the Commission make the temporary field rules permanent.

MR. HINKLE: We would like to offer in evidence Exhibits 1 through 5.

MR. NUTTER: Coastal States Exhibits 1 through 5 will be admitted in evidence.

MR. HINKLE: Do you have anything else?

THE WITNESS: No, sir.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. McGraw, if you have indicated that you have

gotten 40-acre production to date using your volumetric calculations that could indicate that your 80-acre drainage pattern is effective or it could indicate that your recovery factor is going to be higher than your twelve and a half percent either one, isn't it?

A Yes, sir, it could.

Q And you have no conclusive evidence at this time as to interference or draw downs from one well to the other?

A That's true, we do not.

Q How can you then make a recommendation that these pool rules be made permanent?

A Because with these rock characteristics, I do not believe that we could have a higher than -- recovery factor than is normally recovered from better quality San Andres rock in the area.

Q You think twelve and a half percent is the maximum for the San Andres?

A I certainly do.

Q I think you will find some San Andres reservoirs that produce up to as high as 30 percent --

A Yes, sir, that is true.

Q -- in Southeast New Mexico. Mr. McGraw, has any indication other than these high GOR's that you find as you

move up structure, is there any other indication that there's a gas cap? Are there any gas wells farther to the northwest up here?

A No, sir. This will be pointed out in later geologic testimony.

Q I see.

MR. NUTTER: Are there further questions of Mr. McGraw? He may be excused.

(Witness excused.)

MR. NUTTER: Call your next witness, please.

MR. PAULANTIS: J. T. Paulantis, Iden and Johnson, 1220 Simms Building, Albuquerque, New Mexico, appearing on behalf of Oil Development Company of Texas who appears here in supprt of the contentions of Coastal States Gas Producing Company for the continuation and permanence of the Commission's temporary Rule 3850 with regard to the Sawyer West-San Andres Oil Field.

We have two witnesses. First will be Mr. Guy W. Leach. Would you please stand and be sworn?

MR. NUTTER: If they would both please stand and be sworn at the same time.

MR. PAULANTIS: And Mr. Meeks.

(Witnesses sworn.)

(Whereupon, Oil Development Company Exhibits 1 through 5 (Leach) were marked for identification.)

GUY W. LEACH

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

DIRECT EXAMINATION

BY MR. PAULANTIS:

Q Would you state your name and address, please?

A My name is Guy W. Leach. My address is 4100 Tucson, Amarillo, Texas.

Q By whom are you employed and in what capacity?

A Oil Development Company of Texas, as an area geologist.

Q Have you appeared and testified before this Commission --

A I have not.

Q -- previously? Will you briefly state your education and employment qualifications as a petroleum geologist?

A I received my BS Degree in geology at the University of Oklahoma in 1949. I worked on a Masters, completing my residency in 1950; however, I did not complete my thesis.

I have been employed by Oil Development Company since 1950 as a geologist and have been on special assignments with Koehlin Oil Corporation, Santa Fe Pacific Railway Company and Cherokee and Pittsburg Coal and Mining Company.

Q Mr. Leach, are you familiar with and have you made a study of the field in question?

A I have.

Q And have you prepared or had prepared under your supervision and direction exhibits which you have presented here today?

A I have 5 exhibits to present, yes, sir.

Q Would you explain Exhibit Number 1?

A All right. Exhibit Number 1 -- Oil Development Company's Exhibit Number 1, rather, is a plat showing the location of the West Sawyer Field in relation to known structures and fields of this region.

Exhibit Number 1 shows that the West Sawyer Oil Field is located geologically in the northern part of the Tatum Basin. This basin is bounded on the north by the Matador **Ridge,** on the east by the North Midland Basin Platform, to the south by the Artesia Vacuum trend and to the west by the northwest shelf of the Midland Basin.

The regional structural strike of the San Andres

Formation is generally in a northeast-southwest direction and the regional dip is generally southeast at about 100 feet per million. However, the rate and direction of dip vary somewhat locally.

The closest oil and gas fields to the West Sawyer Oil Field are Number 1, the abandoned southeast segment of the Allison-**Bough** C Oil Field are located about 5 miles north.

Number 2, the Sawyer San Andres Oil and Gas Field is located about 3 miles east and Number 3, the cross-roads East Devonian Oil Field is located about 2 miles northwest. These are all on Exhibit 1. They are kind of hard to read there, but they are there.

Q The field in question is marked in red?

A Is marked in red, yes, sir.

Q Would you explain Exhibit Number 2?

A Exhibit Number 2 is a map showing by color code the names of the various lease hold ownerships in the West Sawyer Field. You will note the discovery well is marked by large red circle. This is the Coastal States Number 1 Santa Fe, in the southwest quarter-southwest quarter, Section 33.

I have only -- the Coastal States leases are shown by yellow color; Oil Development Company of Texas

leases are by pink and the Santa Fe Pacific Railway by green. All other ownership are shown by printing only. This is within a 9 section square surrounding the field.

You will note that Coastal States and Oil Development Company and Sun are the only operators in the field at present. Coastal States has 8 wells, Oil Development 5 wells and Sun 1.

Q And those wells are shown on the map?

A The wells are shown on the map, yes, sir.

Q Exhibit Number 3.

A Exhibit Number 3 is a map showing the structure on top the San Andres Formation Pi Zone as marker or subsea datum. Locally the San Andres Pi zone has a strike ranging from northeast-southwest, swings around to east-west in about Section 23 and then swings back to northeast-southwest in Section 25 or thereabouts.

East from the Cross-roads East Devonian Oil Field the dip of the Pi zone flattens in a east-southeast direction from about 100 feet per mile to about 50 feet per mile indicating the presence of east-southeast plunging nose -- structural nose, I'm sorry.

The Exhibit 3 shows that the West Sawyer Field is located on the eastern flank of this structure. East of the

West Sawyer Oil Field, the normal southeast dip of the Pi zone reverses in about Section 35 and becomes a southwest dip near the Sawyer Oil and Gas Field. The rate of dip becomes steeper, averaging about 100 feet per mile. This reversal of dip, the type of production which is mainly gas and the Featherstone Number One McCormick State dry hole in Section 36, Township 9 South, Range 37 East, in my opinion is strong evidence that the re-entrant in Section 26 and 35 or a low area between the two fields acts as a structural separation.

The trapping mechanism for the West Sawyer-San Andres Field appears to be the structural nose having minor closure in 3 directions and porosity development on the east flank with an up-dip or west pinch-out forming a cell in that direction.

This is a combination stratigraphic structural type trap. However, in my opinion the development of zones of porosity and permeability appear to be more important than structural elevation.

Q Is this exhibit compatible with the -- I believe it was Exhibit Number 3 of the previous witness?

A It is. The only difference would be my interpretation against their interpretation and no geologists

contour exactly alike.

Q Mr. Leach, in your opinion, does this bear out the structure as testified to by the previous witness?

A Yes, sir, it does.

Q Exhibit Number 4, please.

A Exhibit Number 4 is a diagrammatic est-west cross section from the Sawyer Oil and Gas Field passing through the West Sawyer Oil Field and terminating in the East Cross-Roads Devonian Field in the Oil Development Company of Texas Number 1-30 Santa Fe dry hole.

I have included it to illustrate the structural separation between the Sawyer and West Sawyer Fields and the up-dip or west thinning of this Slaughter P-1 or upper porosity zone. This is shown by a blue color. My datum is sea level plus 700 feet or it's actually a reference to sea level.

I have the information on each well below it showing the date it was spudded and completed, the acid treatments and the perforations. The Slaughter P-1 or upper porosity zone is located near the middle of the San Andres Formation. It's encountered about 4900 feet in depth in the West Sawyer-San Andres Oil Field or about 700 feet below the top of the San Andres Formation.

Generally, there are 5 or more porosity intervals present in the area and each is usually separated by a dense and impermeable stratum. However, sometimes these zones are hard to distinguish on electrical logs, cores and samples because of eradic development.

We are only concerned with 3 Slaughter zones of porosity in the West Sawyer Field. These are P-1, or upper porosity zone which normally contains oil or gas, the P-2 or middle porosity zone which is a transition type zone; it contains oil and water. P-3 or lower zone is normally water bearing as is P-4 and P-5.

I would like to note that many operators in this area call these zones the Slaughter A, B, C, et cetera. You will note on the cross section that the P-1 zone is about 35 feet thick -- this is gross thickness -- and has an average nte pay of about 23 feet.

Exhibit 4 also illustrates the variable thickness of this zone and how it thins to the west, northwest or up-dip. This up-dip pinch-out of porosity and permeability forms a very effective seal or barrier. To date, we have not established a definite water-oil contact because most of the wells in the field have stopped in the P-2 zone or have barely penetrated the P-3 zone.

The available core data and electrical logs do not show this zone clearly. However, from experience, it appears that the oil-water contact will essentially parallel this structural dip. In other words, as you go up-dip, your water-oil contact will become higher or to the west; as you go down-dip, the water-oil contact will be lower and this is kind of emphasized in this Oil Development Company of Texas Number One Rich Unit which is the lowest well down-dip. Up-dip we have no good information yet except there was one well which I don't show is the Lone Star Number Three Santa Fe in Section 30, Township 9 South, Range 36 East, which tested this P-1 zone before becoming a water injection well.

We had them test it and they -- it was real tight and it could recover nothing in this particular zone. The San Andres Formation, the local area, is usually a tan to gray, fine to medium, crystalline anhydritic dolomite. The anhydrite appears to be secondary inclusions, nodules, bug fillings and fractures. Other minor minerals present are pyrite, chirt, quartz and clay minerals. However, no swelling clay minerals such as bentonite have been reported.

The type porosity encountered ranges from intergranular, pinpoint, small bug and fracture. Most of the

fractures have a vertical orientation. We find in our calculations from logs and core analyses that the P-1 porosity averages about 7.1 percent. I think that's all I have to say on this one.

Q All right, sir. Would you explain Exhibit Number 5?

A Oil Development Company Exhibit Number 5 is essentially east-west diagrammatic cross section -- I mean northeast-southwest, I'm sorry. It runs through the center of the field.

It is presented to show the continuity of the Slaughter P-1 pay zone and that the wells shown are completed from a common zone or reservoir. The zone perforated -- the perforations are shown on the logs. The zone perforated is shown in -- I mean the P-1 zone is shown in blue color. This is my interpretation.

There's one well, that Coastal States Number 3 SFPRR which the P-1 and what I call the P-2 zones seem to have grown together; there's not a very permeable barrier between the two zones and this is the only well, but the rest of them are in this particular P-1 zone.

You note again we have the core description, perforations, acid treatment underneath each well and the

production. This is about all I have to say for this cross section.

Q Mr. Leach, do you have anything further to say about the geology in the area in question other than what you have already testified to?

A No, sir. I think this is all my testimony.

MR. PAULANTIS: I have no further questions of Mr. Leach.

MR. NUTTER: Are there any questions of Mr. Leach? He may be excused.

(Witness excused.)

MR. PAULANTIS: We would move the introduction of Exhibits 1 through 5, inclusive.

MR. NUTTER: Oil Development Exhibits 1 through 5 will be admitted in evidence.

(Whereupon, Oil Development Company Exhibit 6 (Meeks) was marked for identification.)

J. DEAN MEEKS

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

DIRECT EXAMINATION

BY MR. PAULANTIS:

Q Will you state your name and address, please?

A My name is J. Dean Meeks. I live at 104 Ramada Trail in Amarillo, Texas.

Q By whom are you employed and in what capacity?

A I am employed by Oil Development Company of Texas as chief petroleum engineer.

Q Have you testified before this Commission previosly?

A I have not.

Q Would you briefly state your education and employment qualifications for your position?

A I received a Bachelor of Science Degree in petroleum engineering from Texas Tech University in May of 1959. Following graduation, I was employed by Halliburton Company for approximately one year. Consequently, I taught as an instructor at South Plains Junior College for one semester, teaching math and geology.

For approximately -- following my instruction at South Plains, I was employed by Shamrock Oil and Gas Corporation for approximately three years in their production engineering department as a petroleum engineer. Following Shamrock, I was employed by Texas Pacific Oil Company for two and a half years as a district engineer in the Ardmore, Oklahoma district and was responsible for engineering in that district.

The last four years I have been employed by Oil Development Company of Texas and my position as chief petroleum engineer has made my responsibilities in all there is of engineering in the company operations.

Q Mr. Meeks, have you prepared or had prepared under your supervision any exhibits?

A Yes, sir, I have Exhibit Number 6.

Q Oil Development Company Exhibit Number 6?

A Yes, sir.

Q Let me ask you one thing before we get into the exhibit, Mr. Meeks. Has your company and you and Mr. Leach cooperated with Coastal States in exchanging data and information so that everything could be brought out before this Commission?

A Yes, sir, we have exchanged information quite freely and we have both followed the development of the field since the discovery well was drilled.

Q Would you explain Exhibit Number 6?

A Exhibit Number 6 shows the volumetric calculations of reserves and pay out data based on information from drilling and completing five wells. That's the Oil Development Company wells in the West Sawyer-San Andres Field.

Oil in place was calculated to be 7,152 barrels

per acre. Using a twelve and a half percent recovery factor, a 40-acre drilling pattern will result in 35,760 barrels of recoverable oil and an 80-acre drainage pattern will result in 1,520 barrels of recoverable oil.

As you will note, the recoverable oil on 40 acres will not pay for an average well cost of $73,255.00. An 80-acre pattern will allow the operator reasonable rate of return on his investment of 1.691.

Q Mr. Meeks, where did you get this recovery factor of 12.5 percent?

A We feel that this is a reasonable and typical recovery factor that should be used for a San Andres Field of this nature as noticing by both low porosities, fairly low gravity crudes and rock characteristics.

Q Did you arrive at this figure independently from the figure that was testified to here by Mr. McGraw?

A Yes, sir. We have been using this twelve and a half percent in other fields, particularly in West Texas that are of this quality.

Q Is it your opinion that the 80-acre location will effectively and efficiently drain the 80 acres?

A Well, our production history from our wells is not adequate to establish a decline, but in my opinion,

Mr. McGraw's extrapolation of the production on the Coastal States Santa Fe Number One -- I believe that's Exhibit Number 5 -- is a reasonable extrapolation and is indictive that one well will effectively and efficiently drain 80 acres.

Q Are you using Mr. McGraw's graphs and figures in calculating your reserves in the length of time that you will be able to operate in this field?

A My volumetric calculations?

Q Yes, sir.

A The only data that we received from Coastal States was the formation of volume factor which was arrived from PVT data that they had taken earlier. Our porosities were arrived from both log and core data and also the water saturations.

Q Your company, Oil Development Company of Texas, supports the position of Coastal States Gas and asks the Commission that the temporary Rule 3850 be made permanent?

A Yes, we do. We concur with Coastal States and request along with Coastal States that these temporary rules be made permanent.

MR. PAULANTIS: I have no further questions of Mr. Meeks.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Meeks, has your company made any attempt to conduct pressure interference tests or draw down tests between the wells here to establish the radius of drainge on the wells?

A Well, our efforts were really combined with Coastal States in that we ran the --

Q In those unsuccessful tests that Mr. McGraw was referring to?

A Yes, sir. Our Santa Fe Pacific Number One was involved.

MR. NUTTER: Are there any further questions of Mr. Meeks? He may be excused.

(Witness excused.)

MR. NUTTER: Do you have anything futher, Mr. Paulantis?

MR. PAULANTIS: We move the introduction of Exhibit Number 6.

MR. NUTTER: Oil Development Company's Exhibit 6 will be admitted in evidence.

MR. PAULANTIS: I have nothing further.

MR. NUTTER: Does anyone have anything they wish

to offer in Case 4222, reopened?

MR. HATCH: Sun Oil Company has advised the Commission that they concur with Coastal States.

MR. NUTTER: If there's nothing further, we will take the case under advisement and call a fifteen-minute recess.

(Whereupon, a fifteen-minute recess was taken.)

I N D E X

E X H I B I T S

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, GLENDA BURKS, Court Reporter in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

Glenda Burks
Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4222 heard by me on 9/30, 1970.

..., Examiner
New Mexico Oil Conservation Commission

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
September 15, 1971

EXAMINER HEARING

IN THE MATTER OF:

Case 4222 being reopened pursuant to the provisions of Order No. R-3850-A, which order continued 80-acre spacing units for the West Sawyer-San Andres Pool, Lea County, New Mexico, for an additional one-year period.

Case 4222 (Reopened)

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF Hearing

I N D E X

E X H I B I T S

	Marked	Offered and Admitted
Oil Development Exhibits 1, 2, & 3	9	9
Coastal States Exhibits 4, 5, 6, 7 & 8	11	18

MR. NUTTER: Case 4222, Reopened.

MR. HATCH: Case 4222, Reopened. In the matter of Case 4222 being reopened pursuant to the provisions of Order No. R-3850-A, which order continued 80-acre spacing units for the West Sawyer-San Andres Pool, Lea County, New Mexico, for an additional one-year period.

MR. HINKLE: Clarence Hinkle of Hinkle, Bondurant, Cox and Eaton, appearing on behalf of Coastal States Gas Producing Company.

Coastal States was the original Applicant two years ago, pursuant to which the special pools were entered and which were extended a year ago. During the last year, the Oil Development Company of Texas has been the principle developer in the pool. That is the reason we would like for them to put on evidence first in the case and we will follow them with evidence of Coastal States.

MR. NUTTER: Very good.

MR. LANPHERE: Mr. Examiner, I am Eric D.Lanphere. I am an attorney with the firm of Iden and Johnson, 1220 Simms Building, Albuquerque, New Mexico, and I appear on behalf of Oil Development Company of Texas. I have one witness with three exhibits.

(Witness sworn)

LARRY D. LEAVELL

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

DIRECT EXAMINATION

BY MR. LANPHERE:

Q Would you state your name, your residence,by whom you are employed and in what capacity you are employed?

A My name is Larry D. Leavell, I work for Oil Development Company of Texas as a Petroleum Engineer in Amarillo, Texas.

Q Have you previously testified before the Commission?

A No, sir, I have not.

Q Can you briefly state your education and employment qualifications as a Petroleum Engineer?

A I received a Bachelor of Science degree in Mechanical Engineering from New Mexico State University in January of 1966. Following graduation, I was employed by Pan American Petroleum Corporation as a Petroleum Engineer in the Brownfield and Andrews, Texas area offices. In September of 1967, I was transferred to the Fort Worth Division Office, Fort Worth, Texas. My first assignment

for approximately one and one-half years was in the operations and development section, following and directing drilling operations in southeastern New Mexico. Following that assignment, I worked as a reservoir engineer for Pan American until February of 1970 when I joined Oil Development Company of Texas. My responsibilities for Oil Development Company has been in both drilling operations and reservoir engineering.

Q Are you familiar with and have you made a study of the field in question?

A Yes, sir, I have.

Q Have you prepared or have there been prepared under your direction certain exhibits in this case?

A Yes, sir, I have.

Q Please refer to Exhibit 1, explain what it is and what it shows?

A Exhibit 1 is a plat showing a field as it now exists. Oil Development Company of Texas leases are shown in the pink color. At the time of the last Hearing, there were 14 wells completed in the field. Since that time 14 additional wells have been drilled with 12 wells completed as oil wells, and 2 wells completed as dry holes. These 14 wells are marked with red dots on Exhibit 1.

Oil Development Company has drilled 9 of the 12 producers. The 2 dry holes are located in the SW/4 of Section 34 and SW/4 of Section 26. The other operators in the field are Sun Oil Company and D & B Oil Company.

The plat shows the wells' initial potential test in barrels of oil, barrels of water and MCF per day. Also shown are the wells' completion dates.

Q Do you have anything further with respect to Exhibit No. 1?

A No, sir, I do not.

Q Now, would you please refer to Exhibit No. 2 and explain that, please?

A Exhibit 2 is a map showing the structure and the top of the San Andres pie marker as the sub-C data. Again, Oil Development Company's leases are shown in the pink color. This exhibit was prepared to show the geology with the recent development. It is essentially the same as presented at the last Hearing. I would like to point out that Wilmac has drilled a dry hole in the SW/4 of Section 26. This well which is marked with a black arrow is between the Sawyer-San Andres field to the east and West Sawyer-San Andres field.

Q Do you have anything further with respect to

Exhibit No. 2?

A No, sir, I do not.

Q Please, then, refer to Exhibit 3 and explain it, please?

A Exhibit 3 is a plat showing structural positions of each well, contoured on the San Andres pie marker along with the latest daily test information in barrels of oil per day, barrels of water per day and the producing gas-oil ratio. You will note in studying the map that the producing gas-oil ratio appears to be a function of the structural position of the wells. The wells located near the minus 775-foot contoured line are producing at the highest gas-oil ratios in the field. Coastal States Etta Long Well No. 1 located in Section 5 has a present gas-oil ratio of 2970. Moving northward along this line, Sun State S-No. 1, located in Section 32 has a gas-oil ratio of 7300. R. S. C. P. R. R. Well No. 6 located in the NW/4 of Section 33 has the highest gas-oil ratio in the field with 22,100. R.S.C.P.R.R. Well No. 10, 11 and 9, located in the W/2 of Section 28 have respective gas-oil ratios of 4330, 21,650 and 6150.

Q How do the gas-oil ratios compare at the minus 825-foot contour line to the gas-oil ratios at the minus

775-foot contour line?

A The gas-oil ratios are considerably less. They range from about 400 on Coastal States' West Sawyer State No. 1 located in the NE corner of Section 4 to approximately 1420 on Coastal States' Mar No. 1 located in the SE/4 of Section 33. Moving northward along this line you will note that most of the gas-oil ratios are within this range.

Q Do the higher gas-oil ratios at the higher structure completions indicate a gas cap near by?

A Yes, it does indicate this.

Q Do you believe that this is an associated reservoir?

A Yes, sir, I do. Based upon the reservoir fluid study conducted by Coastal States and a sample from their Coastal States Santa Fe Well No. 1 which indicated that the reservoir was saturated at the original reservoir pressure and the high gas-oil ratios at the high structural wells, we concluded that this is an associated reservoir.

Q In your opinion, is the field reaching the final stages of development?

A Yes, I do. With the probable drilling of three or four wells in Sections 22 and 27, the field is reaching

the end of development.

Coastal States Mar No. 2 is located in the SW/4 of Section 34 was non-productive of oil in the San Andres. Thus, continued development to the east and south of this location cannot be justified. Generally, because of the low productivity of the wells in the north and west part of the field, additional development is not expected in these areas.

MR. LANPHERE: We would like to offer in evidence Exhibits 1 through 3, inclusive.

MR. NUTTER: Oil Development's Exhibits Nos. 1 through 3 will be admitted in evidence.

(Whereupon, Oil Development's Exhibits 1, 2 and 3 were marked for identification, offered and admitted in evidence.)

MR. LANPHERE: That is all I have of this witness, Mr. Examiner.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Leavell, the pool to date has not been classified as an associated reservoir, has it?

A That is correct. It has not.

Q Was it at the request of Coastal States previously that the field be so classified?

A This is correct.

Q Are there any wells that could be conclusively classified as gas wells?

A No, sir.

Q And there haven't been any wells, then, that have been drilled in the gas cap if such does exist up here to the northwest?

A That is correct.

Q Do you anticipate there will be developments in that area?

A No, sir.

Q In other words, this line that you pointed out across through here with the high GOR is probably the limit of development in that direction?

A That is correct.

Q Actually, the contours that you have shown on Exhibit 3 are simply a blown-up version of the information shown on Exhibit 2, isn't that right?

A Yes, sir, that is correct.

Q It is contoured on the same interval?

A Yes, sir.

MR. NUTTER: Are there any further questions of Mr. Leavell?

MR. HATCH: Mr. Examiner, maybe Mr. Hinkle could help us out here. It seems to me that Coastal States did not ask for a classification as an associated pool, but that the Examiner in prior Hearings questioned as to whether it was or not and that is the reason the case was advertised as it was and finally put it in one of the prior orders as to the purpose of reopening.

MR. NUTTER: I noticed that in the previous Order, the question as to whether it should be classified as an associated reservoir was mentioned in the Order itself. I didn't see where it had been denied, so I wondered where it was in there.

If there are no further questions of Mr. Leavell, he may be excused.

(Witness dismissed)

MR. HINKLE: We have one witness we would like to have sworn.

(Whereupon, Coastal States' Exhibits 4 through 8 were marked for identification.

(Witness sworn)

JACK McGRAW

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, by whom you are employed and your residence?

A My name is Jack McGraw. I work for Coastal States Gas Producing Company in Midland, Texas as Division Petroleum Engineer.

Q Have you previously testified before the Commission?

A Yes, sir, I have.

Q And your qualifications as a Petroleum Engineer are a matter of record with the Commission?

A Yes, they are.

Q Did you testify in this case when the Application was originally filed by Coastal States?

A Yes, I did.

Q Also a year ago?

A Yes.

Q Have you kept up with the development in the West Sawyer-San Andres pool?

A Yes, sir.

Q Since its inception?

A Yes, I have.

Q And have kept up with the development this

last year?

A Yes, sir.

Q Have you prepared or has there been prepared under your direction certain exhibits for introduction in this case?

A Yes, they have.

Q Refer to Coastal States' Exhibit No. 4 and explain what this is and what it shows?

A Exhibit No. 4 is a graph showing the total field monthly producing performance. Also shown is the development rate of the field. This graph shows that the present producing rate is 13,100 barrels per month and the present cumulative recovery from the field is 280,682 barrels. This exhibit also shows that the field has enjoyed an orderly development rate under the existing field rules. There are at the present time 25 wells producing from the reservoir and has been previously testified, probably three or four more wells will be drilled.

Q Refer to Exhibit 5 and explain what this shows?

A Exhibit 5 is a graph of the monthly producing rate of Coastal State's Santa Fe No. 1. This well is the oldest producing well in the reservoir and has the

best established decline. This well was used at last year's Hearing to illustrate that one well could drain approximately the amount of oil calculated to be recoverable from 80 acres in this reservoir. At that time a decline rate of 30 per cent per year was used and an ultimate primary recovery of 65,668 barrels was projected. It can be seen from this exhibit that the 30 per cent per year decline still is an approximate fit for this well. By using the present cumulative of 39,746 barrels and the present rate of 900 barrels per month, the ultimate primary appears to be 66,746 barrels, almost the same as was calculated last year.

Q Practically this same exhibit was introduced a year ago?

A Yes, sir, it sure was.

Q Refer to Exhibit No. 6 and explain this?

A Exhibit 6 shows this decline rate applied to the Coastal States' Santa Fe No. 3 well. This exhibit shows that the well has declined at considerably different rates in the past, but now is at an approximately 30 per cent per year decline. Using this decline rate, the reserves attributed to this well would be 88,350 barrels -- correction -- 88,850 barrels.

Q Refer to Exhibit No. 7 and would you explain this?

A Exhibit 7 shows the performance of the Coastal States' Santa Fe No. 4 with this 30 per cent per year decline applied to this well; a calculated recovery of 80,500 barrels is projected. Although this is in excess of the amount calculated to be recoverable from 80 acres, it is also obvious that the better wells in a reservoir will recover a disproportionate part of the oil mainly because of the inability of the poor wells to recover the oil due to limited permeability in the vicinity of the well bore. Also these wells enjoy early development. They were in first and got a little bit of additional oil due to that.

Q Have you made a study of the economics involved in drilling and developing this pool on 40-acre and 80-acre basis?

A Yes, we have. Exhibit 8 shows the reservoir data and economic analysis that was presented at the prior Hearings. The only change to be made at this time is the price per barrel which is increased to $3. and the cost to drill a well has increased to $78,000. This change in the economics changes the 40-acre ratio of income to investment would be .83 which is still, of

course, uneconomical, and on the 80-acre pattern, the ratio of income to investment is 1.65 which is somewhat better than was calculated last year.

Q What do you conclude from this Exhibit?

A We conclude from this Exhibit that although the price of oil has increased some, it still is not economical to develope this field on 40 acres.

Q In your opinion will substantially the same amount of oil be recovered by development on 80 acres as well as 40?

A Yes, sir, in our opinion, it will be.

Q In your opinion has the development of the pool about reached the state of completion?

A Yes, as has been previously testified to by Mr. Leavell, it looks like at this point probably three or four more wells will be needed to fully develope the field. We are already beginning to think about secondary recovery in this field and will be to that stage in the near future.

Q Have you made some preliminary investigation with respect to secondary recovery?

A Yes, some preliminary studies have already been initiated.

Q In your opinion will 80-acre spacing be helpful in secondary recovery operations?

A We feel that it will not be detrimental to secondary recovery.

Q What is your recommendation to the Commission with respect to the present temporary ruling?

A It is our recommendation that the temporary rules that have existed for the last two years now be made permanent in this reservoir.

Q In the event that these are not made permanent and you go back on a 40-acre spacing basis, would you recommend to your company that the undrilled locations be drilled?

A No, sir, we could not -- I could not recommend to my management that we drill this on 40 acres.

Q According to your economic study, if you did, it would not pay off?

A Yes, sir.

Q In your opinion, would the continuation of these rules be in the interest of conservation and prevention of waste?

A Yes, sir, they would.

MR. HINKLE: I might ask Mr. Leavell if he

concurs in this recommendation?

MR. LEAVELL: Yes, we concur that the temporary rules be made permanent.

MR. HINKLE: We would like to offer Exhibits 4 through 8.

MR. NUTTER: Coastal States' Exhibits 4 through 8 will be admitted in evidence.

(Whereupon, Coastal States' Exhibits Nos. 4 through 8 were offered and admitted in evidence.)

MR. HINKLE: That is all of this witness.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. McGraw, you presented the decline curves on Exhibits 5, 6 and 7. Are they typical wells or are they three of the better wells in the pool or just what would you say?

A Well, they are three of the oldest and three that have at least some decline established and they are the better wells. They are not the average well.

Q They are better than average?

A They are better than average.

Q And their cumulative productions up to August 1, 1971 are among the highest of the cumulative productions?

A Yes, sir, they certainly are.

Q What would you say of the remaining reserves; are they typical of the remaining reserves?

A Yes, sir, they probably are, of the remaining reserves.

Q So the best one that you have here would be the Santa Fe No. 3 and you estimate it has a remaining reserve of 44,000 barrels?

A Yes, sir. Some of the tighter wells, of course, will not be able to recover that amount of remaining primary oil, but the average well probably will.

Q But in each case here, these three wells have produced more than they have remaining?

A Yes, sir. I might also add that we have been successful in obtaining a gas market. We are now selling gas from this reservoir.

Q Which would affect the economics somewhat?

A Somewhat, yes, sir. I am sorry to say it is not very much, but a little.

MR. NUTTER: Are there further questions of Mr. McGraw?

You may be excused.

(Witness dismissed.)

MR. NUTTER: Is there anything further, Mr. Hinkle?

MR.HINKLE: Nothing further.

MR. NUTTER: Does anyone have anything they wish to offer in Case No. 4222, Reopened?

MR. HATCH: The Commission has received a letter from Atlantic Richfield Company saying that we request favorable consideration of the continuation of 80-acre spacing in the subject field. And a letter from D & B Oil Company addressed to the Commission: (Reading) We feel that a spacing order of less than 80-acres per well in the above mentioned field is very uneconomical. There is every reason to question the feasibility of the present spacing of 80-acres showing a profit. As you know, the gravity of this oil is very low and costly to handle with the water separation problem. Daily production declines rapidly after the first two or three weeks, therefore, we feel there is very little justification with 10 to 14 barrels a day wells for 40-acre spacing rules.

MR. NUTTER: Thank you. If there is nothing further on Case No. 4222, we will take it under advisement.

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

I, RICHARD L. NYE, Court Reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

RICHARD L. NYE, COURT REPORTER

My commission expires March 25, 1975.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4222/rep heard by me on 9/15, 1974.

Examiner
New Mexico Oil Conservation Commission