CASE 7252: FOUR CORNERS GAS PRODUCERS ASSOCIATION FOR DESIGNATION OF A TIGHT FORMATION, SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO

To association.

Case No.

7252

Application

Transcripts

Small Exhibits

ETC

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
6 May 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Four Corners Gas Producers Association for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7252

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: William F. Carr, Esq.
CAMPBELL, BYRD, & BLACK P.A.
Jefferson Place
Santa Fe, New Mexico 87501

I N D E X

KEVIN H. McCORD

E X H I B I T S

MR. STAMETS: We'll call next Case Number 7252.

MR. PADILLA: Application of Four Corners Gas Producers Association for a designation of tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. CARR: May it please the Examiner, my name is William F. Carr, with the law firm Campbell, Byrd, and Black, P. A., in Santa Fe, New Mexico appearing on behalf of the applicant.

We have one witness who needs to be sworn.

MR. STAMETS: Any other appearances in this case?

(Witness sworn.)

KEVIN H. McCORD

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

DIRECT EXAMINATION

BY MR. CARR:

Q Will you state your full name and place of residence?

A. My name is Kevin McCord and I live in Farmington, New Mexico.

Q. Mr. McCord, by whom are you employed and in what capacity?

A. I'm a self-employed petroleum engineer, acting as a consultant for the Four Corners Gas Producers Association.

Q. Have you previously testified before the New Mexico OIl Conservation Commission or one of its examiners?

A. No, I have not.

Q. Will you briefly summarize your educational background and your work experience?

A. I obtained a Bachelor of Science degree in petroleum engineering from the Colorado School of Mines in December of 1977.

Prior to this I held summer jobs with three different oil companies.

In May through August of 1975 I worked with Union Oil Company in Santa Maria, California, as a roustabout.

In June through September of 1976 I worked with Skelly Oil Company in Denver, Colorado, as an assistant reservoir engineer, involved with their computer work in their company's oil and gas figures for their coming

merger with Getty Oil Company.

In May through September, 1977, I worked with Amoco Production Company in Denver, Colorado, as a Senior Production Technologist. I worked in their reservoir department and wrote the reserve update study and field performance report on the Brady Field in southern Wyoming.

After graduation in February of 1978, to January of 1980, I worked with Amoco Production Company as a production engineer in the Montbello District Office in Denver, Colorado, and as a reservoir engineer in their regional office in Denver.

In January of 1980 I joined EEE Company, which is a consulting firm in Farmington, New Mexico. I worked as a consultant, supervising Dakota completion work until March of 1981, when I became self-employed.

Q. Mr. McCord, are you familiar with the application of Four Corners Gas Producers Association in this case?

A. I am.

Q. Are you familiar with the subject area?

A. I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. STAMETS: They are.

Q. Mr. McCord, will you briefly state what Four Corners Gas Producers Association seeks with this application?

A. The Four Corners Gas Producers Association is applying for a portion of the Basin Dakota Gas Field to be designated as a tight formation under Section 107 of the Natural Gas Policy Act of 1978.

The proposed Huerfano tight gas area is located in the south central portion of the San Juan Basin and covers portions of San Juan and Rio Arriba Counties in northwestern New Mexico.

Q. Have you prepared certain exhibits for introduction in this case?

A. I have.

Q. Have each of these exhibits previously been submitted to the Oil Conservation Division and to the United States Geological Survey --

A. Yes, they have. Oh, I'm sorry.

Q. -- with a statement of the meaning and purpose of each, as is required by the Commission rules?

A. Yes, they have.

Q. Will you please refer to what has been marked for identification as Exhibit Number One and explain what it is and what it shows?

A. Okay, Exhibit Number One is a Dakota formation completion and production map displaying the proposed Huerfano tight gas area. The area includes approximately 135,040 acres in Townships 24 and 25 North, Ranges 7 through 10 West.

The production figures presented for each producing well are initial potential, date of initial potential, average daily production for 1979, and 1-1-80 cumulative production of gas and oil.

I'd like to state at this time in my report there is a mistake. It is typed as 1-1-81 cumulative production. That should be 1-1-80.

Exhibit Number One also presents completion and production data from wells outside the proposed area to use as a comparison.

The Huerfano tight gas area contains 35 Dakota formation gas wells, 22 of which are abandoned in the Dakota at this time.

The low number of producing wells, which are only 13, in this designated area in comparison with the better producing locations outside of the area indicate the poor Dakota formation qualities this area has.

Examination of cumulative and current gas production rates also indicate the poor quality Dakota

formation in the Huerfano tight gas area.

Q. Mr. McCord, the area which is the subject of this application is outlined in blue on Exhibit One, is that correct?

A. Yes, it is.

Q. Certain of the wells appear to be color coded. Could you explain that coding to the Examiner?

A. In the pink, the pink wells are seven cored wells in the area, six of them actually in the area itself, one directly outside of the area.

The green wells are cross section wells, which will be presented in Exhibits Three and Four.

Q. And this exhibit also contains traces which is a key or an index to those later cross sections?

A. That's correct.

Q. Will you now refer to what has been marked as Four Corners Exhibit Number Two?

A. Okay, Exhibit Number Two is a type log of a typical well found in the Huerfano area. This log is of Universal Resources Grigsby Federal No. 4 Well, which shows the Greenhorn, Graneros, and Dakota formations. The type log shown is in the northwestern part of the tight gas area, which has exhibited better producing characteristics than the remainder of the area. Wells in the remaining sections of the

area could be expected to have the same or poorer log characteristics than this type log.

Q. Now, is the Graneros a separate formation or is it generally considered part of the Dakota?

A. It is generally represented as part of the Dakota formation.

Q. Is the Greenhorn part of the Dakota?

A. No, it is not.

Q. So this log shows the relationship of the Dakota to both the Greenhorn and the Mancos, is that correct?

A. That is correct.

Q. How is the Dakota formation defined by the Oil Conservation Division?

A. The State of New Mexico has defined the Dakota producing interval in the Basin Dakota Field to begin at the base of the Greenhorn limestone and extend to a point 400 feet below the base of the Greenhorn. The formations covered in this 400 feet are the Graneros, Dakota, Burro Canyon, and Morrison formations. The Graneros and Upper Dakota formations are productive in this area, while the lower Dakota zones, the Burro Canyon and the Morrison formations are generally water-bearing.

Q. What is the average depth of the Dakota

formation in the area which is governed by this application?

A. 6350 feet.

Q. And what is the gross thickness of the formation?

A. Approximately 200 to 350 feet gross thickness.

Q. Mr. McCord, will you now refer to Four Corners Exhibits Three and Four and explain what they are and what they show?

A. Exhibits Numbers Three and Four are log cross sections through the Huerfano area to show the continuity of the Dakota formation.

Cross Section A-A' is a log cross section in the northwest to southeast direction, while B-B' is in a north/south direction. These log cross sections use the base of the Greenhorn as a datum. I'd like to point out there is another mistake on these two exhibits, in that the counties listed are San Juan and Sandoval Counties. That should read San Juan and Rio Arriba Counties, New Mexico.

Wells both in and out of the designated tight gas area were used for comparison. Wells outside of the area tend to have a better quality reservoir rock, which is supported by the better production figures from wells outside of the tight gas area, as also can be shown in Figure 1.

Q. Now what do these cross sections show?

A. They show that the Dakota is a continuous reservoir throughout the area and also indicate the better sand characteristics outside of the Dakota -- the Huerfano tight gas area.

Q. Mr. McCord, what is the porosity range within the area governed by this application?

A. Approximately 5 to 15 percent.

Q. And what is the average pay porosity?

A. That is approximately 7 percent, and those were calculated by means of core analysis studies.

Q. Is the in situ permeability cutoff in the Huerfano tight gas area less than 0.1 millidarcy?

A. Yes, it is.

Q. And is this formation dependent on stimulation techniques to be commercially productive?

A. Yes, it is.

Q. Have you calculated permeability for this area?

A. Yes, I have.

Q. Would you review Exhibits Five through Eleven and explain what these are and what results you obtained?

A. Okay. Exhibits Five through Eleven present the core analysis data used to determine the average --

I'm sorry, they're inside the report.

MR. STAMETS: Thank you.

A. Exhibits Five through Eleven present the core analysis data used to determine the average laboratory permeability there for Dakota formations pay zones in this area. The exhibits contain the actual core analysis reports, plus summary tables showing the analysis of cores taken from only the productive portion of the Dakota formation.

The cored intervals chosen for permeability averaging were determined by log examination of the interval cored for each well. Only cored intervals of sand with more than 10 ohms resistivity appearing on the induction resistivity log of the well were used for permeability averaging. This 10 ohm resistivity cutoff represents the average resistivity shown by the shale sections on the logs and values less than this cutoff were not considered to be pay zones.

The average laboratory permeability to air determined for the Huerfano area in this manner was .159 millidarcy. The actual in situ permeability of the formation is less than this laboratory determined value, mainly due to confining pressures found in the Basin Dakota reservoir.

Q. What was the laboratory determined pressure --- permeability?

A. .159 millidarcy.

Q. Could you explain what causes that difference, the laboratory sample at 1.59 and the in situ at .024?

A. Okay. Laboratory core analysis tests are generally taken at approximately 100 psi, which does not indicate near the confining pressures found at reservoir conditions.

Q. Will you now refer to --

MR. STAMETS: Before we go on --

A. Sure.

MR. STAMETS: -- where on Exhibit Five are those final figures shown?

A. On Exhibit Five through Eleven I have averaged the permeability for each core analysis taken, the average of the -- of the seven different zones.

MR. STAMETS: Okay, let's go through this. Now Exhibit Five, the first well we have is Val Reese 3-29 Connie.

A. Uh-huh.

MR. STAMETS: And on the second page of that it says average permeability 0.393 millidarcies. Average in situ permeability .006 millidarcies.

A. Right.

MR. STAMETS: All right, now the aver-

age is the core lab average.

A. That is correct.

MR. STAMETS: And then the in situ is calculated from that, based on core pressure -- or overburden pressure.

A. Yes, confining pressure, which will be Exhibits Twelve and Thirteen.

MR. STAMETS: All right. Then you have the next one for the --

A. Stevenson No. 1.

MR. STAMETS: That's a different well.

A. Yes, the Stevenson No. 1 is Exhibit Six.

MR. STAMETS: The next one is the same well.

A. Okay, that's the actual core data following the summary table, is the actual core data used.

MR. STAMETS: Okay, and the difference between the two is the fact that you selected the zones on the first two pages as the zones most likely to be productive, is that correct?

A. That is correct.

MR. STAMETS: And the second two pages are the overall core.

A. That's correct. In many cases shales

were cored, which certainly would not be pay zones.

MR. STAMETS: And Exhibit Six is -- begins the second well, right?

A. That is correct. Six -- Five through Eleven were all prepared in the same manner. The per daily averaging values given on the first summary sheet, an average laboratory value initially, then an average in situ permeability value. These were averaged for the six -- for the seven different cases, the average laboratory value being .159 millidarcies.

MR. STAMETS: .1 --

A. .159.

MR. STAMETS: .159, not zero .159.

A. No. Well, zero.159.

MR. STAMETS: Zero .159, and then that converts to in situ of what figure?

A. .0 -- zero .024 millidarcy.

MR. STAMETS: That's for the six wells inside.

A. That's for an average of all seven wells.

MR. STAMETS: Okay.

Q. All right. Mr. McCord, will you now refer to what has been marked as Four Corners Exhibit Number Twelve and identify this?

A. Exhibit Number Twelve presents a technical paper written by Rex D. Thomas and Bond C. Ward of the U. S. Bureau of Mines, entitled Effect of Overburden Pressure and --

MR. STAMETS: Where is that?

A. It's --

MR. CARR: It's in the packet again. It's just -- they're all -- all the remaining exhibits are in the folder that was presented to you, the green folder, and they are tabbed on the righthand side so that you can, by just picking up the tabs, go exhibit by exhibit.

MR. STAMETS: Okay.

A. Exhibit Number Twelve is entitled Effect of Overburden Pressure and Water Saturation on Gas Permeability of Tight Sandstone Cores.

This paper presents relationships between laboratory determined permeability in cores and actual in situ permeability found in reservoirs.

Q. Now, Mr. McCord, will you please refer to what has been marked Exhibit Thirteen and explain what this is?

MR. STAMETS: Before you do that, would you highlight the appropriate conclusions from the paper that you've cited?

A. Okay. Their general findings in this paper is that not confining pressure on a core, otherwise subjecting a core to a substantial amount of pressure, such as reservoir pressure, substantially decreases the permeability found in the core from laboratory conditions.

Figure 1 in Exhibit Twelve lists the graph used, which I'll explain as Exhibit Thirteen, in finding the permeability reduction for this area. As you can see from the nature of the graph, the higher the pressure imposed upon the core, the lower the permeability found in the core itself.

MR. STAMETS: Okay.

Q. All right, Mr. McCord, will you now refer to Exhibit Thirteen and review that?

A. Exhibit Thirteen explains how in situ permeability was calculated from the core analysis, using this technical paper presented. An average in situ permeability of 0.024 millidarcy was calculated for the Huerfano area. This value is well below the .1 millidarcy tight gas cutoff.

Q. And this exhibit in effect is showing how the -- how Exhibit Twelve was applied to the subject area, is that correct?

A. That is correct.

Q. It shows your calculations?

A. Yes.

Q. Can gas be produced in commercial quantities from this formation without stimulation?

A. No, I believe not.

Q. Now, Mr. McCord, I believe you stated that the average depth of the Dakota in this area was 6350 feet.

A. That's correct.

Q. What is the maximum stabilized production rate against atmospheric pressure allowed for wells in the subject area at this depth by Oil Conservation Division rules?

A. That is 217 Mcf.

Q. Of gas per day?

A. Yes.

Q. Unstimulated. Have you obtained stabilized, unstimulated gas production rates for Dakota wells in the subject area?

A. Yes, I have. Obtaining the stabilized, unstimulated gas production rates for the Dakota wells is not a standard procedure used by companies when completing their wells. Past experience has shown that these low permeability Dakota wells must be stimulated to attain commercial production. Due to these facts, I have only one natural unstimulated flow test performed in the Huerfano tight gas area.

This test was on Dugan Production Com-

pany's "MF" No. 1 Well, which is in Township 24 North, Range 9 West, Section 18, and it's in the northwest of the southwest, 24, 9.

MR. STAMETS: Okay.

A. All right. This well tested at an unstimulated of 152 Mcf per day with no associated oil production after a 3-hour flow period to the atmosphere, and this followed a 7-day buildup.

To test the validity of this natural production figure, I used Darcy's law to calculate an unstimulated gas flow rate, using the average in situ value of 0.024 millidarcy, determined from core analysis.

Exhibit Number Fourteen presents this calculation and shows that initial unstimulated gas flow rate of 48.5 Mcf per day is associated with the average in situ permeability of 0.024 millidarcies for the area.

Now both the actual unstimulated gas production rate and our calculated unstimulated gas production rate for the Dakota formation are less than the 217 Mcf per day limit for tight gas reservoirs.

Q. Mr. McCord, is it possible that the Dugan Production Company "MF" No. 1 Well would have produced at higher rates than the typical well in this area?

A. That's -- that's very possible, the

reason being, it's just a 3-hour flow test for a 7-day buildup. When you start producing this for any length of time we have found that these IP's are not real representative of what the well will actually do over a period of time.

Q. In your opinion would the calculated figure be more reliable when applied to the entire area than the data from this one well?

A. Yes, I believe so.

Q. Do you have any unstimulated oil production figures for the subject area?

A. Yes, I do. Once again, the only well with unstimulated oil production figures is the Dugan "MF" No. 1 Well.

This well did not produce enough oil to measure so no oil production figures were reported during the production test; however, examination of Exhibit One will show that production figures for these wells in the Huerfano area show that some oil is produced in this area.

It should also be noted here that condensate is also reported as oil to the State of New Mexico; therefor, the oil production figures presented represent both oil and condensate that is not a liquid -- not in liquid form at reservoir conditions.

To examine the extent of this oil pro-

duction in the area, the cumulative oil production per Mcf of gas was averaged for every well inside the proposed tight gas area. This average value was 0.028 barrels of oil per Mcf of gas produced.

Applying this figure to the 48.5 Mcf per day rate calculated using Darcy's law, now this is of course from the core analysis data, resulted in an average initial unstimulated oil production rate of 1.3 barrels of oil per day.

So both our actual unstimulated and calculated unstimulated oil production rates do not exceed 5 barrels of oil per day.

Therefor, I believe no well drilled in the Huerfano tight gas area is expected to produce without stimulation more than 5 barrels of crude oil per day.

Q. Now, Mr. McCord, you made no effort to try and break down the liquids as to what portion of it was crude oil -- or oil, and what portion of it was condensate, is that correct?

A. That is correct. The results of my findings indicate that the combination of both are still under the 5 barrels of oil per day limit.

Q. The techniques that you've employed in reaching these figures, are they techniques commonly used and accepted by the oil and gas industry?

A. Yes, they are.

Q. Will the production of hydrocarbons from the subject area impair fresh water supplies in the area?

A. I believe not. We have existing State and Federal regulations that assure that development of the Dakota formation will not adversely affect or impair any fresh water aquifers that are being used or are expected to be used in the foreseeable future for domestic or agricultural water supplies.

The regulations require that casing programs be designed to seal off potential water-bearing formations from oil and gas producing formations. The fresh water zones in this area are from the surface to the base of the Ojo Alamo formation, which is in the range of 500 to 1100 feet. These wells are drilled with a natural mud, which will not contaminate any fresh water zones. The casing design is such that 8-5/8ths inch surface casing is set from 200 to 250 feet with cement being circulated to the surface. After reaching TD 4-1/2 or 5-1/2 inch casing is run to total depth and all potential oil, gas, and water-bearing zones have cement placed over them. If cement is not circulated to the surface, a temperature log is run to determine the cement top and if oil, gas, or water-bearing zones are not covered, they -- they must then be covered. All those zones are protected by

both cement and casing, therefor.

The fracs designs done in this area are usually done with one or two percent potassium chloride water, which will not contaminate a water zone, and there is also a substantial difference between the Dakota and the Ojo Alamo formation, approximately 5000 feet. This large distance involved is added insurance of no contamination.

Therefor, New Mexico and Federal regulations will protect any fresh water supply that may be affected by drilling, completing, and producing the Dakota formation in the Huerfano tight gas area.

Q. Mr. McCord, do these fresh water zones exist throughout the subject area?

A. Yes, they do.

Q. Approximately how much vertical distance is there between the Dakota formation and the Ojo Alamo fresh water aquifer?

A. Approximately 5000 feet.

Q. Now you made reference to existing State and Federal regulations. Have you reviewed these regulations as they relate to the protection of fresh water?

A. I have.

Q. In your opinion will compliance with these regulations assure that the development of the subject

area not impair any fresh water aquifer during either drilling or waste disposal operations?

A. I do.

Q. Is it your testimony that the proposed development of the subject area will not adversely affect the domestic or agricultural supplies?

A. Yes, it is.

Q. In your opinion is the price authorized by Section 107 of the Natural Gas Policy Act necessary to provide a reasonable incentive for production of natural gas from the subject formation due to the extraordinary risks or costs associated with such production?

A. Yes, I believe that adequate production of the area will not be obtained without the incentive price.

Q. In your opinion does the data presented at this hearing support the conclusion that the entire area governed by this application qualifies for a tight formation designation under Section 107 of the NGPA?

A. Yes, it does.

Q. Now, you have covered these points, but I want to be sure that the record is clear on each of them.

Is the in situ permeability in the subject area less than .1 millidarcy?

A. Yes, it is.

Q. Is the stabilized production rate at atmospheric pressure or calculated against atomospheric pressure from the Dakota wells completed in this area less than 217 Mcf of gas per day?

A. Yes, they are.

Q. And do you expect any wells drilled into any portion of the Dakota which is covered by this application to produce more than 5 barrels of crude oil per day prior to the application of stimulation techniques and practices?

A. No, I believe it will not.

Q. Has this area been approved for infill drilling?

A. Yes, it has.

Q. Have any infill wells been drilled in the subject area?

A. No, not in the subject area. If you look at Figure 1 again you'll notice that there is some production to the north of this area and some infill drilling has been done in this area, but none in the Huerfano tight gas proposed area.

Q. Without the incentive price do you believe any infill wells will be drilled in the area?

A. No, I believe not.

Q. Will you please identify what has been

marked for identification as Four Corners Exhibit Number Fifteen?

A. Exhibit Number Fifteen is the written text explaining each of the exhibits that I have just presented.

Q. Were Exhibits One through Fifteen prepared by you or have you reviewed them and can you testify as to their accuracy?

A. Yes, I can.

Q. In your opinion will granting this application result in the production of gas that otherwise would not be produced?

A. Yes.

Q. Will granting the application be in the best interest of conservation, the prevention of waste, and the protection of correlative rights?

A. Yes, it will.

MR. CARR: At this time, Mr. Stamets, we would offer into evidence Four Corners Exhibits One through Fifteen.

MR. STAMETS: These exhibits will be admitted.

MR. CARR: I have nothing further of Mr. McCord on direct.

MR. STAMETS: Are there questions of the

witness?

MR. BUCKINGHAM: Yes, sir.

MR. STAMETS: Would you identify yourself for the record?

MR. BUCKINGHAM: Allen Buckingham, USGS.

This morning I gave Mr. Carr and the Examiner a copy of some questions we had concerning this application. Some of them have been answered during this testimony but Bob Higgins, a geologist, has some more specific questions relating to the ones I gave this morning he would like to ask at this time.

QUESTIONS BY MR. HIGGINS:

Q My name is Bob Higgins. I'm a geologist with the USGS in Albuquerque.

Okay, in your testimony, page two, paragraph three, you state that the low number of producing wells, 13, in the designated Huerfano -- proposed Huerfano tight sand gas area, and the cumulative and current gas production rates indicated a poor quality of Dakota formation in this Huerfano area as opposed to surrounding areas.

Why is this Dakota poor quality in this area? Is there a geologic reason? Is it a mappable feature?

What does it relate to?

A. It possibly might be a mappable feature if you're looking at cumulative production for the wells.

Actual analysis of the log data will show you that in the Huerfano area itself the Dakota has lesser induction resistivity and lesser porosity than the wells surrounding it in the outside areas. This, combined with the fact that the production from these wells has been minimal compared to the outlying areas indicate that we have a poor quality of rock inside the area.

Q. Okay, so there's been no attempt, in other words, to map these trends.

A. No, there has not. What we have done in -- in blocking off this area, is -- is not to determine which area is a tight gas area or which area is not a tight gas area, but it's a boundary of study for this entire area. What I wanted to do was cut out the producing parts of the area in that it would not hurt our presentation. It's obvious that wells inside the area are poor quality wells. The extra price incentive would be a great help for us to develop this area.

Q. That leads into another question. You used the wells that were within this area. Some of these wells are a good many miles away from, say, the northwestern

portion of this area, where you have well data that's within a mile or a quarter of a mile, and when you statistically treated that to determine the flow rates, permeability, and the other criteria for the 107 gas price --

A. Uh-huh.

Q. -- you didn't use data from this well, is that correct, or from the surrounding northeastern producing areas?

A. I used the core data from that area. As you notice, we have a core that's just right outside of the area, so that is a producing well. If I recall, it's a fairly good well. It was averaged in along with all our poorer wells and our qualifications were still well under -- under our limits for a tight gas classification.

So for that reason, I went ahead and used our core data. We have a large number of core analyses run in this area, so I took full advantage of all of them.

Q. But you're saying that you only used one core data outside of the proposed Huerfano tight gas sand area.

A. That's correct. We were not trying to designate the area outside of the area as tight gas, just the inside of it.

Q. Okay. Is it reasonable to assume in the

case of the proposed Huerfano tight gas sand, that the core data used for measuring the permeability in the laboratory yields a result that is 85 percent higher than the in situ permeability?

A. Yes, very reasonable.

Q. You think that're reasonable, and the main reason for this is the -- due to the overburden?

A. It's due to confining pressure, which is overburden minus your reservoir pressure.

Q. And if you had taken into account the water saturation, it would have been even more damaging, as far as permeability?

A. Yes, according to our Exhibit Twelve paper, it would have been even worse.

Q. Okay, in this proposed Huerfano tight gas area, what sort of increase in the potential flow rate could be expected from fracing; that is, if you frac the well, would you expect to get 10, 15, 20 times the flow rate from an unfraced well?

A. Well, that's really hard to say, of course, due to the very nature of the wells, even within this poor area you'll see wells that will exist quite different flow characteristics from the well next to it. As in most of the Dakota, there are sweet spots involved. So really,

depending on the well, that would be tough, but I would say in the neighborhood of five times the -- possibly ten times, would be in the accurate range.

Q. And you believe an average pre-frac flow rate of 48.5 Mcf per day is reasonable based upon your calculations?

A. Yes, I do.

Q. Using the calculated figure 48.5 Mcf per day initial pre-frac flow rate of all the Dakota wells in the proposed Huerfano tight gas sand area, there is an increase in flow rate greater than 20 times. Is this a reasonable result for fracing the Dakota in the area?

A. I believe so, when you consider those initial potentials are 7-day buildups and 3-hour flow tests, which are just used as a comparison basis to other wells in the area. In actuality, a possible guess to that, you could probably take 20 percent of that initial potential and that's it would get you somewhere in the ballpark of what that well would actually do when it's actually put on line, so that 20 times greater is substantially reduced when you're not referring to initial potential. It's a misleading figure.

Q. The Dugan Production Company's "MF" No. 1 Well was the only well in the area that had a pre-frac flow rate, and it produced 152 Mcf per day, and this was a 3-hour

test, and you think that if it was produced -- with further production that that rate would decline and it's not representative of this Huerfano tight sand gas area?

A. Well, I can't say that it's not representative. I believe it's a high rate due to the, once again, to the 7-day buildup and the 3-hour flow rate, so it will be reduced. But it may also be a good well in the area, and that's always a possibility.

I believe the calculated rate of 48-1/2 Mcf per day is a little better number and that we're taking established reservoir parameters and actually calculating what type of flow rate should come about through an average of the entire area. This is just one part of the area; that it could be a good well. But I do believe it will be reduced over a period of time.

Q. But the Dugan well is an actual case. It's not --

A. That's correct.

Q. -- calculated or anything. It's an actual flow rate.

A. The only real way to say if that's high or low is to have natural rates on ten or fifteen, if possible, wells, and that's just not practical. People need to frac these wells to make them commercial.

Q. Did you look outside of thi proposed area to see if any of the wells in the nearby area had pre-fraced flow rates?

A. Yes, I did, and I did not find much of anything. Like I said, it's not a standard practice and that information is hard to come by.

Q. Okay. Were the 22 Dakota dry holes drilled in the proposed Huerfano tight gas area primarily a function of geologic and/or engineering parameters or was there gas present but it was uneconomic to produce?

A. I think there's a combination of both on those. Some of the dry holes were produced for a period of time and then abandoned, which they would have been -- they had to be economical at one time or they would not have been produced. Other times there's some old dry holes in the area that were drilled and abandoned. The gas price might not have been there even though the hydrocarbons were.

So the answer to your question, I think it's a combination of both.

MR. HIGGINS: That concludes our questions for the USGS.

MR. STAMETS: Are there other questions?

MR. CHAVEZ: Yes, I have some questions.

QUESTIONS BY MR. CHAVEZ:

Q. Going over these permeability samples that you have in your exhibits, why did you not use the perforated intervals, say, for example, in the Hanson No. 1 of Tenneco, to calculate what the permeability of that particular well was? I guess I didn't understand your parameters for why you selected permeability ranges for averaging.

A. Okay. In many cases the perforated intervals would -- would -- is very company oriented as to what one company calls pay versus another company's pay. My cutoffs established a shale base line throughout the area and this turned out to be 10 ohms of resistivity.

So I was looking at Dakota formation with induction anything over this 10 ohms, and we also, we had a problem that all the cored interval did not always grab all the pay, so you just kind of had to grab the areas that were inside the pay zones and actually had a resistivity of greater than 10 ohms.

Q. Okay, so let me explain it back to you to see if I got it right.

In your permeability averages you looked at the logs first to find those areas with over 10 ohms.

A. That's correct.

Q. Resistivity, and then used only the permeabilities from the cores in those particular depths.

A. That's correct.

Q. Okay.

A. Only the cored intervals from those depths. We did not use any -- we did not have any information -- there might have been pay that was not cored and that's very common.

Q. Okay. In Exhibit Number Five -- not Five, the exhibit Number Twelve on the effects of overburden pressure, why did you use the gasbuggy core graph instead of a wagonwheel graph to calculate the effect of the overburden?

A. Okay, first of all, the gasbuggy core is a PC well, and the Pictured Cliffs is generally a tight gas formation such as the Dakota. Without actual core data of this nature being run on the Dakota formation, this was just about all we had to go on. If you'll notice, the line I chose in finding my 85 percent reduction factor, the initial laboratory core permeability for this core was 0.151 millidarcies, which is very close to my 0.159 millidarcies average for the Huerfano area.

Q. But wasn't the Dakota core -- I mean the wagonwheel actually the Dakota formation, also?

A. If it was I went right over that. I

used the Pictured Cliffs.

I don't know. I don't know that for sure. I'm sure it will say something in here on it.

I don't believe so.

(There followed comments off the record.)

MR. STAMETS: For the record let's clarify that point. We had people all over the place responding.

What was the answer to that?

Q. The answer is not a cretaceous formation. It was not covered.

MR. STAMETS: Thank you.

Q. Is all the land within this area leased?

A. Yes, it is. Some have expired. I say on that yes. Some have expired in the area. It is all of known geologic structure. In fact, in finding out ownership of these leases, I sent -- I've gone to the Federal Abstract Company in Santa Fe here to get ownership for all these oil and gas leases, and we do have in the neighborhood of 67 individuals involved in these leases, so it is not just one or two companies. It's a large amount of companies involved.

Q. Okay. The -- on your Exhibit Number One, I guess it is, it shows the area laid out for the appli-

cation. In 23 North, 8 West, Section 5, there's the Kenai Well, which is shown to be producing from the Graneros formation.

A. Uh-huh.

Q. Which would be considered part of the Basin Dakota Field. Is there any particular reason why that was left out of the application?

A. No particular reason. As I stated before, I have a large amount of area here. I needed to pick some guidelines as a basis of study. I did go through and cut out all our large producing areas that might possibly hurt our case, and in doing so, I would like to say that I did not try and state that one side was a tight gas area, the other side was not. I was just using this as a basis of study to determine this as a tight gas area.

So it's very possible and probably very probable that this Kenai Well exhibits very similar characteristics to the tight gas area.

Q. Okay, would it -- stimulation, then, your expected average production -- I'm sorry, without stimulation your average production would be approximately 48-1/2 Mcf a day average?

A. Calculated, yes.

Q. Calculated average?

A. Yes, that is correct.

Q. And what was the oil condensate?

A. 1.3 barrels per day.

Q. With stimulation that would --

A. I have not calculated that with stimulation. I have calculated prestimulation rates due to that's what's called for in the guidelines.

MR. CHAVEZ: That's all I have. Thank you.

A. Thank you.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. McCord, the type log section that you presented as an exhibit somewhere in here, has the top of the formation on it but I don't believe it contains the full section and so we were not shown the bottom of the Dakota.

A. Yes, sir, Mr. Examiner, in many cases the Dakota -- the Morrison is not drilled into due to the high water content of this formation. So finding a type log that will show the Morrison adequately is often hard to find.

Q. Okay, but you feel if we use this as the -- well, we could use this as the type log and the 400 foot definition.

Did you examine the logs on all the wells inside this area?

A. Not all the logs. Most of them that I could get hold of, yes. A lot of them are pretty old and hard to come by. This was the most representative log where I could show all of the producing tight formations.

The Graneros sometimes does not show up but the main Dakota sand is always prevalent throughout the area.

Q. Did any of those logs penetrate the Morrison?

A. I imagine they probably did. I did not go into that detail with them.

Q. I wonder if it would be possible to get a type log that had the entire section?

A. Maybe we could look through them and see if there is one with a --

Q. I certainly think it would be worthwhile if this is designated as a tight sands area to have a section that shows exactly what it is we're looking at from top to bottom.

MR. CARR: We would request that the record be left open to let us supply you with the most representative log that we can find that would include some

indication as to the location of the Morrison.

Q. Very good. Where is the area in relationship to the Basin Dakota Pool?

A. The Basin Dakota Pool is, to the best of my knowledge, throughout --- is it throughout the entire San Juan -- San Juan Basin. So --

Q. Let me rephrase that question. Where is this area in relationship to the developed Basin Dakota Pool?

A. Okay, it is to the south of the Basin Dakota.

Q. Is this also on the immediate south or southeast, southwest?

A. Southwest.

Q. How about -- is it southwest?

MR. CHAVEZ: Uh-huh.

Q. Okay, if you say so.

How did you select the area for the application today?

A. Okay. Through the Four Corners Gas Association Executive Committee, which consists of Tom Dugan as President and Robert L. Bayless, Jr., as Vice-President, the area of study was generally including these township and ranges. We wanted to get a large base area established as tight gas for possible expansion later on of other companies'

individual interests, if they choose to do so. That's why I chose it as a basis of study rather than any specific factors.

Q. Now there are wells to the north. Is this an area which has been undergoing rapid development moving into this tight sands area or is this an area where the wells have been on production for some time with little new development?

A. I would say it's the latter. Some of these wells, they've been developed through the -- through the years.

Now, this also includes some of the Huerfano Unit, which is separate and apart from the Huerfano tight gas area. A lot of El Paso wells are involved. Some smaller companies have come in and developed their interests in a more rapid manner than these older, established wells.

And on Exhibit One the Huerfano Unit is not outlined.

Q. Now, for example, this salient that comes in at about the middle on the north side, it looks as though a lot of those wells are back in the '60s; there is '60, '68, '65, and so on. Some of the newer development appears to occur on the west side with '76 and '77. I see one dry hole in there that's a '76. I thought I saw an '80 in there some place. There's a dry hole.

A. I -- the only '80 dry hole that I believe, is the Dome Well, and that would be in 25, 8, I believe it would be in the lower section, probably section, in the neighborhood of 31, 32, in that area.

That was due to a lease expiration date.

Q. How many of the wells inside the area are producing from the Dakota at this time?

A. I believe there's thirteen. Thirteen wells in the Dakota. Now some of the wells --

Q. We're going to take a coffee break in a minute or two here, and I'm going to let you mark those thirteen wells on my copy of the exhibit here.

I think we will do that at this point, take about fifteen minutes.

(Thereupon a recess was taken.)

Q. When we took a break I asked that you circle the producing wells in the area, and I see you have done that with orange circles.

A. That's correct.

Q. Let's just talk about some of those, if we could.

Up in the far northwest corner of the

area there are two wells. They appear to be first delivered in 1976, is that correct?

A. Are those the Universal Resources wells?

Q. Right.

A. Okay, that's correct.

Q. Okay, and those are both Dakota wells, right?

A. Yes, sir.

Q. Then in the cum production for the northernmost well says .099. What is that indicative of?

A. That is Bcf.

Q. Bcf, okay. Okay, when we move over to 25 North, 9 West, in Section 12, there is a well marked new well. Now is that a well that's just in process of being completed?

A. Yes, sir, it is. I have no initial production figures for that well.

Q. Okay. And the other three wells in the immediate vicinity are 1974 wells.

A. That is correct.

Q. Mr. McCord, now you've given us a couple of cross sections and a type log. There was no structure map, no Isopach. Why did you choose not to submit that type of evidence?

A. It was my feeling that the log cross sections showed that the Dakota was a continuous formation throughout the proposed area and that it would suffice as far as the geologic criteria.

Q. You do show wells on Exhibit One outside the area that you propose; in 5 of 23 North, 8 West, there is a well that's a Dakota well; and then you have edge wells on the east side; wells on the north. About the only place I don't see wells is down along the southwest margin of the area.

To your knowledge, does the Dakota formation exist beyond the southwest boundary of the area that you have proposed here?

A. Yes, sir, it does. There are no wells to my knowledge in that area. The wells I have shown bounding the proposed area was for clarification purposes, just to show that there were wells there.

MR. STAMETS: Are there other questions of this witness?

MR. PADILLA: I have a couple, Mr. Examiner.

CROSS EXAMINATION

BY MR. PADILLA:

Q. Mr. McCord, what percentage of the well completion costs are attributed towards fracing of the well and stimulation of the well in the area?

A. In the neighborhood of 10 to 15 percent of the total well cost.

Q. What kind of payouts do you -- are you looking at for wells completed in the area?

A. Sir, I have not really done any detailed economic analysis of these wells. It would certainly depend on where the well was drilled in the area, whether it was close to production or in the -- a long distance from production. Of course that would -- we've got a large area involved here and there is going to be varying well characteristics, and depending on how good the well is, of course, will depend on the payout. I have not done any economic data to support those.

Q. We do have some producing wells in the area now. Wouldn't that give -- wouldn't you have an idea of what payout is for some of those wells?

A. I could not give you an exact figure, but from the low cumulative production shown for most all of the wells in the area, I would say it would be an awful long time for payout. They're certainly not very good wells and probably on the verge of being economic.

Q. How much does it cost to drill a well in the area?

A. Approximately $445,000.

Q. To your knowledge is there any geologic feature separating the -- the wells north and west of the northern boundary of your area?

A. I would presume, looking at the cumulative productions from the wells outside of the proposed tight gas area versus the wells inside of the area, we have better Dakota pay zones in these outside areas, based solely on -- on the cumulative production. There's obviously gas in these wells that we're not seeing in the wells inside our area, due to the differences in cums.

Q. Do you know whether the pay thickness is different for those wells to the north as compared to the ones in the south?

A. I would assume the pay thickness is larger; probably better log characteristics.

Q. What's the -- I think maybe the question has been asked, but what's the closest town with respect to this area?

A. It would be -- Farmington would be approximately 26 to 30 miles northwest.

Q. Now, I'd like to -- you said the initial

potentials of the wells were misleading, and I'd like to -- for you to elaborate on that. Maybe that's been touched on already, but your -- one of your cross sections indicated I think, that the -- some of the initial potentials were 1200 per day. Is that a pre-frac or after frac?

A. That is a post-frac figure, and that is an absolute open flow, as required by the State of New Mexico for an initial potential, and this value is taken, as I said before, after a 3-hour flow test and a 7-day buildup. This is -- past experience has shown that these numbers are abnormally high and smaller percentages are actually what the well will produce.

Q. Would you have 7-day buildups north of the line?

A. Actual pre-frac buildup tests?

Q. I mean would you have the same kind of initial potentials based on 7-day buildups north of the -- north of the line?

Would you do the same thing whether -- irrespective of where the line lies?

A. Yes, that's correct, and I would assume that wells, in looking at the -- some of the production figures, these IP's are larger north of the proposed area.

Q. As far as your area that you're proposing

here today is concerned, I guess the final analysis is that it hasn't been economic to drill there and that's why there aren't any wells, or that's why there are only thirteen producing wells.

A. That's a very good conclusion. Yes, it's not an economic area right now.

Q. And in this area there are also, what, twenty-two dry holes, is that --

A. That's correct.

Q. Of the wells that are producing here, how long did they generally produce? What's the life of one of those wells?

A. Once again, I'm sure that would depend on -- on the well and how good it is, how good of a well it turns out to be. We'd be conjecturing. I really don't know.

Q. Well, could you give us an average or you just don't know what the average is?

A. I really don't know. I haven't looked into that. These -- there are just not long production estimates for these wells, or not enough production data. There's been no -- they've just been such poor and sorry wells.

Q. I guess on that paper, one of your exhibits, the Exhibit Number Twelve, is the relevancy of that to this area -- is the relevancy the Pictured Cliffs formation?

Is that what you're -- how you're tying the Dakota to the -- or that paper to this application?

A. That's correct. Exhibit Twelve dealt with the Pictured Cliffs formation, and that's the only study that we have published so far that we can refer to for tight gas -- for tight sandstone reservoirs.

So what we have done is chosen an ini-- tial laboratory permeability that is very close to our Dakota permeability and used this -- and used this in our Dakota study. I would say they are very, very similar.

Q. For the record would you please state where the Pictured Cliffs formation is in relation to the Dakota?

A. Okay. The Pictured Cliffs -- let me make sure of that.

In the neighborhood of 2000 to 2500 feet, depending on where it's located in the area.

Q. Above?

A. Above, yes. No, pardon me. That's 2000 to 2500 feet total depth; otherwise, the Dakota being 6350 feet, the Pictured Cliffs being 2000 to 2500 feet.

Q. So --

A. It is above the Dakota.

Q. So based on this paper you have a greater

overburden factor on the Dakota.

A. That is correct, but the paper has gone through and taken a Pictured Cliffs core and subjected it to a great amount of pressure, and in doing so they have taken data points throughout these pressure changes, and we have established ourselves a curve. So for our confining pressure in the Dakota we're able to read off the graph the permeability reduction due to this confining pressure.

Q. Do you think that the core of the Pictured Cliffs in that case would be similar to the Basin Dakota? If you took a Basin Dakota pressure and subjected it to the same type of pressure would you get basically the same type of results?

A. Yes, sir.

MR. PADILLA: Mr. Examiner, I have no further questions.

MR. STAMETS: Are there other questions of this witness?

MR. CHAVEZ: Yes, I have one -- or a couple questions.

QUESTIONS BY MR. CHAVEZ:

Q. Were there any pressure buildup tests run -- was any pressure buildup test data available on any of

the wells which are producing or which had been plugged in this area?

A. Yes, sir, there have been some DST's run on the area, but these are scattered and old tests, hard to examine, and the core data from these is a much, much better and easier means of calculating permeability.

The DST's need to be, in a tight gas formation, need to be in the hole quite a period of time to get an adequate buildup and an accurate value of permeability from your buildup analysis. If you do this in open hole a lot of times you will lose your DST. You cannot leave them in the hole that long.

The only adequate method of pressure buildup is either a bottom hole pressure bomb or a cased hole type DST data to determine permeability, and there are none of these available in the area.

Q. Do the production decline curves on the producing wells within the area reflect a decline that's common through the Dakota?

A. Yes, they do. That involves a high initial decline rate with a leveling out in the neighborhood of 4 to 6 percent in the latter years, possibly 5 years down the road, with the wells that long a life -- a producing life, and there are only a couple of them in the area.

Q Have you done any calculations to calculate the reserves available in this area that would be -- would become economically feasible to recover under tight gas sands price?

A Yes, I have. Once again you've only got a couple of wells to look at, and my estimation is the ultimate reserves we'd be able to get in this area is a half a Bcf or less, probably less than that.

Q Per well?

A Per well.

Q At a 6 percent decline rate in considering the wells eligible for a stripper gas price, say when they reach average rate of production of 60 Mcf or less, do you figure that the payout would be, say extend more than five years on the average well within this area?

A Can you state that again, please?

Q Considering a 6 percent decline rate on these wells, and also that the wells would become eligible for stripper gas price at a 60 Mcf or less daily production rate, would that extend the payout period, say more than five years for a well drilled within this area without tight sands pricing?

A I would have to put in on paper and look at it, but that sounds fairly reasonable.

MR. CHAVEZ: I have no further questions.

MR. STAMETS: Any other questions of the witness?

MR. TULLY: I'm Richard Tully from Farmington, a few questions.

QUESTIONS BY MR. TULLY:

Q Referring to Exhibit Number One, you don't mind if I stand over your shoulder here, up in this area, did I understand you correctly to say that the area not included within the subject area, and about the middle of it and to the north --

MR. STAMETS: Would you identify this area, please?

MR. TULLY: Yes. The Township 25 North and Township -- Ranges 9 West and 10 West, and as it comes down and jogs down and comes back up, it would be about half -- well, mainly in 25 North, Range 9 West.

Q You have a line drawn here also included in some of the subject lands and not in other lands. In addition, you also appear to have a cross section running north and south. Is it my understanding that you used this information, the log information, core data, and IP information in order to try to determine whether or not this particular

area might also be classified as a tight sands area?

A. No, I did not. As I stated before, this entire area was just chosen as a field of study. These production areas were not considered due to the large number of wells involved in this area. The area below the production figures and the rates and averages shown were taken in this area below this area and not in this area up here.

Q. Okay. Referring, though, to some of these wells in this area not included in the -- in your application, does it appear to you that in the northern part of the Township 25 North, Range 9 West, as well as in the northern part of the Township 25 North, Range 10 West, that there are numerous wells that were drilled in the early, mid, and late '60s?

A. Yes, that's correct.

Q. And does your map indicate whether or not any new wells have been drilled in that -- in those same areas?

A. Yes, it does.

Q. Okay, and could you please identify a couple of those for us?

A. I have a couple of infill wells, a Consolidated well, 25 North, 10 West, Section 11, and this would be in the northwest quarter, which is the Navajo 2-E, is a new

well.

Also 25 North, 10 West, Section 2, Consolidated Oil and Gas, in the north -- excuse me, the southeast quarter, the Consolidate Navajo 1-E is 12-80.

Township 25 North, Range 9 West, Section 19, northeast quarter, Consolidated Ladd No. 1-E was drilled in 12 of 80.

In that same township, range, and section, Consolidated, in the north -- in the southwest one quarter, the Mills 1-E -- excuse me, that's the -- that's the southeast quarter, the Mills 1-E, in 12 of 1980.

There's also an El Paso Natural Gas well, Huerfano 281, 25 North, 9 West, Section 5, I believe the southeast one quarter, the Huerfano 281, 8 of 78.

There are considerable more wells, or a few more wells in this area.

Q. Okay. Now, also in this same area, though, do you see very many -- are you aware of the Dakota infill order from New Mexico Oil Conservation Division?

A. Yes.

Q. Do you know when that was enacted?

A. I don't have the exact date, no.

MR. TULLY: Do you happen to have that date? October of 1979.

Q. Looking in the same area, in addition to those wells that you've just enumerated as being recent wells, are there a lot of other wells in this same area that were drilled in early, mid, and late 1960's that have not at the present time had infill Dakota wells drilled on the same proration units?

A. That's correct.

Q. Now, what would you, in your opinion, in this area not included in your area, but in this area up here, what would you think would be some of the reasons, or one of the reasons that there has not been Dakota infill wells drilled for these 1960 wells?

A. Probably the cumulative production on these wells is not sufficient to justify the drilling of a new well.

Q. Okay. Log data, core data, and IP test information, would that -- have you reviewed that on these wells that we've just talked about that were drilled in 1960?

A. To the extent of placing them on the map here, yes.

Q. Okay, would it be fair to say that that information would possibly qualify those wells if they were going to be drilled now as tight sands gas?

A. Possibly, but I'd like to state also,

that is not the purpose of my study.

As I've said before, this is merely an area of study. There can be areas inside and around this area that could be justified as tight gas. I am merely working on the Huerfano tight gas area.

Q. Okay. A hypothetical question and then I'll terminate.

Would it be possible that on the undrilled Dakota acreage for infill purposes on these 1960 wells, that those undrilled locations could possibly qualify for tight sands?

A. Yes, they possibly could.

MR. TULLY: Thank you.

A. Uh-huh.

MR. STAMETS: Are there other questions of this witness? Mr. Carr.

REDIRECT EXAMINATION

BY MR. CARR:

Q. Mr. McCord, in response to the questions just asked by Mr. Tully, the area that he was talking about in Township 25 North, Ranges 9 and 10 West, that is outside the subject area, the area governed by this application, is that correct?

A. Yes. it is.

Q. Are there any infill wells drilled within the subject area?

A. Yes, there were.

Q. How many?

A. To my knowledge four infill wells.

Q. And the area that you were talking about, reviewing with Mr. Tully, has substantially more than that, is that correct?

A. More infill wells?

Q. Yes.

A. Yes, to the north there is, to my knowledge, off the map. We don't have these listed here. To my knowledge, yes, there probably are more infill wells drilled.

Q. The acreage, however, in Township 25 North, Ranges 9 and 10 West, has been excluded from this application, is that correct?

A. Yes, it is.

Q. Anyone else would be free to bring an application for any other area they felt might qualify, is that right?

A. That is correct.

Q. And you're not here today to testify as to whether or not that area should or should not qualify for

a tight sand designation, is that correct?

A. That is correct.

Q. Now I'd like to direct your attention to Four Corners Exhibit Number Two. This is the log which we've discussed with Mr. Stamets.

I believe you previously testified that that log did not show the Morrison, is that correct?

A. Yes, it is. During the break I have talked with Mr. Curtis Little, who previously had worked for Universal Resources and had drilled this well. He indicated to me that this log did in fact show the Morrison formation, and this is indicated by log depth 6338.

Q. So below that depth we have the Morrison formation?

A. That is correct.

Q. Based on your review of the logs in the area, is this log the best quality of any that you've reviewed?

A. Yes, it is. This is the best log I've found in the entire area to -- to show the characteristics of the Dakota formation in this area.

MR. CARR: Mr. Stamets, with your permission, we would request that this log be treated as the type log and that everything, all depths below, or the top of the Morrison be indicated on this as at a depth of 6338.

MR. STAMETS: Okay, I've done that.

MR. CARR: If you would like for us to supply additional logs, we could do that, but we believe this is probably the best quality log and would be most useful as a type log.

MR. STAMETS: Yes, that's fine. While we're there let's get the figure for the top of the Dakota. Would that be 6048 feet?

A. Yes, that is correct, 6048 feet, that also being the base of the Greenhorn.

MR. STAMETS: Okay.

Q. Mr. McCord, I believe you indicated in cross examination that it was your opinion that the quality of the Dakota formation fluctuated throughout the subject area, is that correct?

A. Yes.

Q. Now, was it your testimony that you have reviewed all data available to you on wells located within the subject area?

A. That is correct.

Q. Now the Kenai Well that you discussed in cross examination by Mr. Chavez, that lies outside the subject area, is that right?

A. Yes, it is.

Q. Based on your study of this area, in your opinion would any portion of the subject area fail to meet the requirements necessary to qualify it as a tight formation?

A. No, the entire area will qualify, in my opinion.

Q. Now, I believe Mr. Stamets asked you to locate the subject area in regard to other Dakota production in northwestern New Mexico, is that correct?

A. Yes.

Q. Would you be willing following the hearing to submit to Mr. Stamets for inclusion in this record a plat which would show the Dakota wells and also outline the subject area so that it would clearly show where this lies in respect to other Dakota production?

A. I'd be happy to.

MR. CARR: I have nothing further on redirect.

RECROSS EXAMINATION

BY MR. STAMETS:

Q. Just one more clarifying matter. We had quite a few questions concerning the economics, and I believe that your request is not based on economic factors

but based strictly on permeability, productivity, and oil production, is that correct?

A. That is correct.

Q. Okay.

A. Due to the fact there are no infill wells in my proposed area.

MR. STAMETS: Are there any other questions of this witness? He may be excused.

Mr. Carr, I would certainly appreciate it if you could prepare a draft order --

MR. CARR: I'd be happy to.

MR. STAMETS: -- in this matter. That could be submitted with the additional data.

MR. CARR: We also believe that there have been certain telegrams or communications to the Division in support, or maybe in opposition, and we'd like them noted in the record.

MR. STAMETS: We do have various communications in support.

There is a letter from Dugan Production Corporation.

A telegram from Merrion & Bayless.

A telegram from -- who's that from?

A letter from Benson, Montin, & Greer

Corporation.

A telegram from Amoco.

A telegram from Supron.

Is there anything further in this case? The case will be taken under advisement.

If there is nothing further, the hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____, heard by me on _____ 19___.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
6 May 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Four Corners Gas Producers Association for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7252

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: William F. Carr, Esq.
CAMPBELL, BYRD, & BLACK P.A.
Jefferson Place
Santa Fe, New Mexico 87501

I N D E X

E X H I B I T S

MR. STAMETS: We'll call next Case Number 7252.

MR. PADILLA: Application of Four Corners Gas Producers Association for a designation of tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. CARR: May it please the Examiner, my name is William F. Carr, with the law firm Campbell, Byrd, and Black, P. A., in Santa Fe, New Mexico, appearing on behalf of the applicant.

We have one witness who needs to be sworn.

MR. STAMETS: Any other appearances in this case?

(Witness sworn.)

KEVIN H. McCORD

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your full name and place of residence?

A. My name is Kevin McCord and I live in Farmington, New Mexico.

Q. Mr. McCord, by whom are you employed and in what capacity?

A. I'm a self-employed petroleum engineer, acting as a consultant for the Four Corners Gas Producers Association.

Q. Have you previously testified before the New Mexico Oil Conservation Commission or one of its examiners?

A. No, I have not.

Q. Will you briefly summarize your educational background and your work experience?

A. I obtained a Bachelor of Science degree in petroleum engineering from the Colorado School of Mines in December of 1977.

Prior to this I held summer jobs with three different oil companies.

In May through August of 1975 I worked with Union Oil Company in Santa Maria, California, as a roustabout.

In June through September of 1976 I worked with Skelly Oil Company in Denver, Colorado, as an assistant reservoir engineer, involved with their computer work in their company's oil and gas figures for their coming

merger with Getty Oil Company.

In May through September, 1977, I worked with Amoco Production Company in Denver, Colorado, as a Senior Production Technologist. I worked in their reservoir department and wrote the reserve update study and field performance report on the Brady Field in southern Wyoming.

After graduation in February of 1978, to January of 1980, I worked with Amoco Production Company as a production engineer in the Montbello District Office in Denver, Colorado, and as a reservoir engineer in their regional office in Denver.

In January of 1980 I joined EEE Company, which is a consulting firm in Farmington, New Mexico. I worked as a consultant, supervising Dakota completion work until March of 1981, when I became self-employed.

Q. Mr. McCord, are you familiar with the application of Four Corners Gas Producers Association in this case?

A. I am.

Q. Are you familiar with the subject area?

A. I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. STAMETS: They are.

Q. Mr. McCord, will you briefly state what Four Corners Gas Producers Association seeks with this application?

A. The Four Corners Gas Producers Association is applying for a portion of the Basin Dakota Gas Field to be designated as a tight formation under Section 107 of the Natural Gas Policy Act of 1978.

The proposed Huerfano tight gas area is located in the south central portion of the San Juan Basin and covers portions of San Juan and Rio Arriba Counties in northwestern New Mexico.

Q. Have you prepared certain exhibits for introduction in this case?

A. I have.

Q. Have each of these exhibits previously been submitted to the Oil Conservation Division and to the United States Geological Survey --

A. Yes, they have. Oh, I'm sorry.

Q. -- with a statement of the meaning and purpose of each, as is required by the Commission rules?

A. Yes, they have.

Q. Will you please refer to what has been marked for identification as Exhibit Number One and explain what it is and what it shows?

A. Okay, Exhibit Number One is a Dakota formation completion and production map displaying the proposed Huerfano tight gas area. The area includes approximately 135,040 acres in Townships 24 and 25 North, Ranges 7 through 10 West.

The production figures presented for each producing well are initial potential, date of initial potential, average daily production for 1979, and 1-1-80 cumulative production of gas and oil.

I'd like to state at this time in my report there is a mistake. It is typed as 1-1-81 cumulative production. That should be 1-1-80.

Exhibit Number One also presents completion and production data from wells outside the proposed area to use as a comparison.

The Huerfano tight gas area contains 35 Dakota formation gas wells, 22 of which are abandoned in the Dakota at this time.

The low number of producing wells, which are only 13, in this designated area in comparison with the better producing locations outside of the area indicate the poor Dakota formation qualities this area has.

Examination of cumulative and current gas production rates also indicate the poor quality Dakota

formation in the Huerfano tight gas area.

Q. Mr. McCord, the area which is the subject of this application is outlined in blue on Exhibit One, is that correct?

A. Yes, it is.

Q. Certain of the wells appear to be color coded. Could you explain that coding to the Examiner?

A. In the pink, the pink wells are seven cored wells in the area, six of them actually in the area itself, one directly outside of the area.

The green wells are cross section wells, which will be presented in Exhibits Three and Four.

Q. And this exhibit also contains traces which is a key or an index to those later cross sections?

A. That's correct.

Q. Will you now refer to what has been marked as Four Corners Exhibit Number Two?

A. Okay, Exhibit Number Two is a type log of a typical well found in the Huerfano area. This log is of Universal Resources Grigsby Federal No. 4 Well, which shows the Greenhorn, Graneros, and Dakota formations. The type log shown is in the northwestern part of the tight gas area, which has exhibited better producing characteristics than the remainder of the area. Wells in the remaining sections of the

area could be expected to have the same or poorer log characteristics than this type log.

Q. Now, is the Graneros a separate formation or is it generally considered part of the Dakota?

A. It is generally represented as part of the Dakota formation.

Q. Is the Greenhorn part of the Dakota?

A. No, it is not.

Q. So this log shows the relationship of the Dakota to both the Greenhorn and the Mancos, is that correct?

A. That is correct.

Q. How is the Dakota formation defined by the Oil Conservation Division?

A. The State of New Mexico has defined the Dakota producing interval in the Basin Dakota Field to begin at the base of the Greenhorn limestone and extend to a point 400 feet below the base of the Greenhorn. The formations covered in this 400 feet are the Graneros, Dakota, Burro Canyon, and Morrison formations. The Graneros and Upper Dakota formations are productive in this area, while the lower Dakota zones, the Burro Canyon and the Morrison formations are generally water-bearing.

Q. What is the average depth of the Dakota

formation in the area which is governed by this application?

A. 6350 feet.

Q. And what is the gross thickness of the formation?

A. Approximately 200 to 350 feet gross thickness.

Q. Mr. McCord, will you now refer to Four Corners Exhibits Three and Four and explain what they are and what they show?

A. Exhibits Numbers Three and Four are log cross sections through the Huerfano area to show the continuity of the Dakota formation.

Cross Section A-A' is a log cross section in the northwest to southeast direction, while B-B' is in a north/south direction. These log cross sections use the base of the Greenhorn as a datum. I'd like to point out there is another mistake on these two exhibits, in that the counties listed are San Juan and Sandoval Counties. That should read San Juan and Rio Arriba Counties, New Mexico.

Wells both in and out of the designated tight gas area were used for comparison. Wells outside of the area tend to have a better quality reservoir rock, which is supported by the better production figures from wells outside of the tight gas area, as also can be shown in Figure 1.

Q. Now what do these cross sections show?

A. They show that the Dakota is a continuous reservoir throughout the area and also indicate the better sand characteristics outside of the Dakota -- the Huerfano tight gas area.

Q. Mr. McCord, what is the porosity range within the area governed by this application?

A. Approximately 5 to 15 percent.

Q. And what is the average pay porosity?

A. That is approximately 7 percent, and those were calculated by means of core analysis studies.

Q. Is the in situ permeability cutoff in the Huerfano tight gas area less than 0.1 millidarcy?

A. Yes, it is.

Q. And is this formation dependent on stimulation techniques to be commercially productive?

A. Yes, it is.

Q. Have you calculated permeability for this area?

A. Yes, I have.

Q. Would you review Exhibits Five through Eleven and explain what these are and what results you obtained?

A. Okay. Exhibits Five through Eleven present the core analysis data used to determine the average --

I'm sorry, they're inside the report.

MR. STAMETS: Thank you.

A. Exhibits Five through Eleven present the core analysis data used to determine the average laboratory permeability there for Dakota formations pay zones in this area. The exhibits contain the actual core analysis reports, plus summary tables showing the analysis of cores taken from only the productive portion of the Dakota formation.

The cored intervals chosen for permeability averaging were determined by log examination of the interval cored for each well. Only cored intervals of sand with more than 10 ohms resistivity appearing on the induction resistivity log of the well were used for permeability averaging. This 10 ohm resistivity cutoff represents the average resistivity shown by the shale sections on the logs and values less than this cutoff were not considered to be pay zones.

The average laboratory permeability to air determined for the Huerfano area in this manner was .159 millidarcy. The actual in situ permeability of the formation is less than this laboratory determined value, mainly due to confining pressures found in the Basin Dakota reservoir.

Q. What was the laboratory determined pressure -- permeability?

A. .159 millidarcy.

Q. Could you explain what causes that difference, the laboratory sample at 1.59 and the in situ at .024?

A. Okay. Laboratory core analysis tests are generally taken at approximately 100 psi, which does not indicate near the confining pressures found at reservoir conditions.

Q. Will you now refer to --

MR. STAMETS: Before we go on --

A. Sure.

MR. STAMETS: -- where on Exhibit Five are those final figures shown?

A. On Exhibit Five through Eleven I have averaged the permeability for each core analysis taken, the average of the -- of the seven different zones.

MR. STAMETS: Okay, let's go through this. Now Exhibit Five, the first well we have is Val Reese 3-29 Connie.

A. Uh-huh.

MR. STAMETS: And on the second page of that it says average permeability 0.393 millidarcies. Average in situ permeability .006 millidarcies.

A. Right.

MR. STAMETS: All right, now the aver-

age is the core lab average.

A. That is correct.

MR. STAMETS: And then the in situ is calculated from that, based on core pressure -- or overburden pressure.

A. Yes, confining pressure, which will be Exhibits Twelve and Thirteen.

MR. STAMETS: All right. Then you have the next one for the --

A. Stevenson No. 1.

MR. STAMETS: That's a different well.

A. Yes, the Stevenson No. 1 is Exhibit Six.

MR. STAMETS: The next one is the same well.

A. Okay, that's the actual core data following the summary table, is the actual core data used.

MR. STAMETS: Okay, and the difference between the two is the fact that you selected the zones on the first two pages as the zones most likely to be productive, is that correct?

A. That is correct.

MR. STAMETS: And the second two pages are the overall core.

A. That's correct. In many cases shales

were cored, which certainly would not be pay zones.

MR. STAMETS: And Exhibit Six is -- begins the second well, right?

A. That is correct. Six -- Five through Eleven were all prepared in the same manner. The per daily averaging values given on the first summary sheet, an average laboratory value initially, then an average in situ permeability value. These were averaged for the six -- for the seven different cases, the average laboratory value being .159 millidarcies.

MR. STAMETS: .1 --

A. .159.

MR. STAMETS: .159, not zero .159.

A. No. Well, zero.159.

MR. STAMETS: Zero .159, and then that converts to in situ of what figure?

A. .0 -- zero .024 millidarcy.

MR. STAMETS: That's for the six wells inside.

A. That's for an average of all seven wells.

MR. STAMETS: Okay.

Q. All right. Mr. McCord, will you now refer to what has been marked as Four Corners Exhibit Number Twelve and identify this?

A. Exhibit Number Twelve presents a technical paper written by Rex D. Thomas and Bond C. Ward of the U. S. Bureau of Mines, entitled Effect of Overburden Pressure and --

MR. STAMETS: Where is that?

A. It's --

MR. CARR: It's in the packet again. It's just -- they're all -- all the remaining exhibits are in the folder that was presented to you, the green folder, and they are tabbed on the righthand side so that you can, by just picking up the tabs, go exhibit by exhibit.

MR. STAMETS: Okay.

A. Exhibit Number Twelve is entitled Effect of Overburden Pressure and Water Saturation on Gas Permeability of Tight Sandstone Cores.

This paper presents relationships between laboratory determined permeability in cores and actual in situ permeability found in reservoirs.

Q. Now, Mr. McCord, will you please refer to what has been marked Exhibit Thirteen and explain what this is?

MR. STAMETS: Before you do that, would you highlight the appropriate conclusions from the paper that you've cited?

A. Okay. Their general findings in this paper is that net confining pressure on a core, otherwise subjecting a core to a substantial amount of pressure, such as reservoir pressure, substantially decreases the permeability found in the core from laboratory conditions.

Figure 1 in Exhibit Twelve lists the graph used, which I'll explain as Exhibit Thirteen, in finding the permeability reduction for this area. As you can see from the nature of the graph, the higher the pressure imposed upon the core, the lower the permeability found in the core itself.

MR. STAMETS: Okay.

Q. All right, Mr. McCord, will you now refer to Exhibit Thirteen and review that?

A. Exhibit Thirteen explains how in situ permeability was calculated from the core analysis, using this technical paper presented. An average in situ permeability of 0.024 millidarcy was calculated for the Huerfano area. This value is well below the .1 millidarcy tight gas cutoff.

Q. And this exhibit in effect is showing how the -- how Exhibit Twelve was applied to the subject area, is that correct?

A. That is correct.

Q. It shows your calculations?

A. Yes.

Q. Can gas be produced in commercial quantities from this formation without stimulation?

A. No, I believe not.

Q. Now, Mr. McCord, I believe you stated that the average depth of the Dakota in this area was 6350 feet.

A. That's correct.

Q. What is the maximum stabilized production rate against atmospheric pressure allowed for wells in the subject area at this depth by Oil Conservation Division rules?

A. That is 217 Mcf.

Q. Of gas per day?

A. Yes.

Q. Unstimulated. Have you obtained stabilized, unstimulated gas production rates for Dakota wells in the subject area?

A. Yes, I have. Obtaining the stabilized, unstimulated gas production rates for the Dakota wells is not a standard procedure used by companies when completing their wells. Past experience has shown that these low permeability Dakota wells must be stimulated to attain commercial production. Due to these facts, I have only one natural unstimulated flow test performed in the Huerfano tight gas area.

This test was on Dugan Production Com-

pany's "MF" No. 1 Well, which is in Township 24 North, Range 9 West, Section 18, and it's in the northwest of the southwest, 24, 9.

MR. STAMETS: Okay.

A. All right. This well tested at an unstimulated of 152 Mcf per day with no associated oil production after a 3-hour flow period to the atmosphere, and this followed a 7-day buildup.

To test the validity of this natural production figure, I used Darcy's law to calculate an unstimulated gas flow rate, using the average in situ value of 0.024 millidarcy, determined from core analysis.

Exhibit Number Fourteen presents this calculation and shows that initial unstimulated gas flow rate of 48.5 Mcf per day is associated with the average in situ permeability of 0.024 millidarcies for the area.

Now both the actual unstimulated gas production rate and our calculated unstimulated gas production rate for the Dakota formation are less than the 217 Mcf per day limit for tight gas reservoirs.

Q. Mr. McCord, is it possible that the Dugan Production Company "MF" No. 1 Well would have produced at higher rates than the typical well in this area?

A. That's -- that's very possible, the

reason being, it's just a 3-hour flow test for a 7-day buildup. When you start producing this for any length of time we have found that these IP's are not real representative of what the well will actually do over a period of time.

Q. In your opinion would the calculated figure be more reliable when applied to the entire area than the data from this one well?

A. Yes, I believe so.

Q. Do you have any unstimulated oil production figures for the subject area?

A. Yes, I do. Once again, the only well with unstimulated oil production figures is the Dugan "MF" No. 1 Well.

This well did not produce enough oil to measure so no oil production figures were reported during the production test; however, examination of Exhibit One will show that production figures for these wells in the Huerfano area show that some oil is produced in this area.

It should also be noted here that condensate is also reported as oil to the State of New Mexico; therefor, the oil production figures presented represent both oil and condensate that is not a liquid -- not in liquid form at reservoir conditions.

To examine the extent of this oil pro-

duction in the area, the cumulative oil production per Mcf of gas was averaged for every well inside the proposed tight gas area. This average value was 0.028 barrels of oil per Mcf of gas produced.

Applying this figure to the 48.5 Mcf per day rate calculated using Darcy's law, now this is of course from the core analysis data, resulted in an average initial unstimulated oil production rate of 1.3 barrels of oil per day.

So both our actual unstimulated and calculated unstimulated oil production rates do not exceed 5 barrels of oil per day.

Therefor, I believe no well drilled in the Huerfano tight gas area is expected to produce without stimulation more than 5 barrels of crude oil per day.

Q. Now, Mr. McCord, you made no effort to try and break down the liquids as to what portion of it was crude oil -- or oil, and what portion of it was condensate, is that correct?

A. That is correct. The results of my findings indicate that the combination of both are still under the 5 barrels of oil per day limit.

Q. The techniques that you've employed in reaching these figures, are they techniques commonly used and accepted by the oil and gas industry?

A. Yes, they are.

Q. Will the production of hydrocarbons from the subject area impair fresh water supplies in the area?

A. I believe not. We have existing State and Federal regulations that assure that development of the Dakota formation will not adversely affect or impair any fresh water aquifers that are being used or are expected to be used in the foreseeable future for domestic or agricultural water supplies.

The regulations require that casing programs be designed to seal off potential water-bearing formations from oil and gas producing formations. The fresh water zones in this area are from the surface to the base of the Ojo Alamo formation, which is in the range of 500 to 1100 feet. These wells are drilled with a natural mud, which will not contaminate any fresh water zones. The casing design is such that 8-5/8ths inch surface casing is set from 200 to 250 feet with cement being circulated to the surface. After reaching TD 4-1/2 or 5-1/2 inch casing is run to total depth and all potential oil, gas, and water-bearing zones have cement placed over them. If cement is not circulated to the surface, a temperature log is run to determine the cement top and if oil, gas, or water-bearing zones are not covered, they -- they must then be covered. All those zones are protected by

both cement and casing, therefor.

The fracs designs done in this area are usually done with one or two percent potassium chloride water, which will not contaminate a water zone, and there is also a substantial difference between the Dakota and the Ojo Alamo formation, approximately 5000 feet. This large distance involved is added insurance of no contamination.

Therefor, New Mexico and Federal regulations will protect any fresh water supply that may be affected by drilling, completing, and producing the Dakota formation in the Huerfano tight gas area.

Q. Mr. McCord, do these fresh water zones exist throughout the subject area?

A. Yes, they do.

Q. Approximately how much vertical distance is there between the Dakota formation and the Ojo Alamo fresh water aquifer?

A. Approximately 5000 feet.

Q. Now you made reference to existing State and Federal regulations. Have you reviewed these regulations as they relate to the protection of fresh water?

A. I have.

Q. In your opinion will compliance with these regulations assure that the development of the subject

area not impair any fresh water aquifer during either drilling or waste disposal operations?

A. I do.

Q. Is it your testimony that the proposed development of the subject area will not adversely affect the domestic or agricultural supplies?

A. Yes, it is.

Q. In your opinion is the price authorized by Section 107 of the Natural Gas Policy Act necessary to provide a reasonable incentive for production of natural gas from the subject formation due to the extraordinary risks or costs associated with such production?

A. Yes, I believe that adequate production of the area will not be obtained without the incentive price.

Q. In your opinion does the data presented at this hearing support the conclusion that the entire area governed by this application qualifies for a tight formation designation under Section 107 of the NGPA?

A. Yes, it does.

Q. Now, you have covered these points, but I want to be sure that the record is clear on each of them.

Is the in situ permeability in the subject area less than .1 millidarcy?

A. Yes, it is.

Q. Is the stabilized production rate at atmospheric pressure or calculated against atomospheric pressure from the Dakota wells completed in this area less than 217 Mcf of gas per day?

A. Yes, they are.

Q. And do you expect any wells drilled into any portion of the Dakota which is covered by this application to produce more than 5 barrels of crude oil per day prior to the application of stimulation techniques and practices?

A. No, I believe it will not.

Q. Has this area been approved for infill drilling?

A. Yes, it has.

Q. Have any infill wells been drilled in the subject area?

A. No, not in the subject area. If you look at Figure 1 again you'll notice that there is some production to the north of this area and some infill drilling has been done in this area, but none in the Huerfano tight gas proposed area.

Q. Without the incentive price do you believe any infill wells will be drilled in the area?

A. No, I believe not.

Q. Will you please identify what has been

marked for identification as Four Corners Exhibit Number Fifteen?

A. Exhibit Number Fifteen is the written text explaining each of the exhibits that I have just presented.

Q. Were Exhibits One through Fifteen prepared by you or have you reviewed them and can you testify as to their accuracy?

A. Yes, I can.

Q. In your opinion will granting this application result in the production of gas that otherwise would not be produced?

A. Yes.

Q. Will granting the application be in the best interest of conservation, the prevention of waste, and the protection of correlative rights?

A. Yes, it will.

MR. CARR: At this time, Mr. Stamets, we would offer into evidence Four Corners Exhibits One through Fifteen.

MR. STAMETS: These exhibits will be admitted.

MR. CARR: I have nothing further of Mr. McCord on direct.

MR. STAMETS: Are there questions of the

witness?

MR. BUCKINGHAM: Yes, sir.

MR. STAMETS: Would you identify yourself for the record?

MR. BUCKINGHAM: Allen Buckingham, USGS.

This morning I gave Mr. Carr and the Examiner a copy of some questions we had concerning this application. Some of them have been answered during this testimony but Bob Higgins, a geologist, has some more specific questions relating to the ones I gave this morning he would like to ask at this time.

QUESTIONS BY MR. HIGGINS:

Q. My name is Bob Higgins. I'm a geologist with the USGS in Albuquerque.

Okay, in your testimony, page two, paragraph three, you state that the low number of producing wells, 13, in the designated Huerfano -- proposed Huerfano tight sand gas area, and the cumulative and current gas production rates indicated a poor quality of Dakota formation in this Huerfano area as opposed to surrounding areas.

Why is this Dakota poor quality in this area? Is there a geologic reason? Is it a mappable feature?

What does it relate to?

A. It possibly might be a mappable feature if you're looking at cumulative production for the wells.

Actual analysis of the log data will show you that in the Huerfano area itself the Dakota has lesser induction resistivity and lesser porosity than the wells surrounding it in the outside areas. This, combined with the fact that the production from these wells has been minimal compared to the outlying areas indicate that we have a poor quality of rock inside the area.

Q. Okay, so there's been no attempt, in other words, to map these trends.

A. No, there has not. What we have done in -- in blocking off this area, is -- is not to determine which area is a tight gas area or which area is not a tight gas area, but it's a boundary of study for this entire area. What I wanted to do was cut out the producing parts of the area in that it would not hurt our presentation. It's obvious that wells inside the area are poor quality wells. The extra price incentive would be a great help for us to develop this area.

Q. That leads into another question. You used the wells that were within this area. Some of these wells are a good many miles away from, say, the northwestern

portion of this area, where you have well data that's within a mile or a quarter of a mile, and when you statistically treated that to determine the flow rates, permeability, and the other criteria for the 107 gas price --

A. Uh-huh.

Q. -- you didn't use data from this well, is that correct, or from the surrounding northeastern producing areas?

A. I used the core data from that area. As you notice, we have a core that's just right outside of the area, so that is a producing well. If I recall, it's a fairly good well. It was averaged in along with all our poorer wells and our qualifications were still well under -- under our limits for a tight gas classification.

So for that reason, I went ahead and used our core data. We have a large number of core analyses run in this area, so I took full advantage of all of them.

Q. But you're saying that you only used one core data outside of the proposed Huerfano tight gas sand area.

A. That's correct. We were not trying to designate the area outside of the area as tight gas, just the inside of it.

Q. Okay. Is it reasonable to assume in the

case of the proposed Huerfano tight gas sand, that the core data used for measuring the permeability in the laboratory yields a result that is 85 percent higher than the in situ permeability?

A. Yes, very reasonable.

Q. You think that're reasonable, and the main reason for this is the -- due to the overburden?

A. It's due to confining pressure, which is overburden minus your reservoir pressure.

Q. And if you had taken into account the water saturation, it would have been even more damaging, as far as permeability?

A. Yes, according to our Exhibit Twelve paper, it would have been even worse.

Q. Okay, in this proposed Huerfano tight gas area, what sort of increase in the potential flow rate could be expected from fracing; that is, if you frac the well, would you expect to get 10, 15, 20 times the flow rate from an unfraced well?

A. Well, that's really hard to say, of course, due to the very nature of the wells, even within this poor area you'll see wells that will exist quite different flow characteristics from the well next to it. As in most of the Dakota, there are sweet spots involved. So really,

depending on the well, that would be tough, but I would say in the neighborhood of five times the -- possibly ten times, would be in the accurate range.

Q. And you believe an average pre-frac flow rate of 48.5 Mcf per day is reasonable based upon your calculations?

A. Yes, I do.

Q. Using the calculated figure 48.5 Mcf per day initial pre-frac flow rate of all the Dakota wells in the proposed Huerfano tight gas sand area, there is an increase in flow rate greater than 20 times. Is this a reasonable result for fracing the Dakota in the area?

A. I believe so, when you consider those initial potentials are 7-day buildups and 3-hour flow tests, which are just used as a comparison basis to other wells in the area. In actuality, a possible guess to that, you could probably take 20 percent of that initial potential and that's -- it would get you somewhere in the ballpark of what that well would actually do when it's actually put on line, so that 20 times greater is substantially reduced when you're not referring to initial potential. It's a misleading figure.

Q. The Dugan Production Company's "MF" No. 1 Well was the only well in the area that had a pre-frac flow rate, and it produced 152 Mcf per day, and this was a 3-hour

test, and you think that if it was produced -- with further production that that rate would decline and it's not representative of this Huerfano tight sand gas area?

A. Well, I can't say that it's not representative. I believe it's a high rate due to the, once again, to the 7-day buildup and the 3-hour flow rate, so it will be reduced. But it may also be a good well in the area, and that's always a possibility.

I believe the calculated rate of 48-1/2 Mcf per day is a little better number and that we're taking established reservoir parameters and actually calculating what type of flow rate should come about through an average of the entire area. This is just one part of the area; that it could be a good well. But I do believe it will be reduced over a period of time.

Q. But the Dugan well is an actual case. It's not --

A. That's correct.

Q. -- calculated or anything. It's an actual flow rate.

A. The only real way to say if that's high or low is to have natural rates on ten or fifteen, if possible, wells, and that's just not practical. People need to frac these wells to make them commercial.

Q. Did you look outside of thi proposed area to see if any of the wells in the nearby area had pre-fraced flow rates?

A. Yes, I did, and I did not find much of anything. Like I said, it's not a standard practice and that information is hard to come by.

Q. Okay. Were the 22 Dakota dry holes drilled in the proposed Huerfano tight gas area primarily a function of geologic and/or engineering parameters or was there gas present but it was uneconomic to produce?

A. I think there's a combination of both on those. Some of the dry holes were produced for a period of time and then abandoned, which they would have been -- they had to be economical at one time or they would not have been produced. Other times there's some old dry holes in the area that were drilled and abandoned. The gas price might not have been there even though the hydrocarbons were.

So the answer to your question, I think it's a combination of both.

MR. HIGGINS: That concludes our questions for the USGS.

MR. STAMETS: Are there other questions?

MR. CHAVEZ: Yes, I have some questions.

QUESTIONS BY MR. CHAVEZ:

Q. Going over these permeability samples that you have in your exhibits, why did you not use the perforated intervals, say, for example, in the Hanson No. 1 of Tenneco, to calculate what the permeability of that particular well was? I guess I didn't understand your parameters for why you selected permeability ranges for averaging.

A. Okay. In many cases the perforated intervals would -- would -- is very company oriented as to what one company calls pay versus another company's pay. My cutoffs established a shale base line throughout the area and this turned out to be 10 ohms of resistivity.

So I was looking at Dakota formation with induction anything over this 10 ohms, and we also, we had a problem that all the cored interval did not always grab all the pay, so you just kind of had to grab the areas that were inside the pay zones and actually had a resistivity of greater than 10 ohms.

Q. Okay, so let me explain it back to you to see if I got it right.

In your permeability averages you looked at the logs first to find those areas with over 10 ohms.

A. That's correct.

Q. Resistivity, and then used only the permeabilities from the cores in those particular depths.

A. That's correct.

Q. Okay.

A. Only the cored intervals from those depths. We did not use any -- we did not have any information -- there might have been pay that was not cored and that's very common.

Q. Okay. In Exhibit Number Five -- not Five, the exhibit Number Twelve on the effects of overburden pressure, why did you use the gasbuggy core graph instead of a wagonwheel graph to calculate the effect of the overburden?

A. Okay, first of all, the gasbuggy core is a PC well, and the Pictured Cliffs is generally a tight gas formation such as the Dakota. Without actual core data of this nature being run on the Dakota formation, this was just about all we had to go on. If you'll notice, the line I chose in finding my 85 percent reduction factor, the initial laboratory core permeability for this core was 0.151 millidarcies, which is very close to my 0.159 millidarcies average for the Huerfano area.

Q. But wasn't the Dakota core -- I mean the wagonwheel actually the Dakota formation, also?

A. If it was I went right over that. I

used the Pictured Cliffs.

I don't know. I don't know that for sure. I'm sure it will say something in here on it.

I don't believe so.

(There followed comments off the record.)

MR. STAMETS: For the record let's clarify that point. We had people all over the place responding.

What was the answer to that?

Q. The answer is not a cretaceous formation. It was not covered.

MR. STAMETS: Thank you.

Q. Is all the land within this area leased?

A. Yes, it is. Some have expired. I say on that yes. Some have expired in the area. It is all of known geologic structure. In fact, in finding out ownership of these leases, I sent -- I've gone to the Federal Abstract Company in Santa Fe here to get ownership for all these oil and gas leases, and we do have in the neighborhood of 67 individuals involved in these leases, so it is not just one or two companies. It's a large amount of companies involved.

Q. Okay. The -- on your Exhibit Number One, I guess it is, it shows the area laid out for the appli-

cation. In 23 North, 8 West, Section 5, there's the Kenai Well, which is shown to be producing from the Graneros formation.

A. Uh-huh.

Q. Which would be considered part of the Basin Dakota Field. Is there any particular reason why that was left out of the application?

A. No particular reason. As I stated before, I have a large amount of area here. I needed to pick some guidelines as a basis of study. I did go through and cut out all our large producing areas that might possibly hurt our case, and in doing so, I would like to say that I did not try and state that one side was a tight gas area, the other side was not. I was just using this as a basis of study to determine this as a tight gas area.

So it's very possible and probably very probable that this Kenai Well exhibits very similar characteristics to the tight gas area.

Q. Okay, would it -- stimulation, then, your expected average production -- I'm sorry, without stimulation your average production would be approximately 48-1/2 Mcf a day average?

A. Calculated, yes.

Q. Calculated average?

A. Yes, that is correct.

Q. And what was the oil condensate?

A. 1.3 barrels per day.

Q. With stimulation that would --

A. I have not calculated that with stimulation. I have calculated prestimulation rates due to that's what's called for in the guidelines.

MR. CHAVEZ: That's all I have. Thank you.

A. Thank you.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. McCord, the type log section that you presented as an exhibit somewhere in here, has the top of the formation on it but I don't believe it contains the full section and so we were not shown the bottom of the Dakota.

A. Yes, sir, Mr. Examiner, in many cases the Dakota -- the Morrison is not drilled into due to the high water content of this formation. So finding a type log that will show the Morrison adequately is often hard to find.

Q. Okay, but you feel if we use this as the -- well, we could use this as the type log and the 400 foot definition.

Did you examine the logs on all the wells inside this area?

A. Not all the logs. Most of them that I could get hold of, yes. A lot of them are pretty old and hard to come by. This was the most representative log where I could show all of the producing tight formations.

The Graneros sometimes does not show up but the main Dakota sand is always prevalent throughout the area.

Q. Did any of those logs penetrate the Morrison?

A. I imagine they probably did. I did not go into that detail with them.

Q. I wonder if it would be possible to get a type log that had the entire section?

A. Maybe we could look through them and see if there is one with a --

Q. I certainly think it would be worthwhile if this is designated as a tight sands area to have a section that shows exactly what it is we're looking at from top to bottom.

MR. CARR: We would request that the record be left open to let us supply you with the most representative log that we can find that would include some

indication as to the location of the Morrison.

Q. Very good. Where is the area in relationship to the Basin Dakota Pool?

A. The Basin Dakota Pool is, to the best of my knowledge, throughout -- is it throughout the entire San Juan -- San Juan Basin. So --

Q. Let me rephrase that question. Where is this area in relationship to the developed Basin Dakota Pool?

A. Okay, it is to the south of the Basin Dakota.

Q. Is this also on the immediate south or southeast, southwest?

A. Southwest.

Q. How about -- is it southwest?

MR. CHAVEZ: Uh-huh.

Q. Okay, if you say so.

How did you select the area for the application today?

A. Okay. Through the Four Corners Gas Association Executive Committee, which consists of Tom Dugan as President and Robert L. Bayless, Jr., as Vice-President, the area of study was generally including these township and ranges. We wanted to get a large base area established as tight gas for possible expansion later on of other companies'

individual interests, if they choose to do so. That's why I chose it as a basis of study rather than any specific factors.

Q. Now there are wells to the north. Is this an area which has been undergoing rapid development moving into this tight sands area or is this an area where the wells have been on production for some time with little new development?

A. I would say it's the latter. Some of these wells, they've been developed through the -- through the years.

Now, this also includes some of the Huerfano Unit, which is separate and apart from the Huerfano tight gas area. A lot of El Paso wells are involved. Some smaller companies have come in and developed their interests in a more rapid manner than these older, established wells.

And on Exhibit One the Huerfano Unit is not outlined.

Q. Now, for example, this salient that comes in at about the middle on the north side, it looks as though a lot of those wells are back in the '60s; there is '60, '68, '65, and so on. Some of the newer development appears to occur on the west side with '76 and '77. I see one dry hole in there that's a '76. I thought I saw an '80 in there some place. There's a dry hole.

A. I -- the only '80 dry hole that I believe, is the Dome Well, and that would be in 25, 8, I believe, it would be in the lower section, probably section, in the neighborhood of 31, 32, in that area.

That was due to a lease expiration date.

Q. How many of the wells inside the area are producing from the Dakota at this time?

A. I believe there's thirteen. Thirteen wells in the Dakota. Now some of the wells --

Q. We're going to take a coffee break in a minute or two here, and I'm going to let you mark those thirteen wells on my copy of the exhibit here.

I think we will do that at this point, take about fifteen minutes.

(Thereupon a recess was taken.)

Q. When we took a break I asked that you circle the producing wells in the area, and I see you have done that with orange circles.

A. That's correct.

Q. Let's just talk about some of those, if we could.

Up in the far northwest corner of the

area there are two wells. They appear to be first delivered in 1976, is that correct?

A. Are those the Universal Resources wells?

Q. Right.

A. Okay, that's correct.

Q. Okay, and those are both Dakota wells, right?

A. Yes, sir.

Q. Then in the cum production for the northernmost well says .099. What is that indicative of?

A. That is Bcf.

Q. Bcf, okay. Okay, when we move over to 25 North, 9 West, in Section 12, there is a well marked new well. Now is that a well that's just in process of being completed?

A. Yes, sir, it is. I have no initial production figures for that well.

Q. Okay. And the other three wells in the immediate vicinity are 1974 wells.

A. That is correct.

Q. Mr. McCord, now you've given us a couple of cross sections and a type log. There was no structure map, no Isopach. Why did you choose not to submit that type of evidence?

A. It was my feeling that the log cross sections showed that the Dakota was a continuous formation throughout the proposed area and that it would suffice as far as the geologic criteria.

Q. You do show wells on Exhibit One outside the area that you propose; in 5 of 23 North, 8 West, there is a well that's a Dakota well; and then you have edge wells on the east side; wells on the north. About the only place I don't see wells is down along the southwest margin of the area.

To your knowledge, does the Dakota formation exist beyond the southwest boundary of the area that you have proposed here?

A. Yes, sir, it does. There are no wells to my knowledge in that area. The wells I have shown bounding the proposed area was for clarification purposes, just to show that there were wells there.

MR. STAMETS: Are there other questions of this witness?

MR. PADILLA: I have a couple, Mr. Examiner.

CROSS EXAMINATION

BY MR. PADILLA:

Q. Mr. McCord, what percentage of the well completion costs are attributed towards fracing of the well and stimulation of the well in the area?

A. In the neighborhood of 10 to 15 percent of the total well cost.

Q. What kind of payouts do you -- are you looking at for wells completed in the area?

A. Sir, I have not really done any detailed economic analysis of these wells. It would certainly depend on where the well was drilled in the area, whether it was close to production or in the -- a long distance from production. Of course that would -- we've got a large area involved here and there is going to be varying well characteristics, and depending on how good the well is, of course, will depend on the payout. I have not done any economic data to support those.

Q. We do have some producing wells in the area now. Wouldn't that give -- wouldn't you have an idea of what payout is for some of those wells?

A. I could not give you an exact figure, but from the low cumulative production shown for most all of the wells in the area, I would say it would be an awful long time for payout. They're certainly not very good wells and probably on the verge of being economic.

Q. How much does it cost to drill a well in the area?

A. Approximately $445,000.

Q. To your knowledge is there any geologic feature separating the -- the wells north and west of the northern boundary of your area?

A. I would presume, looking at the cumulative productions from the wells outside of the proposed tight gas area versus the wells inside of the area, we have better Dakota pay zones in these outside areas, based solely on -- on the cumulative production. There's obviously gas in these wells that we're not seeing in the wells inside our area, due to the differences in cums.

Q. Do you know whether the pay thickness is different for those wells to the north as compared to the ones in the south?

A. I would assume the pay thickness is larger; probably better log characteristics.

Q. What's the -- I think maybe the question has been asked, but what's the closest town with respect to this area?

A. It would be -- Farmington would be approximately 26 to 30 miles northwest.

Q. Now, I'd like to -- you said the initial

potentials of the wells were misleading, and I'd like to -- for you to elaborate on that. Maybe that's been touched on already, but your -- one of your cross sections indicated, I think, that the -- some of the initial potentials were 1200 per day. Is that a pre-frac or after frac?

A. That is a post-frac figure, and that is an absolute open flow, as required by the State of New Mexico for an initial potential, and this value is taken, as I said before, after a 3-hour flow test and a 7-day buildup. This is -- past experience has shown that these numbers are abnormally high and smaller percentages are actually what the well will produce.

Q. Would you have 7-day buildups north of the line?

A. Actual pre-frac buildup tests?

Q. I mean would you have the same kind of initial potentials based on 7-day buildups north of the -- north of the line?

Would you do the same thing whether -- irrespective of where the line lies?

A. Yes, that's correct, and I would assume that wells, in looking at the -- some of the production figures, these IP's are larger north of the proposed area.

Q. As far as your area that you're proposing

here today is concerned, I guess the final analysis is that it hasn't been economic to drill there and that's why there aren't any wells, or that's why there are only thirteen producing wells.

A. That's a very good conclusion. Yes, it's not an economic area right now.

Q. And in this area there are also, what, twenty-two dry holes, is that --

A. That's correct.

Q. Of the wells that are producing here, how long did they generally produce? What's the life of one of those wells?

A. Once again, I'm sure that would depend on -- on the well and how good it is, how good of a well it turns out to be. We'd be conjecturing. I really don't know.

Q. Well, could you give us an average or you just don't know what the average is?

A. I really don't know. I haven't looked into that. These -- there are just not long production estimates for these wells, or not enough production data. There's been no -- they've just been such poor and sorry wells.

Q. I guess on that paper, one of your exhibits, the Exhibit Number Twelve, is the relevancy of that to this area -- is the relevancy the Pictured Cliffs formation?

Is that what you're -- how you're tying the Dakota to the -- or that paper to this application?

A. That's correct. Exhibit Twelve dealt with the Pictured Cliffs formation, and that's the only study that we have published so far that we can refer to for tight gas -- for tight sandstone reservoirs.

So what we have done is chosen an initial laboratory permeability that is very close to our Dakota permeability and used this -- and used this in our Dakota study. I would say they are very, very similar.

Q. For the record would you please state where the Pictured Cliffs formation is in relation to the Dakota?

A. Okay. The Pictured Cliffs -- let me make sure of that.

In the neighborhood of 2000 to 2500 feet, depending on where it's located in the area.

Q. Above?

A. Above, yes. No, pardon me. That's 2000 to 2500 feet total depth; otherwise, the Dakota being 6350 feet, the Pictured Cliffs being 2000 to 2500 feet.

Q. So --

A. It is above the Dakota.

Q. So based on this paper you have a greater

overburden factor on the Dakota.

A. That is correct, but the paper has gone through and taken a Pictured Cliffs core and subjected it to a great amount of pressure, and in doing so they have taken data points throughout these pressure changes, and we have established ourselves a curve. So for our confining pressure in the Dakota we're able to read off the graph the permeability reduction due to this confining pressure.

Q. Do you think that the core of the Pictured Cliffs in that case would be similar to the Basin Dakota? If you took a Basin Dakota pressure and subjected it to the same type of pressure would you get basically the same type of results?

A. Yes, sir.

MR. PADILLA: Mr. Examiner, I have no further questions.

MR. STAMETS: Are there other questions of this witness?

MR. CHAVEZ: Yes, I have one -- or a couple questions.

QUESTIONS BY MR. CHAVEZ:

Q. Were there any pressure buildup tests run -- was any pressure buildup test data available on any of

the wells which are producing or which had been plugged in this area?

A. Yes, sir, there have been some DST's run on the area, but these are scattered and old tests, hard to examine, and the core data from these is a much, much better and easier means of calculating permeability.

The DST's need to be, in a tight gas formation, need to be in the hole quite a period of time to get an adequate buildup and an accurate value of permeability from your buildup analysis. If you do this in open hole a lot of times you will lose your DST. You cannot leave them in the hole that long.

The only adequate method of pressure buildup is either a bottom hole pressure bomb or a cased hole type DST data to determine permeability, and there are none of these available in the area.

Q. Do the production decline curves on the producing wells within the area reflect a decline that's common through the Dakota?

A. Yes, they do. That involves a high initial decline rate with a leveling out in the neighborhood of 4 to 6 percent in the latter years, possibly 5 years down the road, with the wells that long a life -- a producing life, and there are only a couple of them in the area.

Q. Have you done any calculations to calculate the reserves available in this area that would be -- would become economically feasible to recover under tight gas sands price?

A. Yes, I have. Once again, you've only got a couple of wells to look at, and my estimation is the ultimate reserves we'd be able to get in this area is a half a Bcf or less, probably less than that.

Q. Per well?

A. Per well.

Q. At a 6 percent decline rate in considering the wells eligible for a stripper gas price, say when they reach average rate of production of 60 Mcf or less, do you figure that the payout would be, say extend more than five years on the average well within this area?

A. Can you state that again, please?

Q. Considering a 6 percent decline rate on these wells, and also that the wells would become eligible for stripper gas price at a 60 Mcf or less daily production rate, would that extend the payout period, say more than five years for a well drilled within this area without tight sands pricing?

A. I would have to put in on paper and look at it, but that sounds fairly reasonable.

MR. CHAVEZ: I have no further questions.

MR. STAMETS: Any other questions of the witness?

MR. TULLY: I'm Richard Tully from Farmington, a few questions.

QUESTIONS BY MR. TULLY:

Q. Referring to Exhibit Number One, you don't mind if I stand over your shoulder here, up in this area, did I understand you correctly to say that the area not included within the subject area, and about the middle of it and to the north --

MR. STAMETS: Would you identify this area, please?

MR. TULLY: Yes. The Township 25 North and Township -- Ranges 9 West and 10 West, and as it comes down and jogs down and comes back up, it would be about half -- well, mainly in 25 North, Range 9 West.

Q. You have a line drawn here also included in some of the subject lands and not in other lands. In addition, you also appear to have a cross section running north and south. Is it my understanding that you used this information, the log information, core data, and IP information in order to try to determine whether or not this particular

area might also be classified as a tight sands area?

A. No, I did not. As I stated before, this entire area was just chosen as a field of study. These production areas were not considered due to the large number of wells involved in this area. The area below the production figures and the rates and averages shown were taken in this area below this area and not in this area up here.

Q. Okay. Referring, though, to some of these wells in this area not included in the -- in your application, does it appear to you that in the northern part of the Township 25 North, Range 9 West, as well as in the northern part of the Township 25 North, Range 10 West, that there are numerous wells that were drilled in the early, mid, and late '60s?

A. Yes, that's correct.

Q. And does your map indicate whether or not any new wells have been drilled in that -- in those same areas?

A. Yes, it does.

Q. Okay, and could you please identify a couple of those for us?

A. I have a couple of infill wells, a Consolidated well, 25 North, 10 West, Section 11, and this would be in the northwest quarter, which is the Navajo 2-E, is a new

well.

Also 25 North, 10 West, Section 2, Consolidated Oil and Gas, in the north -- excuse me, the southeast quarter, the Consolidate Navajo 1-E is 12-80.

Township 25 North, Range 9 West, Section 19, northeast quarter, Consolidated Ladd No. 1-E was drilled in 12 of 80.

In that same township, range, and section, Consolidated, in the north -- in the southwest one quarter, the Mills 1-E -- excuse me, that's the -- that's the southeast quarter, the Mills 1-E, in 12 of 1980.

There's also an El Paso Natural Gas well, Huerfano 281, 25 North, 9 West, Section 5, I believe the southeast one quarter, the Huerfano 281, 8 of 78.

There are considerable more wells, or a few more wells in this area.

Q. Okay. Now, also in this same area, though, do you see very many -- are you aware of the Dakota infill order from New Mexico Oil Conservation Division?

A. Yes.

Q. Do you know when that was enacted?

A. I don't have the exact date, no.

MR. TULLY: Do you happen to have that date? October of 1979.

Q. Looking in the same area, in addition to those wells that you've just enumerated as being recent wells, are there a lot of other wells in this same area that were drilled in early, mid, and late 1960's that have not at the present time had infill Dakota wells drilled on the same proration units?

A. That's correct.

Q. Now, what would you, in your opinion, in this area not included in your area, but in this area up here, what would you think would be some of the reasons, or one of the reasons that there has not been Dakota infill wells drilled for these 1960 wells?

A. Probably the cumulative production on these wells is not sufficient to justify the drilling of a new well.

Q. Okay. Log data, core data, and IP test information, would that -- have you reviewed that on these wells that we've just talked about that were drilled in 1960?

A. To the extent of placing them on the map here, yes.

Q. Okay, would it be fair to say that that information would possibly qualify those wells if they were going to be drilled now as tight sands gas?

A. Possibly, but I'd like to state also,

that is not the purpose of my study.

As I've said before, this is merely an area of study. There can be areas inside and around this area that could be justified as tight gas. I am merely working on the Huerfano tight gas area.

Q. Okay. A hypothetical question and then I'll terminate.

Would it be possible that on the undrilled Dakota acreage for infill purposes on these 1960 wells, that those undrilled locations could possibly qualify for tight sands?

A. Yes, they possibly could.

MR. TULLY: Thank you.

A. Uh-huh.

MR. STAMETS: Are there other questions of this witness? Mr. Carr.

REDIRECT EXAMINATION

BY MR. CARR:

Q. Mr. McCord, in response to the questions just asked by Mr. Tully, the area that he was talking about in Township 25 North, Ranges 9 and 10 West, that is outside the subject area, the area governed by this application, is that correct?

A. Yes. it is.

Q. Are there any infill wells drilled within the subject area?

A. Yes, there were.

Q. How many?

A. To my knowledge four infill wells.

Q. And the area that you were talking about, reviewing with Mr. Tully, has substantially more than that, is that correct?

A. More infill wells?

Q. Yes.

A. Yes, to the north there is, to my knowledge, off the map. We don't have these listed here. To my knowledge, yes, there probably are more infill wells drilled.

Q. The acreage, however, in Township 25 North, Ranges 9 and 10 West, has been excluded from this application, is that correct?

A. Yes, it is.

Q. Anyone else would be free to bring an application for any other area they felt might qualify, is that right?

A. That is correct.

Q. And you're not here today to testify as to whether or not that area should or should not qualify for

a tight sand designation, is that correct?

A. That is correct.

Q. Now I'd like to direct your attention to Four Corners Exhibit Number Two. This is the log which we've discussed with Mr. Stamets.

I believe you previously testified that that log did not show the Morrison, is that correct?

A. Yes, it is. During the break I have talked with Mr. Curtis Little, who previously had worked for Universal Resources and had drilled this well. He indicated to me that this log did in fact show the Morrison formation, and this is indicated by log depth 6338.

Q. So below that depth we have the Morrison formation?

A. That is correct.

Q. Based on your review of the logs in the area, is this log the best quality of any that you've reviewed?

A. Yes, it is. This is the best log I've found in the entire area to -- to show the characteristics of the Dakota formation in this area.

MR. CARR: Mr. Stamets, with your permission, we would request that this log be treated as the type log and that everything, all depths below, or the top of the Morrison be indicated on this as at a depth of 6338.

MR. STAMETS: Okay, I've done that.

MR. CARR: If you would like for us to supply additional logs, we could do that, but we believe this is probably the best quality log and would be most useful as a type log.

MR. STAMETS: Yes, that's fine. While we're there let's get the figure for the top of the Dakota. Would that be 6048 feet?

A. Yes, that is correct, 6048 feet, that also being the base of the Greenhorn.

MR. STAMETS: Okay.

Q. Mr. McCord, I believe you indicated in cross examination that it was your opinion that the quality of the Dakota formation fluctuated throughout the subject area, is that correct?

A. Yes.

Q. Now, was it your testimony that you have reviewed all data available to you on wells located within the subject area?

A. That is correct.

Q. Now the Kenai Well that you discussed in cross examination by Mr. Chavez, that lies outside the subject area, is that right?

A. Yes, it is.

Q. Based on your study of this area, in your opinion would any portion of the subject area fail to meet the requirements necessary to qualify it as a tight formation?

A. No, the entire area will qualify, in my opinion.

Q. Now, I believe Mr. Stamets asked you to locate the subject area in regard to other Dakota production in northwestern New Mexico, is that correct?

A. Yes.

Q. Would you be willing following the hearing to submit to Mr. Stamets for inclusion in this record a plat which would show the Dakota wells and also outline the subject area so that it would clearly show where this lies in respect to other Dakota production?

A. I'd be happy to.

MR. CARR: I have nothing further on redirect.

RECROSS EXAMINATION

BY MR. STAMETS:

Q. Just one more clarifying matter. We had quite a few questions concerning the economics, and I believe that your request is not based on economic factors

but based strictly on permeability, productivity, and oil production, is that correct?

A. That is correct.

Q. Okay.

A. Due to the fact there are no infill wells in my proposed area.

MR. STAMETS: Are there any other questions of this witness? He may be excused.

Mr. Carr, I would certainly appreciate it if you could prepare a draft order --

MR. CARR: I'd be happy to.

MR. STAMETS: -- in this matter. That could be submitted with the additional data.

MR. CARR: We also believe that there have been certain telegrams or communications to the Division in support, or maybe in opposition, and we'd like them noted in the record.

MR. STAMETS: We do have various communications in support.

There is a letter from Dugan Production Corporation.

A telegram from Merrion & Bayless.

A telegram from -- who's that from?

A letter from Benson, Montin, & Greer

Corporation.

A telegram from Amoco.

A telegram from Supron.

Is there anything further in this case? The case will be taken under advisement.

If there is nothing further, the hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case no. 7762, heard by me on 5-6 1981.

Richard L. Stamets, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

17 FERC ¶61,199

Before Commissioners. C. M. Butler III, Chairman; Georgiana Sheldon, J. David Hughes and A. G. Sousa.

High-Cost Gas Produced From Tight Formations	))	Docket No. RM79-76 (New Mexico - 6)

ORDER NO. 195

FINAL RULE

(Issued December 3, 1981)

The Commission hereby amends § 271.703(d) of its regulations to include the Dakota Formation in New Mexico as a designated tight formation eligible for incentive pricing under § 271.703. The amendment was proposed in a Notice of Proposed Rulemaking by the Director, OPPR, issued September 22, 1981 (46 Fed. Reg. 49466, September 28, 1981) 1/ based on a recommendation by the New Mexico Oil Conservation Commission (New Mexico) in accordance with § 271.703(c) that the Dakota Formation be designated as a tight formation.

Evidence submitted by New Mexico supports the assertion that the Dakota Formation meets the guidelines contained in § 271.703(c)(2). One comment was received in response to the Notice of Proposed Rulemaking from Southern California Company (SoCal). SoCal noted that by Order No. R-1670-V, New Mexico authorized infill drilling in the Basin Dakota Gas Pool. Order No. R-1670-C, issued November 4, 1960, consolidated all Dakota gas production in San Juan and Rio Arriba Counties, created the Basin Dakota Gas Pool, and established 320-acre gas proration units. Order No. R-1670-V, issued May 22, 1979, retained the original 320-acre unit spacing, but allowed the drilling of an additional well on each unit.

1/ No party requested a hearing in this docket and no hearing was held.

Citing to Commission Order No. 137-A, in Docket No. RM79-76, 2/ wherein the Commission excluded from a tight formation designation certain fields in a formation which had been subject to an infill drilling order and had been substantially developed at the time the infill drilling order was issued, SoCal indicated that a similar situation, requiring exclusion of the infill area, may exist for the recommended Dakota Formation.

The Commission has reviewed SoCal's comments and for the following reasons does not believe that an exclusion of infill areas is required in this case. There are 422 drilling units in the Dakota Formation recommended by New Mexico for tight formation designation. Wells have been drilled in 35 of these units, representing 8.3 percent of the available drilling sites. Of the 35 wells drilled, 22 have been abandoned, leaving 13 wells currently producing. All of these Dakota wells are the only wells in their drilling units. There has been no infill drilling in the area proposed for tight formation designation, and the Commission finds that the area has not been substantially developed, as was the area excluded in Order No. 137. For the reasons stated above, the Commission adopts the New Mexico recommendation.

This amendment shall become effective immediately. The Commission has found that the public interest dictates that new natural gas supplies be developed on an expedited basis, and, therefore, incentive prices should be made available as soon as possible. The need to make incentive prices immediately available establishes good cause to waive the thirty-day publication period.

2/ "Order Denying Application for Rehearing of Order No. 137," issued June 17, 1981 (46 Fed. Reg. 32235, June 22, 1981).

(Department of Energy Organization Act, 42 U.S.C. § 7101 et seq.; Natural Gas Policy Act of 1978, 15 U.S.C. § 3301 - 3342; Administrative Procedure Act, 5 U.S.C. § 553.)

In consideration of the foregoing, Part 271 of Subchapter H, Chapter I, Title 18, Code of Federal Regulations, is amended as set forth below, effective December 3, 1981.

By the Commission. Commissioner Sheldon voted present.

(S E A L)

Kenneth F. Plumb,
Secretary.

Section 271.703(d) is amended by adding new subparagraph (60) to read as follows:

§ 271.703 Tight formations.

* * * * *

(d) Designated tight formations. The following formations are designated as tight formations. A more detailed description of the geographical extent and geological parameters of the designated tight formations is located in the Commission's official file for Docket No. RM79-76, subindexed as indicated, and is also located in the official files of the jurisdictional agency that submitted the recommendation.

* * * * *

(60) The Dakota Formation in New Mexico. RM79-76 (New Mexico - 6).

(i) Delineation of formation. The Dakota Formation underlies portions of Townships 24 and 25 North, Ranges 7 through 10 West, in San Juan and Rio Arriba Counties, New Mexico. The producing interval of the Basin Dakota Field in the Dakota Formation is defined as beginning at the base of the Greenhorn Limestone, and extending to a point 400 feet below the base of the Greenhorn Limestone.

(ii) Depth. The average depth to the top of the Dakota Formation is 6,350 feet. The Dakota Formation begins at the base of the Greenhorn Limestone and is 200 to 350 feet in gross thickness.

RECEIVED
SEP 28 1981
OIL CONSERVATION DIVISION
SANTA FE

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

18 C.F.R. Part 271

High-Cost Gas Produced from Tight Formations; Notice of Proposed Rulemaking

Docket No. RM79-76 (New Mexico-6)

AGENCY : Federal Energy Regulatory Commission

ACTION : Notice of Proposed Rulemaking

SUMMARY : The Federal Energy Regulatory Commission is authorized by section 107(c)(5) of the Natural Gas Policy Act of 1978 to designate certain types of natural gas as high-cost gas where the Commission determines that the gas is produced under conditions which present extraordinary risks or costs. Under section 107(c)(5), the Commission issued a final regulation designating natural gas produced from tight formations as high-cost gas which may receive an incentive price (18 C.F.R. § 271.703). This rule established procedures for jurisdictional agencies to submit to the Commission recommendations of areas for designation as tight formations. This notice of proposed rulemaking by the Director of the Office of Pipeline and Producer Regulation contains the recommendation of the State of New Mexico that the Dakota Formation be designated as a tight formation under § 271.703(d).

DATE : Comments on the proposed rule are due on October 22, 1981.

Public Hearing : No public hearing is scheduled in this docket as yet. Written requests for a public hearing are due on October 7, 1981.

ADDRESS : Comments and requests for hearing must be filed with the Office of the Secretary, 825 North Capitol Street, N. E., Washington, D. C. 20426.

FOR FURTHER INFORMATION CONTACT :

Leslie Lawner, (202) 357-8307, or Victor Zabel, (202) 357-8616

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

High-Cost Gas Produced from Tight Formations	)))	Docket No. RM79-76 (New Mexico-6)

NOTICE OF PROPOSED RULEMAKING
BY DIRECTOR, OPPR

(Issued September 22, 1981)

I. BACKGROUND

On September 2, 1981, the State of New Mexico Oil Conservation Division (New Mexico) submitted to the Commission a recommendation, in accordance with § 271.703 of the Commission's regulations (45 Fed. Reg. 56034, August 22, 1980), that the Dakota Formation located in San Juan and Rio Arriba Counties New Mexico, be designated as a tight formation. Pursuant to § 271.703(c)(4) of the regulations, this Notice of Proposed Rulemaking is hereby issued to determine whether New Mexico's recommendation that the Dakota Formation be designated a tight formation should be adopted. New Mexico's recommendation and supporting data are on file with the Commission and are available for public inspection.

II. DESCRIPTION OF RECOMMENDATION

The Dakota Formation is located in San Juan and Rio Arriba Counties, New Mexico. The area recommended by New Mexico is situated generally in Townships 24 and 25 North, Ranges 7 through 10 West NMPM. The Dakota Formation underlies the described land and contains approximately 135,040 acres. The average

depth to the top of the Dakota Formation is 6,350 feet and the thickness of such formation varies from 200 to 350 feet. The recommended area is subject to New Mexico Order No. R-1670-V, issued May 22, 1979, which authorizes infill drilling in the Basin Dakota Gas Pool. The Basin Dakota Gas Pool contains the recommended formation. Accordingly, certain portions within the proposed area may be subject to exclusion pursuant to § 271.703(c)(2)(i)(D) of the regulations.

III. DISCUSSION OF RECOMMENDATION

New Mexico claims in its submission that evidence gathered through information and testimony presented at a public hearing in Case No. 7252 convened by New Mexico on this matter demonstrates that:

(1) The average *in situ* gas permeability throughout the pay section of the proposed area is not expected to exceed 0.1 millidarcy;

(2) The stabilized production rate, against atmospheric pressure, of wells completed for production from the recommended formation, without stimulation, is not expected to exceed the maximum allowable production rate set out in § 271.703(c)(2)(i)(B); and

(3) No well drilled into the recommended formation is expected to produce more than five (5) barrels of oil per day.

New Mexico further asserts that existing State and Federal Regulations assure that development of this formation will not adversely affect any fresh water aquifers.

Accordingly, pursuant to the authority delegated to the Director of the Office of Pipeline and Producer Regulation by Commission Order No. 97, issued in Docket No. RM80-68 (45 *Fed. Reg.* 53456, August 12, 1980), notice is hereby

given of the proposal submitted by New Mexico that the Dakota Formation, as described and delineated in New Mexico's recommendation as filed with the Commission, be designated as a tight formation pursuant to § 271.703.

IV. PUBLIC COMMENT PROCEDURES

Interested persons may comment on this proposed rulemaking by submitting written data, views or arguments to the Office of the Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N. E., Washington, D.C. 20426, on or before October 22, 1981 . Each person submitting a comment should indicate that the comment is being submitted in Docket No. RM79-76 (New Mexico-6), and should give reasons including supporting data for any recommendations. Comments should include the name, title, mailing address, and telephone number of one person to whom communications concerning the proposal may be addressed. An original nd 14 conformed copies should be filed with the Secretary of the Commission. Written comments will be available for public inspection at the Commission's Office of Public Information, Room 1000, 825 North Capitol Street, N. E., Washington, D.C., during business hours.

Any person wishing to present testimony, views, data, or otherwise participate at a public hearing should notify the Commission in writing that they wish to make an oral presentation and therefore request a public hearing. Such request shall specify the amount of time requested at the hearing. Requests should be filed with the Secretary of the Commission no later than October 7, 1981.

(Natural Gas Policy Act of 1978, 15 U.S.C. §§ 3301 - 3342.)

Accordingly, the Commission proposes to amend the regulations in Part 271, Subchapter H, Title 18, Code of Federal Regulations, as set forth below, in the event New Mexico's recommendation is adopted.

(S E A L)

Kenneth A. Williams
Director, Office of Pipeline
and Producer Regulation

Section 271.703(d) is amended by adding new subparagraph (67) to read as follows:

§ 271.703 Tight formations.

* * * * *

(d) Designated tight formations. The following formations are designated as tight formations. A more detailed description of the geographical extent and geological parameters of the designated tight formations is located in the Commission's official file for Docket No. RM79-76, subindexed as indicated, and is also located in the official files of the jurisdictional agency that submitted the recommendation.

* * * * *

(55) through (66) [RESERVED]

(67) Dakota Formation in New Mexico. RM79-76 (New Mexico-6).

(i) Delineation of formation. The Dakota Formation underlies portions of Townships 24 and 25 North, Ranges 7 through 10 West, in San Juan and Rio Arriba Counties, New Mexico. The State of New Mexico has defined the Dakota producing interval in the Basin Dakota Field to begin at the base of the Greenhorn Limestone and extend to a point 400 feet below the base of the Greenhorn Limestone.

(ii) Depth. The average depth to the top of the Dakota Formation is 6,350 feet. The Dakota Formation begins at the base of the Greenhorn Limestone and is 200 to 350 feet in gross thickness.

RECEIVED
APR 20 1981
OIL CONSERVATION DIVISION
SANTA FE

BEFORE THE

OIL CONSERVATION DIVISION

NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

IN THE MATTER OF THE APPLICATION
OF FOUR CORNERS GAS PRODUCERS
ASSOCIATION FOR DESIGNATION OF
TIGHT FORMATION, SAN JUAN AND
RIO ARRIBA COUNTIES, NEW MEXICO.

Case 7252

APPLICATION

Comes now FOUR CORNERS GAS PRODUCERS ASSOCIATION, by and through its undersigned attorneys and as provided in the Oil Conservation Division's Special Rules and Procedures for Tight Formation Designations under Section 107 of the Natural Gas Policy Act of 1978 promulgated by Oil Conservation Division Order No. R-6388 on June 30, 1980, hereby makes application for an order designating certain portions of the Dakota formation (Basin Dakota Field) as a tight formation under Section 107 of the Natural Gas Policy Act of 1978 and in support of its application would show the Division:

1. Applicant is the owner and operator of certain interests in the Dakota formation (Basin Dakota Field) underlying the following described lands situated in San Juan and Rio Arriba Counties, New Mexico:

Township 24 North, Range 7 West, N.M.P.M.
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

Township 24 North, Range 8 West, N.M.P.M.
Sections 1 through 36: All

Township 24 North, Range 9 West, N.M.P.M.
Sections 1 through 36: All

Township 24 North, Range 10 West, N.M.P.M.
Sections 1 through 36: All

Township 25 North, Range 7 West, N.M.P.M.
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

Township 25 North, Range 8 West, N.M.P.M.
Sections 1 through 36: All

Township 25 North, Range 9 West, N.M.P.M.
Sections 1 through 3: All
Sections 10 through 15: All
Sections 22 through 27: All
Sections 31 through 36: All

Township 25 North, Range 10 West, N.M.P.M.
Sections 8 through 10: All
Sections 14 through 17: All
Sections 20 through 23: All
Sections 26 through 36: All

Containing a total of 135,040 acres, more or less.

2. The Dakota formation is expected to have an estimated average in situ gas permeability throughout the pay section of less than 0.1 millidarcy per foot.

3. The average depth of the top of the Dakota formation is 6350 feet and the stabilized production rate, against atmospheric pressure, of wells completed for production in said formation, without stimulation, is not expected to exceed 217 mcf of gas per day.

4. No well drilled into the Dakota formation in the above-described area is expected to produce, without stimulation, more than five barrels of crude oil per day.

5. Attached to this application and incorporated herein by reference is a complete set of exhibits which applicant proposes to offer or introduce at the hearing on this application, together with a statement of the meaning and purpose of each exhibit. These exhibits cover all

aspects of the required evidentiary data described in Section D of the Oil Conservation Division's Special Rules and Procedures for Tight Sand Formation Designation under Section 107 of the Natural Gas Policy Act of 1978.

WHEREFORE, Applicant prays that this application be set for hearing before a duly appointed examiner of the Oil Conservation Division and that after notice and hearing as required by law, the Division enter its order recommending to the Federal Energy Regulatory Commission that pursuant to 18 CFR, Section 271.701 - 705, that the Dakota formation underlying the above-described land be designated a tight formation, and making such other and further provisions as may be proper in the premises.

Respectfully submitted,

CAMPBELL, BYRD AND BLACK, P.A.

By _____
William F. Carr
Attorneys for Applicant
Post Office Box 2208
Santa Fe, New Mexico 87501
Telephone: (505) 988-4421

Certificate of Service

I hereby certify that a copy of this Application and a complete set of all exhibits which Applicant proposes to offer or introduce at hearing, together with the statement of meaning and purpose of each, has been delivered to the United States Geological Survey in Albuquerque, New Mexico on this 21st day of April, 1981.

_____
William F. Carr

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 7252
Order No. R-6726

APPLICATION OF FOUR CORNERS GAS
PRODUCERS ASSOCIATION FOR
DESIGNATION OF A TIGHT FORMATION,
SAN JUAN AND RIO ARRIBA COUNTIES,
NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on May 6, 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 16th day of July, 1981, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premisse,

FINDS:

(1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Four Corners Gas Producers Association, requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 C.F.R. §271.703 recommend to the Federal Energy Regulatory Commission that the Dakota formation underlying the following lands situated in San Juan and Rio Arriba Counties, New Mexico, hereinafter referred to as the Dakota formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

TOWNSHIP 24 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 24 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 10 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 25 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 3: All
Sections 10 through 15: All
Sections 22 through 27: All
Sections 31 through 36: All

TOWNSHIP 25 NORTH, RANGE 10 WEST, NMPM
Sections 8 through 10: All
Sections 14 through 17: All
Sections 20 through 23: All
Sections 26 through 36: All

Containing a total of 135,040 acres, more or less.

(3) That the Dakota formation underlies all of the above described lands; that the formation consists of barrier beach deposits about 40 to 60 feet thick, composed of fine grained, quartz-rich sandstones characterized by an increase in grain size upward and low angle crossbedding; that the top of such formation is found at an average depth of 6350 feet below the surface of the area set out in Finding No. (2) above; and that the thickness of such formation is from 200 to 350 feet within said area.

(4) That the type section for the Dakota formation for the proposed tight formation designation is found at a depth of from approximately 6048 feet to 6338 feet on the Induction Electrical log dated February 17, 1975, from the Universal Resources Grigsby Federal Well No. 4 located in Unit L of Section 8, Township 25 North, Range 10 West, San Juan and Rio Arriba Counties, New Mexico.

(5) That the following described wells produce natural

gas from the Dakota formation within the proposed area:

Dugan Production Company, M.F. No. 1	NW/4 SW/4, Section 18, Township 24 North, Range 9 West
Dugan Production Company, April Surprise No. 2	NW/4 SW/4, Section 30, Township 24 North, Range 9 West
Kay Kimball, Liberman No. 1	SE/4 SE/4, Section 5, Township 25 North, Range 7 West
Merrion & Bayless, Stephenson No. 1	SW/4 NE/4, Section 17, Township 25 North, Range 8 West
Merrion & Bayless, South Huerfano No. 1 (Previously the Pilgram No. 1)	SW/4 SW/4, Section 35, Township 25 North, Range 8 West
El Paso Natural Gas Company, Nageezi No. 4	NW/4 NW/4, Section 1, Township 25 North, Range 9 West
El Paso Natural Gas Company, Nageezi No. 2	NE/4 SE/4, Section 1, Township 25 North, Range 9 West
El Paso Natural Gas Company, Nageezi No. 5	SW/4 NW/4, Section 12, Township 25 North, Range 9 West
El Paso Natural Gas Company, Nageezi No. 3	NE/4 NE/4, Section 13, Township 25 North, Range 9 West
El Paso Natural Gas Company, Hostein Yazza No. 1	NW/4 SW/4, Section 26, Township 25 North, Range 9 West
Petroleum Corporation of Texas, Mobil Rudman No. 1	NW/4 NW/4, Section 27, Township 25 North, Range 9 West
Universal Resources, Grigsby Federal No. 3	NW/4 NW/4, Section 8, Township 25 North, Range 10 West

Universal Resources, Grigsby Federal No. 4	NW/4 SW/4, Section 8, Township 25 North, Range 10 West

(6) That the Dakota formation underlying the above described lands has been penetrated by several other wells, none of which produce natural gas in commercial quantities from the Dakota formation.

(7) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Dakota formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the following parameters:

(a) average in situ gas permeability throughout the pay section of 0.1 millidarcy; and

(b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and

(c) production of more than five barrels of crude oil per day.

(8) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:

(a) The estimated average in situ gas permeability throughout the pay section of the Dakota formation is expected to be 0.1 millidarcy or less; and

(b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Dakota formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and

(c) No well drilled into the formation is expected to produce, without stimulation, more than five barrels of crude oil per day.

(9) That within the proposed area there is a recognized aquifer being the Ojo Alamo, found at depths of from 500 feet to 1100 feet or approximately 5200 feet above the Dakota formation.

(10) That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Dakota formation will not adversely affect said aquifers.

(11) That the portion of the Dakota formation described herein is currently authorized for development by infill drilling as defined in 18 C.F.R. §271.703(b)(6) of the regulations.

(12) That no infill drilling has occurred within the area proposed for tight formation designation.

(13) That while the Dakota formation has been extensively drilled and infill drilled to the North of the proposed area development therein has been minimal.

(14) That development of the proposed tight formation area has been inhibited by the poorer quality of the Dakota pay and the poorer prospect of commercial production therein.

(15) That that portion of the Dakota formation proposed for tight formation designation cannot be reasonably developed absent the incentive price established in 18 C.F.R. §271.703(a).

(16) That the Dakota formation within the proposed area should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

IT IS THEREFORE ORDERED:

(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Policy Act of 1978, and 18 C.F.R. §271.703 of the regulations that the Dakota formation underlying the following described lands in San Juan and Rio Arriba Counties, New Mexico, be designated as a tight formation:

TOWNSHIP 24 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 24 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 10 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 25 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 3: All
Sections 10 through 15: All
Sections 22 through 27: All
Sections 31 through 36: All

TOWNSHIP 25 NORTH, RANGE 10 WEST, NMPM
Sections 8 through 10: All
Sections 14 through 17: All
Sections 20 through 23: All
Sections 26 through 36: All

Containing a total of 135,040 acres, more or less.

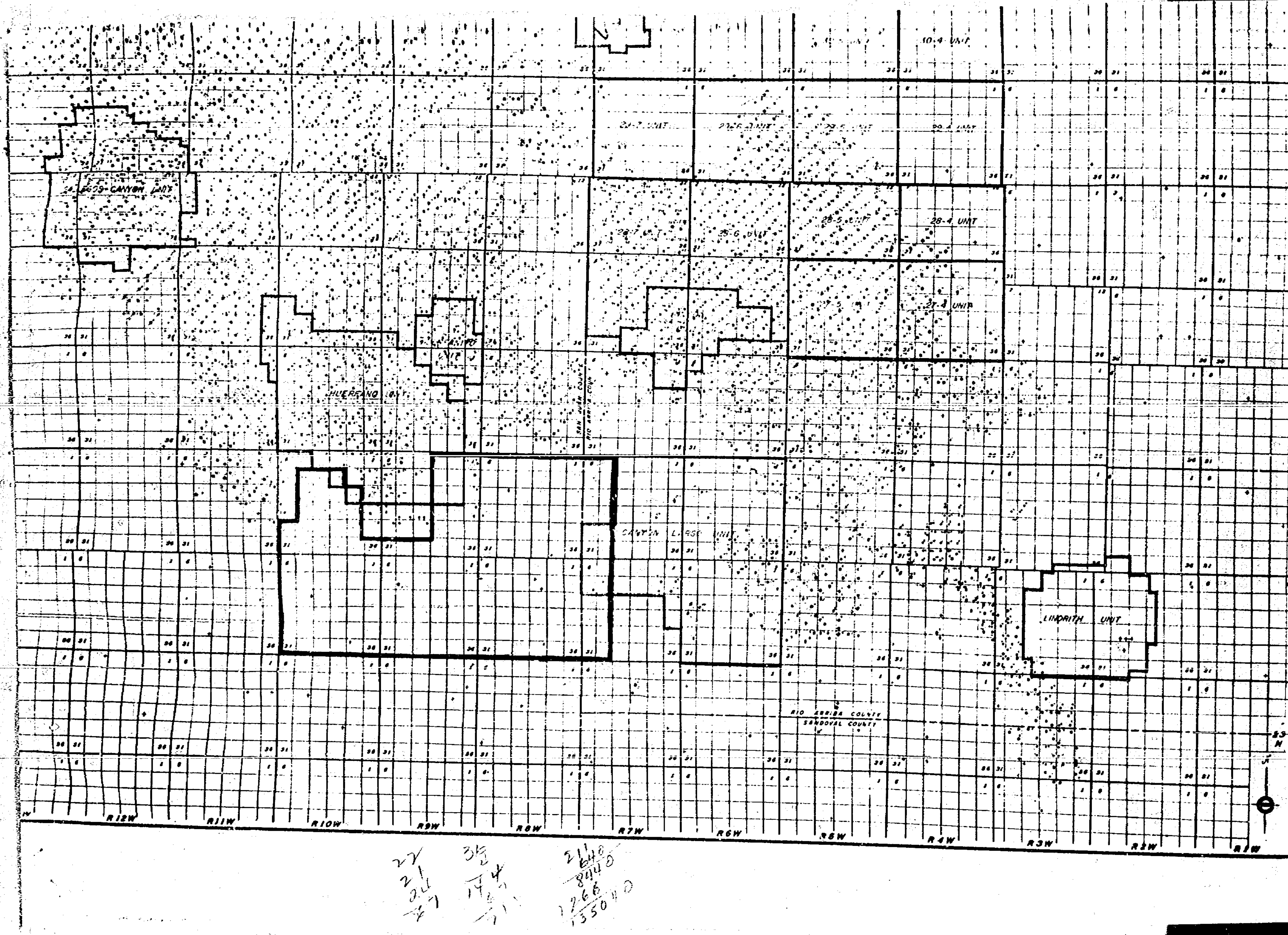
(2) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year herein-above designated.

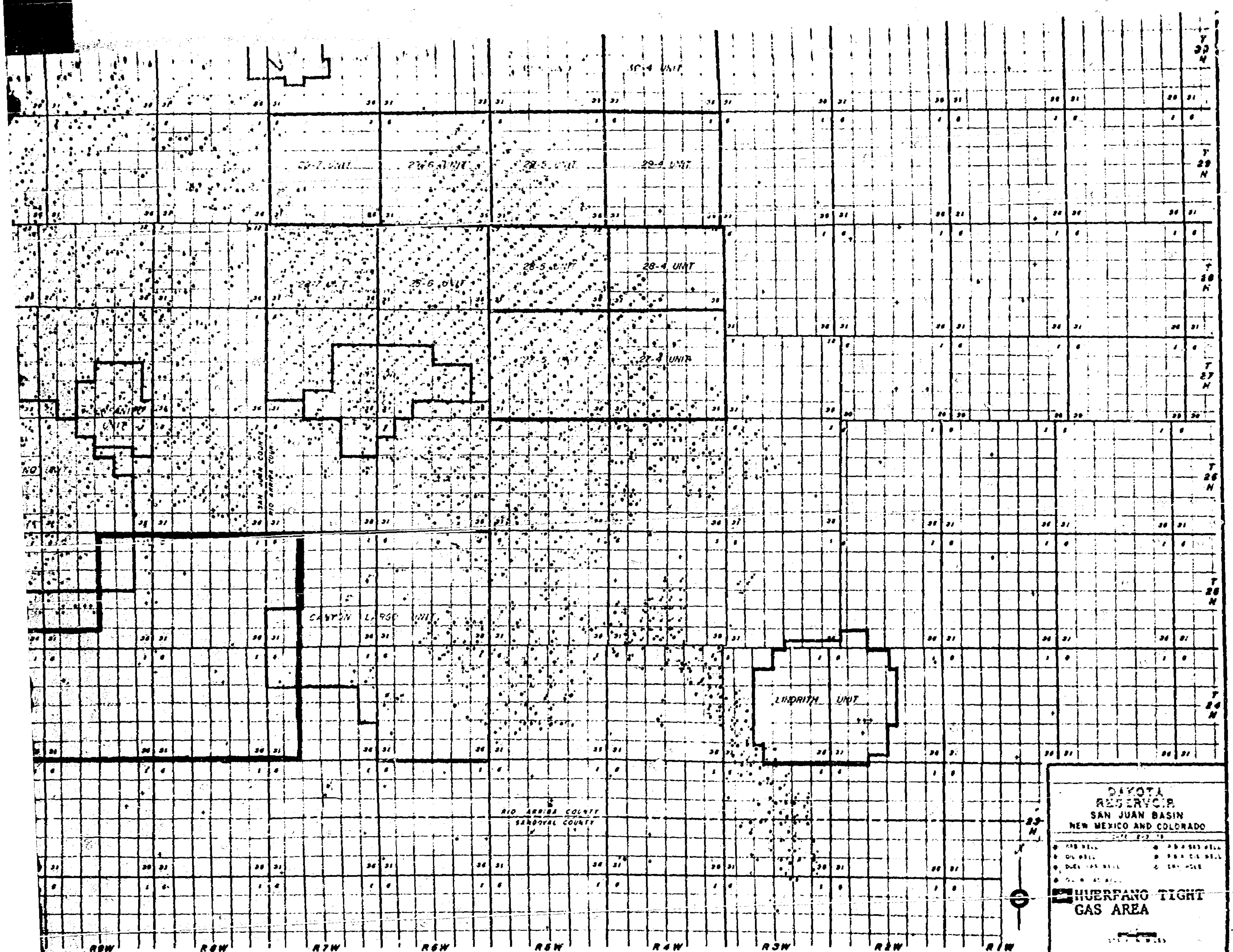
STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

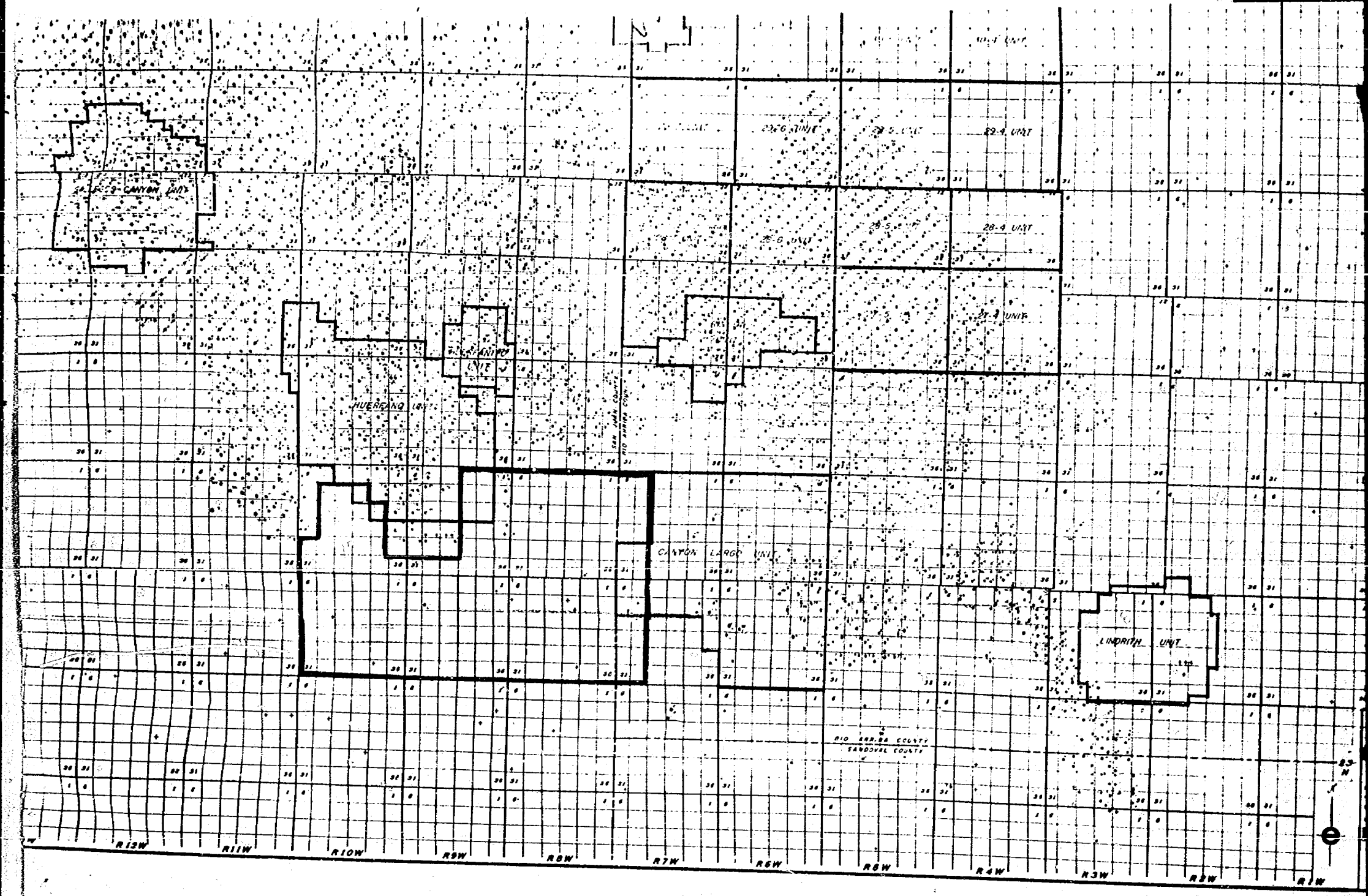
JOE D. RAMEY
Director

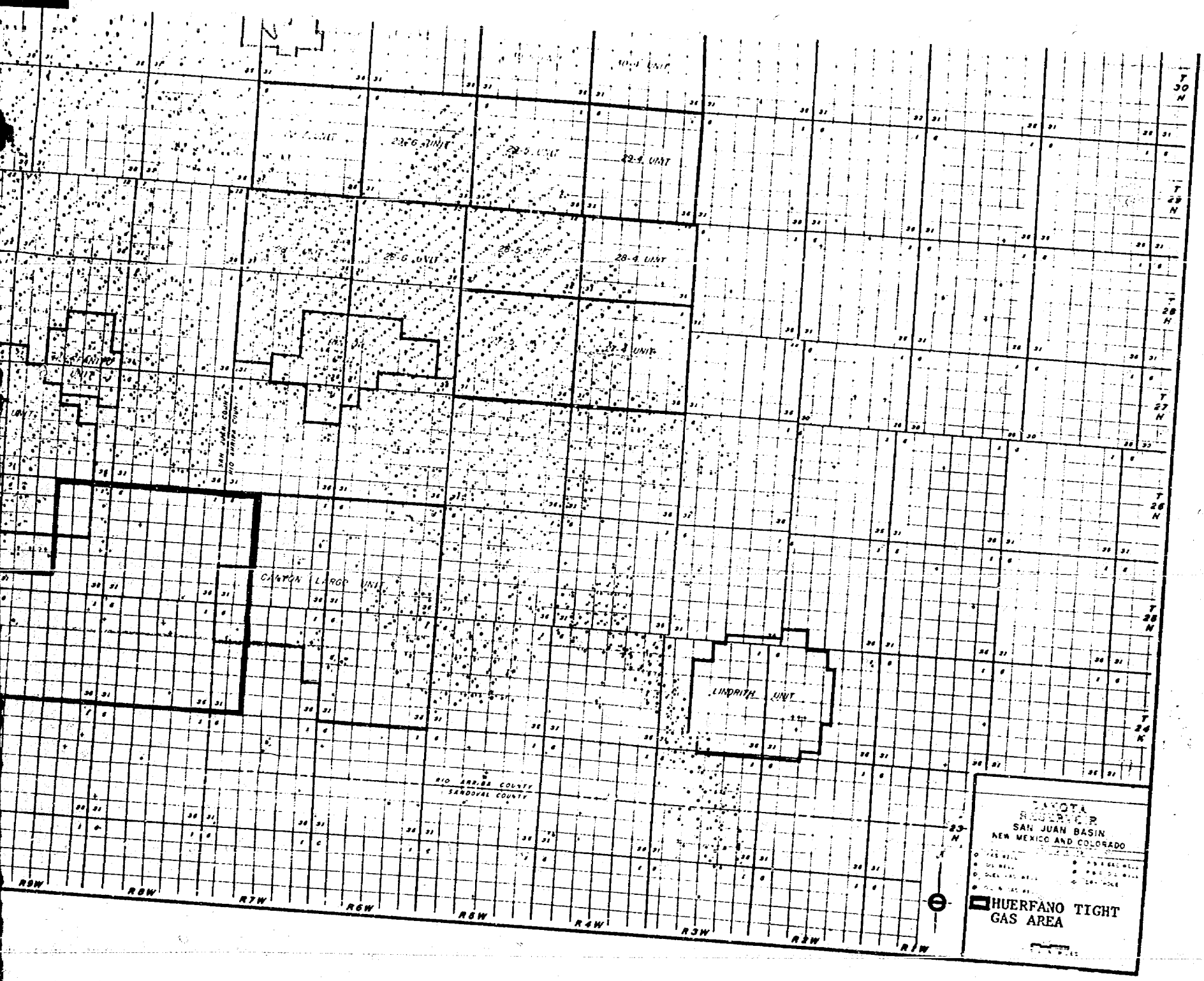
fd/



30-4 UNIT
29-7 UNIT
29-6 UNIT
29-5 UNIT
29-4 UNIT
CANYON UNIT
28-7 UNIT
28-6 UNIT
28-5 UNIT
28-4 UNIT
27-4 UNIT
HUERFANO UNIT
RIO ARRIBA COUNTY
CANYON LARGO UNIT
LINDRITH UNIT
RIO ARRIBA COUNTY
SANDOVAL COUNTY
R12W
R11W
R10W
R9W
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W


29-4 UNIT
29-7 UNIT
29-6 UNIT
29-5 UNIT
29-4 UNIT
28-5 UNIT
28-4 UNIT
27-5 UNIT
27-4 UNIT
SAN JUAN COUNTY
RIO ARRIBA COUNTY
CANYON LARGO UNIT
LINDRITH UNIT
RIO ARRIBA COUNTY
SANDOVAL COUNTY
R9W
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
DAKOTA
RESERVOIR
SAN JUAN BASIN
NEW MEXICO AND COLORADO
HUERFANO TIGHT
GAS AREA


27-5 UNIT
27-4 UNIT
28-6 UNIT
28-5 UNIT
28-4 UNIT
27-5 UNIT
27-4 UNIT
HUERFANO UNIT
CANYON LARGO UNIT
LINDRITH UNIT
SAN JUAN COUNTY
RIO ARRIBA COUNTY
SANDOVAL COUNTY
T 23 N
T 22 N
R 12W
R 11W
R 10W
R 9W
R 8W
R 7W
R 6W
R 5W
R 4W
R 3W
R 2W
R 1W


T 30 N
T 29 N
T 28 N
T 27 N
T 26 N
T 25 N
T 24 N
R9W
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
23 N
CANYON LARGO UNIT
LINDRITH UNIT
RIO ARRIBA COUNTY
SANDOVAL COUNTY
DAKOTA
PICTURED CLIFFS
SAN JUAN BASIN
NEW MEXICO AND COLORADO
HUERFANO TIGHT GAS AREA

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

August 31, 1981

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

Federal Energy Regulatory Comm.
Department of Energy
825 North Capitol Street, N.E.
Washington, D. C. 20426

Attention: Mr. Howard Kilchrist

Dear Mr. Kilchrist:

Enclosed is a tight formation recommendation for the Commission's consideration which I am sending to you for your handling.

Let me know if additional information is required.

Sincerely,

W. PERRY PEARCE
General Counsel

WPP/dr

encl

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

August 31, 1981

Federal Energy Regulatory Comm.
Department of Energy
825 North Capitol Street, N.E.
Washington, D. C. 20426

Attention: Mr. Howard Kilchrist

Dear Mr. Kilchrist:

Enclosed is a tight formation recommendation for the Commission's consideration which I am sending to you for your handling.

Let me know if additional information is required.

Sincerely,

W. PERRY PEARCE
General Counsel

WPP/dr

encl

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

NGPA SECTION 107 TIGHT FORMATION RECOMMENDATION	)	
STATE OF NEW MEXICO OIL CONSERVATION DIVISION OF THE ENERGY AND MINERALS DEPARTMENT	)	Docket No. _____

RECOMMENDATION FOR TIGHT FORMATION DESIGNATION UNDER SECTION 107 OF THE NGPA.

Four Corners Gas Producers Association, pursuant to Section 107 of the Natural Gas Policy Act, 18 CFR §271.703 of the FERC regulations, and the Special Rules and Procedures for Tight Formation Designations under Section 107 of the Natural Gas Policy Act of 1978 of the Oil Conservation Division, petitioned the Oil Conservation Division for tight formation designation of a portion of the Dakota formation in San Juan and Rio Arriba Counties, New Mexico.

After notice and hearing on the application of Four Corners Gas Producers Association, the Oil Conservation Division hereby recommends that that portion of the Dakota formation which is described in Exhibit A (being Oil Conservation Division Order No. R-6726) attached hereto and incorporated by reference, be designated a tight formation. Additionally, the Oil Conservation Division, submits herewith Exhibits B and C, attached hereto and incorporated herein by reference, which are supporting data required under 18 CFR §271.703(c)(3) of the FERC regulations and United States Geological Survey ratification of this recommendation, respectively.

Respectfully submitted,

W. PERRY PEARCE
Attorney for the
Oil Conservation Division

VERIFICATION

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

W. PERRY PEARCE, being first duly sworn, on oath, states that he is an attorney for the Oil Conservation Division of the Energy and Minerals Department of the State of New Mexico; that he has executed the foregoing document with full power and authority to do so; and that the matters and facts set forth therein are true to the best of his information, knowledge and belief.

W. PERRY PEARCE

Subscribed and sworn to before me, this_____day of August, 1981.

NOTARY PUBLIC

My Commission Expires:

October 28, 1981

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the foregoing Recommendation to Four Corners Gas Producers Association in accordance with the requirements of Section 1.17 of the Rules of Practice and Procedure.

Dated this_____day of August, 1981.

W. PERRY PEARCE

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

July 20, 1981

Re: CASE NO. 7252
ORDER NO. R-6726

Applicant:

Four Corners Gas Producers Association

Mr. William F. Carr
Campbell, Byrd & Black
Attorneys at Law
Post Office Box 2208
Santa Fe, New Mexico

Dear Sir:

Enclosed herewith are two copies of the above-referenced Division order recently entered in the subject case.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCD x
Artesia OCD x
Aztec OCD x

Other _____

CAMPBELL, BYRD & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
HARL D. BYRD
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
BRADFORD C. BERGE
WILLIAM G. WARDLE

JEFFERSON PLACE
SUITE I - 110 NORTH GUADALUPE
POST OFFICE BOX 2208
SANTA FE, NEW MEXICO 87501
TELEPHONE: (505) 988-4421
TELECOPIER: (505) 983-6043

May 19, 1981

OIL CONSERVATION DIVISION

MAY 20 1981

RECEIVED

Mr. R. L. Stamets
Technical Support Chief
Oil Conservation Division
New Mexico Department of
Energy and Minerals
Post Office Box 2088
Santa Fe, New Mexico 87501

Re: New Mexico Oil Conservation Division Case 7252:
Application of Four Corners Gas Producers
Association for Designation of a Tight Formation,
San Juan and Rio Arriba Counties, New Mexico

Dear Mr. Stamets:

Pursuant to your request, we are enclosing a draft of an Order approving the application of Four Corners Gas Producers Association in the above-referenced case. Also enclosed, in triplicate, is a map of Dakota production in northwestern New Mexico on which we have indicated the location of the subject tight formation area.

If you need additional data from Four Corners Gas Producers Association to make your determination on its application, please advise.

Very truly yours,

William F. Carr

WFC:lr

Enclosures

cc: Mr. Robert Bayless
Mr. Kevin H. McCord

D E WOOD, DIVISION PRODUCTION MA
717 17TH ST, SUITE 2200
DENVER CO 80222

western union Mailgram®

UNITED STATES POSTAL SERVICE U.S.MAIL

4-025954S125 05/05/81 ICS IPMBNGZ CSP ABQD
3038932233 MGM TDBN DENVER CO 98 05-05 1155A EST

RECEIVED
MAY 07 1981
OIL CONSERVATION DIVISION
SANTA FE

RICHARD L STAMETS OR DANIEL S NUTTER
NEW MEXICO OIL CONSERVATION DIV
STATE LAND OFFICE BLDG
SANTA FE NM 87501

SUBJECT APPLICATION OF FOUR CORNERS GAS PRODUCERS ASSN FOR DESIGNATION OF A TIGHT FORMATION, (BASIN DAKOTA), SAN JUAN AND RIO ARRIBA COUNTIES, NM, CASE #7252.

COTTON PETROLEUM CORP HAS A WORKING INTEREST IN THE LANDS UNDER CONSIDERATION. WE AGREE THAT THE AREA CANNOT BE DEVELOPED WITHOUT INCENTIVE GAS PRICING. WE REQUEST THAT OUR POSITION BE READ AND MADE PART OF THE RECORD IN CASE #7252.

THANK YOU,
D E WOOD, DIVISION PRODUCTION MANAGER
COTTON PETROLEUM CORP

1157 EST

MGMCOMP MGM

5241 (R1/78)

TO REPLY BY MAILGRAM, SEE REVERSE SIDE FOR WESTERN UNION'S TOLL - FREE PHONE NUMBERS

SOUTHERN UNION EXPLORATION CO RA
1217 MAIN ST SUITE 400
DALLAS TX 75202

western union Mailgram® UNITED STATES POSTAL SERVICE U.S.MAIL

4-058473S125 05/05/81 ICS IPMBNGZ CSP ABQD
2147426051 MGM TDBN DALLAS TX 60 05-05 0501P EST

STATE OF NEW MEXICO,
DEPT OF ENERGY & MINERAL,
OIL CONSERVATION DIVISION
PO BOX 2088
SANTA FE NM 87501

RECEIVED
MAY 06 1981
OIL CONSERVATION DIVISION
SANTA FE

THIS IS TO INFORM YOU THAT SOUTHERN UNION EXPLORATION COMPANY SUPPORTS THE APPLICATION OF THE FOUR CORNERS GAS PRODUCERS ASSOCIATION FOR DESIGNATION OF TIGHT FORMATION, SAN JUAN AND RIO ARRIVA COUNTIES NEW MEXICO FILED IN CASE #7252.

SOUTHERN UNION EXPLORATION COMPANY

1703 EST

MGMCOMP MGM

5241 (R1/78)

TO REPLY BY MAILGRAM, SEE REVERSE SIDE FOR WESTERN UNION'S TOLL - FREE PHONE NUMBERS

RECEIVED
APR 20 1981
OIL CONSERVATION DIVISION
SANTA FE

BEFORE THE

OIL CONSERVATION DIVISION

NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

IN THE MATTER OF THE APPLICATION OF FOUR CORNERS GAS PRODUCERS ASSOCIATION FOR DESIGNATION OF TIGHT FORMATION, SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO.

Case 7252

APPLICATION

Comes now FOUR CORNERS GAS PRODUCERS ASSOCIATION, by and through its undersigned attorneys and as provided in the Oil Conservation Division's Special Rules and Procedures for Tight Formation Designations under Section 107 of the Natural Gas Policy Act of 1978 promulgated by Oil Conservation Division Order No. R-6388 on June 30, 1980, hereby makes application for an order designating certain portions of the Dakota formation (Basin Dakota Field) as a tight formation under Section 107 of the Natural Gas Policy Act of 1978 and in support of its application would show the Division:

1. Applicant is the owner and operator of certain interests in the Dakota formation (Basin Dakota Field) underlying the following described lands situated in San Juan and Rio Arriba Counties, New Mexico:

Township 24 North, Range 7 West, N.M.P.M.
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

Township 24 North, Range 8 West, N.M.P.M.
Sections 1 through 36: All

Township 24 North, Range 9 West, N.M.P.M.
Sections 1 through 36: All

Township 24 North, Range 10 West, N.M.P.M.
Sections 1 through 36: All

Township 25 North, Range 7 West, N.M.P.M.
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

Township 25 North, Range 8 West, N.M.P.M.
Sections 1 through 36: All

Township 25 North, Range 9 West, N.M.P.M.
Sections 1 through 3: All
Sections 10 through 15: All
Sections 22 through 27: All
Sections 31 through 36: All

Township 25 North, Range 10 West, N.M.P.M.
Sections 8 through 10: All
Sections 14 through 17: All
Sections 20 through 23: All
Sections 26 through 36: All

Containing a total of 135,040 acres, more or less.

2. The Dakota formation is expected to have an estimated average in situ gas permeability throughout the pay section of less than 0.1 millidarcy per foot.

3. The average depth of the top of the Dakota formation is 6350 feet and the stabilized production rate, against atmospheric pressure, of wells completed for production in said formation, without stimulation, is not expected to exceed 217 mcf of gas per day.

4. No well drilled into the Dakota formation in the above-described area is expected to produce, without stimulation, more than five barrels of crude oil per day.

5. Attached to this application and incorporated herein by reference is a complete set of exhibits which applicant proposes to offer or introduce at the hearing on this application, together with a statement of the meaning and purpose of each exhibit. These exhibits cover all

aspects of the required evidentiary data described in Section D of the Oil Conservation Division's Special Rules and Procedures for Tight Sand Formation Designation under Section 107 of the Natural Gas Policy Act of 1978.

WHEREFORE, Applicant prays that this application be set for hearing before a duly appointed examiner of the Oil Conservation Division and that after notice and hearing as required by law, the Division enter its order recommending to the Federal Energy Regulatory Commission that pursuant to 18 CFR, Section 271.701 - 705, that the Dakota formation underlying the above-described land be designated a tight formation, and making such other and further provisions as may be proper in the premises.

Respectfully submitted,

CAMPBELL, BYRD AND BLACK, P.A.

By _____
William F. Carr
Attorneys for Applicant
Post Office Box 2208
Santa Fe, New Mexico 87501
Telephone: (505) 988-4421

Certificate of Service

I hereby certify that a copy of this Application and a complete set of all exhibits which Applicant proposes to offer or introduce at hearing, together with the statement of meaning and purpose of each, has been delivered to the United States Geological Survey in Albuquerque, New Mexico on this 21st day of April, 1981.

_____
William F. Carr

Telegram western union

WU AGENT SANA

825 A MDT

AYA021(0911)(4-008728S124)PD 05/04/81 0910

ICS IPMBNGZ CSP

2146919141 TDBN DALLAS TX 63 05-04 0910A EST

PMS JOE RAMEY, DIRECTOR, OF CONSERVATION DIVISION RPT DLY MGM, DLR

STATE LAND OFFICE BLDG OLD SANTA FE TRAIL

SANTA FE NM 87501

DEAR MR RAMEY

SUPRON ENERGY CORPORATION CONCURS IN THE APPLICATION IN CASE 7252 RESPECTING CLASSIFICATION OF DAKOTA FORMATION UNDERLYING TOWNSHIP 24 AND 25 RANGES 7-10 WEST INCLUSIVE SAN JUAN AND RIO ARRIVA COUNTIES AS A TYPE SANDS FORMATION WITHIN THE MEANING OF NATURAL GAS POLICY ACT AND APPLICABLE REGULATIONS, AND URGES THAT THE COMMISSION GIVE FAVORABLE CONSIDERATION TO SUCH APPLICATION.

CC RUDY MOTTO

RECEIVED
MAY 04 1981
OIL CONSERVATION DIVISION
SANTA FE

RECEIVED
MAY 04 1981
OIL CONSERVATION DIVISION
SANTA FE

SUPRON ENERGY CORP., BY WILLIAM S JAMESON, GENERAL COUNSEL

10300 NORTH CENTRAL EXPRESSWAY BLDG V 5 FL

DALLAS TX 75231

NNNN

Telegram western union

WU AGENT SANA

1030A

NØ64(1059)(4-02036 4S121)PD 05/01/81 1058

ICS IPMBNGZ CSP

3038305722 TDBN DENVER CO 105 05-01 1058A EST

PMS MR JOE D RANEY, DIRECTOR RPT DLY MEM, DLR

310 OLD SANTA FE TRAIL

SANTA FE NM 87501

RECEIVED
MAY 1 1981
OIL CONSERVATION DIVISION
SANTA FE

WE ARE AWARE THAT ON MAY 6 1980 THE NEW MEXICO OIL CONSERVATION DIVISION WILL HEAR THE FOUR CORNERS GAS PRODUCERS ASSOCIATION ON CASE NUMBER 7252 FOR A REQUEST TO CLASSIFY A PORTION OF THE BASIN DAKOTA FORMATION FOR TIGHT FORMATION GAS DESIGNATION

CASE

AMOCO, BEING A WORKING INTEREST OWNER IN THE SUBJECT AREA, IS IN SUPPORT OF SAID APPLICATION AND MUTUALLY AGREES THAT THE ADDED PRICE INCENTATIVE PROVIDED FOR BY TFG CLASSIFICATION IS NECESSARY FOR FUTURE BASIN DAKOTA DEVELOPMENT IN THE SUBJECT AREA

WE SINCERELY REQUEST THAT THIS STATEMENT BE READ IN SUPPORT OF CASE NUMBER 7252 AND BE INCLUDED AS PART OF THE RECORD

AMOCO PRODUCTION COMPANY, ATTN GERRIE BOCK

1670 BROADWAY

DENVER CO 80202

N

BENSON-MONTIN-GREER DRILLING CORP.
221 PETROLEUM CENTER BUILDING
FARMINGTON, NEW MEXICO 87401
PHONE: 325-8874

RECEIVED
MAY 04 1981
OIL CONSERVATION DIVISION
SANTA FE

April 30, 1981

Department of Energy and Minerals
Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87501

Re: CASE NO. 7252 ADVERTISED FOR MAY 6, 1981:
APPLICATION OF FOUR CORNERS GAS PRODUCERS ASSOCIATION FOR DESIGNATION OF TIGHT FORMATION FOR BASIN DAKOTA FORMATION IN PARTS OF SAN JUAN AND RIO ARRIBA COUNTIES

Gentlemen:

Benson-Montin-Greer Drilling Corp. is owner of oil and gas lease rights covering some of the lands in the subject area. We support the Four Corners Gas Producers Association's application, and note that in our opinion the drilling of Dakota wells in this area cannot be justified economically without such incentive pricing.

Yours very truly,

BENSON-MONTIN-GREER DRILLING CORP.

BY: Albert R. Greer
Albert R. Greer, President

ARG:ney

Telegram western union

ML=

WU AGENT SANA

WU MOD ABQ

1221P

RECEIVED
MAY 1 1981
OIL CONSERVATION DIVISION
SANTA FE

AYB087(1315)(4-03166SI20)PD 04/30/81 1315

ICS IPMMTZZ CSP

5053253571 TDMT FARMINGTON NM 99 04-30 1200P MDT

PMS NEW MEXICAN OIL CONSERVATION DIV JOE RANEY, DLR

STATE LAND OFFICE BLDG

SANTA FE NM 87501

REFERENCE APPLICATION OF FOUR CORNERS GAS PRODUCERS ASSOCIATION, THE DESIGNATION OF TIGHT FORMATION, SAN JUAN AND RIO ARRIDA COUNTIES NEW MEXICO CASE 7252 MAY 6 1981.

DEAR SIR

MERRION AND BAYLESS HAS A WORKING INTEREST IN OIL AND GAS LEASES INVOLVED IN THE 135,040 ACRES APPLIED FOR BY THE FOUR CORNERS GAS PRODUCERS ASSOCIATION AS A TIGHT GAS FORMATION IN THE BASIN DAKOTA POOL. WE FEEL THIS FORMATION CANNOT BE ADEQUATELY PRODUCED WITHOUT PRICE INCENTIVES AND THEREFORE SUPPORT THE APPLICATION WE REQUEST THIS TELEGRAM BE READ AND MADE PART OF THE RECORD TO STATE OUR SUPPORT FOR THE APPLICATION.

ROBERT L BAYLESS AND J GREGORY MERRION

NNNN

dugan production corp.

RECEIVED
MAY 1 1981
OIL CONSERVATION DIVISION
SANTA FE

April 30, 1981

Joe D. Ramey, Director
New Mexico Oil Conservation Division
P.O. Box 2308
Santa Fe, NM 87501

Re: Application of the Four Corners Gas Producers Association
for Designation of Tight Formation
San Juan and Rio Arriba Counties, New Mexico
Case No. 7252

Dear Mr. Ramey:

The above referenced Application is scheduled to be heard by the New Mexico Oil Conservation Commission on May 6, 1981. Briefly, the Four Corners Gas Producers Association seeks the designation of the Dakota Formation, underlying portions of Townships 24 and 25 North, Ranges 7, 8, 9 and 10 West, as a tight gas formation in accordance with the guidelines set forth in the regulations implementing the Natural Gas Policy Act of 1978.

As the owner of significant leasehold interests in the acreage which is the subject of this Application, Dugan Production Corp. fully recognizes that the Dakota Formation underlying these lands cannot be economically developed absent the incentive pricing offered under Section 107 of the Natural Gas Policy Act of 1978 for designated tight gas formations.

The purpose of this letter is to advise you that Dugan Production Corp., in its capacity as an owner of leasehold interests in the subject acreage, fully concurs in the application of Four Corners Gas Producers Association and the request set forth therein.

We request that this letter be made a part of the record in Case No. 7252, or that its contents be read into the record during the hearing on May 6, 1981.

Thank you for your consideration.

Sincerely,

Tommy Roberts

Tommy Roberts
General Counsel

709 BLOOMFIELD RD. • P. O. BOX 208 • FARMINGTON, NEW MEXICO 87401 • PHONE: 505-325-1821

RECEIVED
APR 20 1981
OIL CONSERVATION DIVISION
SANTA FE

BEFORE THE

OIL CONSERVATION DIVISION

NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

IN THE MATTER OF THE APPLICATION OF FOUR CORNERS GAS PRODUCERS ASSOCIATION FOR DESIGNATION OF TIGHT FORMATION, SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO.

Case 7252

APPLICATION

Comes now FOUR CORNERS GAS PRODUCERS ASSOCIATION, by and through its undersigned attorneys and as provided in the Oil Conservation Division's Special Rules and Procedures for Tight Formation Designations under Section 107 of the Natural Gas Policy Act of 1978 promulgated by Oil Conservation Division Order No. R-6388 on June 30, 1980, hereby makes application for an order designating certain portions of the Dakota formation (Basin Dakota Field) as a tight formation under Section 107 of the Natural Gas Policy Act of 1978 and in support of its application would show the Division:

1. Applicant is the owner and operator of certain interests in the Dakota formation (Basin Dakota Field) underlying the following described lands situated in San Juan and Rio Arriba Counties, New Mexico:

Township 24 North, Range 7 West, N.M.P.M.
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

Township 24 North, Range 8 West, N.M.P.M.
Sections 1 through 36: All

Township 24 North, Range 9 West, N.M.P.M.
Sections 1 through 36: All

Township 24 North, Range 10 West, N.M.P.M.
Sections 1 through 36: All

Township 25 North, Range 7 West, N.M.P.M.
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

Township 25 North, Range 8 West, N.M.P.M.
Sections 1 through 36: All

Township 25 North, Range 9 West, N.M.P.M.
Sections 1 through 3: All
Sections 10 through 15: All
Sections 22 through 27: All
Sections 31 through 36: All

Township 25 North, Range 10 West, N.M.P.M.
Sections 8 through 10: All
Sections 14 through 17: All
Sections 20 through 23: All
Sections 26 through 36: All

Containing a total of 135,040 acres, more or less.

2. The Dakota formation is expected to have an estimated average in situ gas permeability throughout the pay section of less than 0.1 millidarcy per foot.

3. The average depth of the top of the Dakota formation is 6350 feet and the stabilized production rate, against atmospheric pressure, of wells completed for production in said formation, without stimulation, is not expected to exceed 217 mcf of gas per day.

4. No well drilled into the Dakota formation in the above-described area is expected to produce, without stimulation, more than five barrels of crude oil per day.

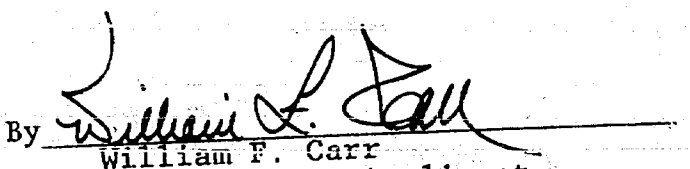
5. Attached to this application and incorporated herein by reference is a complete set of exhibits which applicant proposes to offer or introduce at the hearing on this application, together with a statement of the meaning and purpose of each exhibit. These exhibits cover all

aspects of the required evidentiary data described in Section D of the Oil Conservation Division's Special Rules and Procedures for Tight Sand Formation Designation under Section 107 of the Natural Gas Policy Act of 1978.

WHEREFORE, Applicant prays that this application be set for hearing before a duly appointed examiner of the Oil Conservation Division and that after notice and hearing as required by law, the Division enter its order recommending to the Federal Energy Regulatory Commission that pursuant to 18 CFR, Section 271.701 - 705, that the Dakota formation underlying the above-described land be designated a tight formation, and making such other and further provisions as may be proper in the premises.

Respectfully submitted,

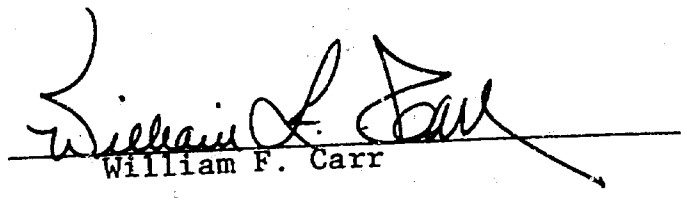
CAMPBELL, BYRD AND BLACK, P.A.

By 

William F. Carr
Attorneys for Applicant
Post Office Box 2208
Santa Fe, New Mexico 87501
Telephone: (505) 988-4421

Certificate of Service

I hereby certify that a copy of this Application and a complete set of all exhibits which Applicant proposes to offer or introduce at hearing, together with the statement of meaning and purpose of each, has been delivered to the United States Geological Survey in Albuquerque, New Mexico on this 21st day of April, 1981.



William F. Carr

CASE 7244: Application of Crescent Energy Corp. for an unorthodox oil well location and non-standard oil proration unit, Roosevelt County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Bough "C" location of a well to be drilled 2630 feet from the North line and 1980 feet from the East line of Section 32, Township 8 South, Range 37 East, Allison-Pennsylvanian Field, the SW/4 NE/4 and NW/4 SE/4 of said Section 32 to be dedicated to the well.

CASE 7245: Application of The Superior Oil Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Morrow formation underlying the N/2 of Section 21, Township 20 South, Range 35 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well. (This case will be dismissed.)

CASE 7246: Application of Getty Oil Company for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion of its Getty 32 State Com. Well No. 1 located in Unit G of Section 32, Township 21 South, Range 32 East, to produce gas from the Atoka and Morrow formations.

CASE 7247: Application of Getty Oil Company for a gas well classification, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the reclassification of its State 29-J Well No. 1, an oil well located in Unit J of Section 29, Township 24 South, Range 33 East, as a retrograde gas condensate well with the S/2 of said Section 29 to be dedicated to the well.

CASE 7248: Application of Inexco Oil Company for pool creation, special pool rules, and an oil discovery allowable, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the creation of a new Wolfcamp oil pool for its Federal 10 State Com. Well No. 1 located in Unit L of Section 10, Township 21 South, Range 26 East, and the promulgation of special rules therefor, including provisions for 160-acre spacing. Applicant further seeks the assignment of approximately 42,290 barrels of discovery allowable to the aforesaid well.

CASE 7249: Application of Southland Royalty Company for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the N/2 of Section 21, Township 18 South, Range 29 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7250: Application of Southland Royalty Company for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Pennsylvanian formation underlying the N/2 of Section 22, Township 18 South, Range 29 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7251: Application of Southern Union Exploration Company of Texas for compulsory pooling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the West Puerto Chiquito-Mancos Oil Pool underlying all of Section 36, Township 24 North, Range 1 West, to be dedicated to its Mobil Federal Well No. 1 drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7252: Application of Four Corners Gas Producers Association for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Dakota formation underlying portions of Townships 24 and 25 North, Ranges 7, 8, 9, and 10 West, containing 135,040 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

Memo

From

FLORENE DAVIDSON
ADMINISTRATIVE SECRETARY

To Called in by Bill Carr
4/10/81

Four Corners Gas Producers association

Designation of Tight Formation
San Juan and Rio Arriba Counties
Dakota formation

T 24 & 25 N, R 7, 8, 9, & 10 W

~~136,960~~ acres
135,040

OIL CONSERVATION COMMISSION-SANTA FE

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 7252
Order No. R-6726

APPLICATION OF FOUR CORNERS GAS PRODUCERS ASSOCIATION FOR DESIGNATION OF A TIGHT FORMATION, SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on May 6, 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this ____ day of May, 1981, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Four Corners Gas Producers Association, requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 C.F.R. §271.703 recommend to the Federal Energy Regulatory Commission that the Dakota formation underlying the following lands situated in San Juan and Rio Arriba Counties, New Mexico, hereinafter referred to as the Dakota formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

TOWNSHIP 24 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 24 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 10 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 25 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 3: All
Sections 10 through 15: All
Sections 22 through 27: All
Sections 31 through 36: All

TOWNSHIP 25 NORTH, RANGE 10 WEST, NMPM
Sections 8 through 10: All
Sections 14 through 17: All
Sections 20 through 23: All
Sections 26 through 36: All

Containing a total of 135,040 acres, more or less.

(3) That the Dakota formation underlies all of the above described lands; that the formation consists of barrier beach deposits about 40 to 60 feet thick, composed of fine grained, quartz-rich sandstones characterized by an increase in grain size upward and low angle crossbedding; that the top of such formation is found at an average depth of 6350 feet below the surface of the area set out in Finding No. (2) above; and that the thickness of such formation is from 200 to 350 feet within said area.

(4) That the type section for the Dakota formation for the proposed tight formation designation is found at a depth of from approximately 6048 feet to 6338 feet on the Induction Electrical log dated February 17, 1975, from the Universal Resources Grigsby Federal No. 4 Well located in Unit L of Section 8, Township 25 North, Range 10 West, San Juan and Rio Arriba Counties, New Mexico.

(5) That the following described wells produce natural gas from the Dakota formation within the proposed area:

Dugan Production Company, M.F. No. 1	NW/4 SW/4, Section 18, Township 24 North, Range 9 West
Dugan Production Company, April Suprise No. 2	NW/4 SW/4, Section 30, Township 24 North, Range 9 West
Kay Kimball, Liberman No. 1	SE/4 SE/4, Section 5, Township 25 North, Range 7 West
Merrion & Bayless, Stephenson No. 1	SW/4 NE/4, Section 17, Township 25 North, Range 8 West
Merrion & Bayless, South Huerfano No. 1 (Previously the Pilgram No. 1)	SW/4 SW/4, Section 35, Township 25 North, Range 8 West

El Paso Natural Gas Company, Nageezi No. 4	NW/4 NW/4, Section 1, Township 25, North, Range 9 West
El Paso Natural Gas Company, Nageezi No. 2	NE/4 SE/4, Section 1, Township 25 North, Range 9 West
El Paso Natural Gas Company, Nageezi No. 5	SW/4 NW/4, Section 12, Township 25 North, Range 9 West
El Paso Natural Gas Company, Nageezi No. 3	NE/4 NE/4, Section 13, Township 25 North, Range 9 West
El Paso Natural Gas Company, Hostein Yazza No. 1	NW/4 SW/4, Section 26, Township 25 North, Range 9 West
Petroleum Corporation of Texas, Mobil Rudman No. 1	NW/4 NW/4, Section 27 Township 25 North, Range 9 West
Universal Resources, Grigsby Federal No. 3	NW/4 NW/4, Section 8, Township 25 North, Range 10 West
Universal Resources, Grigsby Federal No. 4	NW/4 SW/4, Section 8, Township 25 North, Range 10 West

(6) That the Dakota formation underlying the above described lands has been penetrated by several other wells, none of which produce natural gas in commercial quantities from the Dakota formation.

(7) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Dakota formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the following parameters:

(a) average in situ gas permeability throughout the pay section of 0.1 millidarcy; and

(b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and

(c) production of more than five barrels of crude oil per day.

(12) That no infill drilling has occured within ~~the~~ the area proposed for tight formation designation.

(13) That ~~while~~ the Dakota formation has been extensively drilled and infill drilled to the North of the proposed area development there in has been minimal.

(14) That development of the proposed tight formation area has been inhibited by the poorer quality of the Dakota pay ~~there~~ and the poorer prospect of commercial production therein.

(15) That that portion of the Dakota formation ~~within the~~ proposed for tight formation designation cannot be reasonably developed absent the incentive price established in 18 C.F.R. § 271.703 (c).

(12) That no infill drilling has occured within ~~the~~ the area proposed for tight formation designation.

(13) That while the Dakota formation has been extensively drilled and infill drilled to the North of the propised area development there in has been minimal.

(14) That development of the proposed tight formation area has been inhibited by the poorer quality of the Dakota pay ~~there~~ and the poorer prospect of commercial production therein.

(15) That that portion of the Dakota formation ~~within the~~ proposed for tight formation designation cannot be reasonably developed absent the incentive price established in 18 C.F.R. § 271.703(c).

(8) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:

(a) The estimated average in situ gas permeability throughout the pay section of the Dakota formation is expected to be 0.1 millidarcy or less; and

(b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Dakota formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and

(c) No well drilled into the formation is expected to produce, without stimulation, more than five barrels of crude oil per day.

(9) That within the proposed area there is a recognized aquifer being the Ojo Alamo, found at depths of from 500 feet to 1100 feet or approximately 5200 feet above the Dakota formation.

(10) That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Dakota formation will not adversely affect said aquifers.

(11) That the portion of the Dakota formation described herein, is currently authorized for development by infill drilling as defined in 18 C.F.R. §271.703 (b)(6) of the regulations ~~but that said portion of the Dakota formation cannot be developed absent the incentive price established in 18 C.F.R. §271.703(c)~~.

lower + (12) then (15)

(16) ~~(12)~~ That the Dakota formation within the proposed area should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

IT IS THEREFORE ORDERED:

(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Policy Act of 1978, and 18 C.F.R. §271.703 of the regulations that the Dakota formation underlying the following described lands in San Juan and Rio Arriba Counties, New Mexico, be designated as a tight formation:

TOWNSHIP 24 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 24 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 24 NORTH, RANGE 10 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 7 WEST, NMPM
Sections 5 through 8: All
Sections 17 through 20: All
Sections 29 through 32: All

TOWNSHIP 25 NORTH, RANGE 8 WEST, NMPM
Sections 1 through 36: All

TOWNSHIP 25 NORTH, RANGE 9 WEST, NMPM
Sections 1 through 3: All
Sections 10 through 15: All
Sections 22 through 27: All
Sections 31 through 36: All

TOWNSHIP 25 NORTH, RANGE 10 WEST, NMPM
Sections 8 through 10: All
Sections 14 through 17: All
Sections 20 through 23: All
Sections 26 through 36: All

Containing a total of 135,040 acres, more or less.

(2) That jurisdiction of this cause is hereby retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY
Director

S E A L

United States Department of the Interior

GEOLOGICAL SURVEY
South Central Region
P. O. Box 26124
Albuquerque, New Mexico 87125

AUG 1 1 1981

Mr. Ernest L. Padilla
Oil Conservation Division
State of New Mexico
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Padilla:

This jurisdictional agency concurs in the recommendation of the State of New Mexico, Case No. 7252, Order No. R-6726, dated July 16, 1981, that the Dakota formation underlying the described lands in subject order in San Juan and Rio Arriba Counties, New Mexico, be designated as a Section 107 tight formation.

Request this concurrence be included with the recommendation submitted to the Federal Energy Regulatory Commission.

Sincerely yours,

James W. Shelton

For Gene F. Daniel
Deputy Conservation Manager,
Oil and Gas

RECEIVED
AUG 13 1981
OIL CONS.
SANTA FE