BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

IN THE MATTER OF:

Case No. 1508

TRANSCRIPT OF PROCEEDINGS

September 18, 1958

DEARNLEY - MEIER & ASSOCIATES
GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
Phone CHapel 3-6691

I N D E X

WITNESS:	DIRECT	CROSS	REDIRECT	RECROSS
Allan Loleit	6	30		

BEFORE THE
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IN THE MATTER OF:

Application of El Paso Natural Gas Company for the establishment of 320-acre spacing units for the Dakota formation in San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks an order establishing 320-acre spacing units for all gas wells drilled to or completed in the Dakota formation in San Juan and Rio Arriba Counties, New Mexico, including the fifteen presently designated Dakota gas pools in said counties; and for the promulgation of special rules and regulations for said pools.

CASE NO. 1508

BEFORE:

Edwin L. Mechem
Murray Morgan
A. L. Porter

TRANSCRIPT OF PROCEEDINGS

MR. PORTER: The first case on the docket this morning will be consideration of Case 1508.

MR. PAYNE: Case 1508. Application of El Paso Natural Gas Company for the establishment of 320-acre spacing units for the Dakota formation in San Juan and Rio Arriba Counties, New Mexico.

MR. BROWN: I am A. N. Brown --

MR. PORTER: A. M. Brown?

MR. BROWN: A. N. Brown from Denver, Colorado, and we have three Dakota wells producing in Section 34, 27, 10, on the W. R. Weaver base in the Dakota Field, and this is the only Field that we are interested in. I would like to request continuation of this case, pending further study. I was only notified last Friday of this hearing, and have not had a chance to prepare any evidence to present to the Commission at this time in opposition to this application. We are seriously considering suggesting to the Commission that we dedicate our Number 2 well,which is an offset on 160-acres, to an interference test, and further study will help us to make up our mind in that connection.

MR. HOWELL: Ben Howell, representing El Paso Natural Gas Company. If it please the Commission, I think the notice that was given is the usual notice for cases of this character, and there certainly would not be time to conduct any interference test that would be of any particular value. It seems to us that the determination of this question is long overdue. We certainly know more now and have more information about the Dakota formation than was available at the time the MesaVerde spacing was established, and the postponement or continuation of a hearing would permit more drilling, which would be unorthodox, and create more problems, and we suggest that the Commission can act. And certainly in any hearing

regarding spacing, opportunity to show that the spacing is too wide, that too much acreage is allotted to a well, can be made available in later months; whereas, if drilling is continued and permitted on spacing which is too narrow, then not only the parties that have drilled, but offset operators are likely to be injured, and the Commission will be faced with the question of unorthodox locations, and probably granting some sort of allowable relief, such as was recently done in connection with the early Pictured wells that were drilled that were on narrow spacing. We urge that it be appropriate to proceed with the hearing, and certainly at any time in the future that an operator might make application for spacing on narrower bases, I think this Commission has established that it is usually willing to hear such matters, and the industry is willing to be heard on such matters. A person can't be hurt by entering an order for wider spacing, but one can be hurt where narrower spacing continues.

MR. BROWN: Mr. Secretary, it was not our intention that the suggested interference test be conducted in 30 days. From the information we have now, we feel that it would take at least six months to a year to determine adequately whether or not the Dakota, a well in the Dakota will drain more than 160-acres, and if we went in this project in cooperation with the El Paso Natural Gas, it would be our recommendation that it be conducted for six months,

and if we did this, we would dedicate our Number 2 well, which is the only well situated so that such test could be run conclusively.

MR. PORTER: Any further discussion for the motion for continuation?

MR. HOWELL: Mr. Brown, would you be willing to have an interim -- a temporary order entered pending further testing?

MR. BROWN: So long as it does not interfere with the production of our wells at the present time, other than the one we dedicate to the experiment.

MR. HOWELL: If the Commission please, this application does not request the establishment of proration, but wider production.

MR. PORTER: Mr. Brown, the Commission has decided to deny your motion for a continuance, and will proceed to hear testimony at this time.

MR. WHITWORTH: Garrett C. Whitworth, representing El Paso Natural Gas Company. At the outset, we would like to exclude from our application two pools, being the Barker Creek,which is listed as a pool --

MR. PORTER: What is that pool's name?

MR. WHITWORTH: Barker Creek, B-a-r-k-e-r -- and the other one is the Ute Dome which is listed as being in the application.

MR. PORTER: You do not wish those two pools included in

the application?

MR. WHITWORTH: Yes, sir. This is done because at the time we prepared the application --

MR. PORTER: Are you moving for revision of your application at this time?

MR. WHITWORTH: Yes,sir, an amendment to exclude those two pools.

MR. PORTER: Is there objection?

(No response.)

MR. PORTER: It will be so amended.

MR. WHITWORTH: We have done that because at the time we prepared the application, we were not aware of the extent of development in these two pools on 160-acre spacing. Now, our first witness is Mr. Loleit, to be sworn.

(Witness sworn.)

ALLAN LOLEIT

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

DIRECT EXAMINATION

By MR. WHITWORTH:

Q Will you state your name, and the capacity in which you are employed, and by whom.

A Allan Loleit, geologist, El Paso Natural Gas Company.

Q Would you state to the Commission your scholastic qualifications and experience.

A Colorado School of Mines, Geological Engineer, 1950.

Q What experience have you had, Mr. Loleit, as a geologist?

A Two and a half years with the Texas Company, and with El Paso Natural Gas since May 1953.

Q In your connection as a geologist with El Paso Natural Gas Company, have you had occasion to make a geological study of the San Juan Basin?

A Yes, sir.

Q And the wells that are drilled to the Dakota formation in the Basin?

A Yes, sir.

Q How long have you been engaged in that study?

A Approximately a year.

MR. WHITWORTH: We ask that the witness be accepted as qualified.

MR. PORTER: His qualifications are accepted. Would you spell your name for the record?

A L-o-l-e-i-t.

Q Now, in making this geological study of the San Juan Basin with respect to the Dakota formation, what data was available to you?

A Geologic maps, electric logs, gamma ray neutron logs of the wells drilled, and surface study of the Dakota.

Q Do you have information of the wells that have been drilled to the Dakota formation in the San Juan Basin?

A Practically all.

Q Are those listed on a map or plat?

A Yes, sir, exhibit 1.

Q That is El Paso Exhibit 1, is it not?

A Yes.

Q Did you indicate the wells on that exhibit that you have studied?

A Practically all of them.

Q Practically all of them?

A Yes, sir.

Q Did you prepare this exhibit, Mr. Loleit?

A Yes, I did.

Q And what information did you use in the preparation of the exhibit?

A Electric logs and scout reports.

Q Now, would you explain Exhibit 1 to the Commission?

A On this map are located Dakota wells from Range 1 West to 13 West, and from Township 22 North to 34 North. The blue circle indicates the well that has penetrated the Dakota but is not pro-

ducing. The red indicates a gas well from the Dakota; black, an oil well; and half red and half black oil and gas from the Dakota. The green outlines are the Dakota field, and this thin red outline is the extent of the Blanco-Mesa Verde field. The lines across here connecting various wells are cross sections of subsequent completions.

Q About how many dry holes are listed, indicated, on your exhibit?

A Oh, probably about 30.

Q And how would that compare to the producing wells in the Dakota formation?

A Well, there is probably more than 30 dry holes, I imagine; there is about 20 producing holes in the Dakota.

Q How do you account for the dry holes that are indicated on the exhibit?

A In the southwestern portion of the map, the Dakota sometimes carries water in there and probably lacks permeability in the confines of the Blanco-Mesa Verde Field. And, slightly to the southeast in the Huerfano, Angel Peak and West Kutz some of those dry holes were probably dry because of probable lack of adequate testing on the Dakota.

Q Now, on what information that you have studied do you base this opinion?

A By Scout Tickets and electric log characteristics.

Q Have you made any inquiry as to the extent of the Dakota formation in the San Juan Basin?

A Yes, I have.

Q And what have you used in making that inquiry?

A Geologic map of Northwestern New Mexico.

Q Do you have that map with you?

A Yes.

Q And that is El Paso Exhibit Number 2?

A Yes.

Q What does this map show, Mr. Loleit?

A This map shows, in green is the outcrop pattern of the Dakota formation around the perforated San Juan Basin, extended a little further south of the Basin to the Basin proper, and this shows the Dakota outcrop is all around the Basin except for a few areas where it is covered up by more recent sediments.

Q Does it indicate the Mesa Verde?

A Yes, but that is not colored; Mesa Verde comes around in here (indicating), roughly parallels the Dakota outcrops.

Q Where did you get this map, this exhibit?

A That is United States Geological Survey Preliminary Map, I-224.

Q Now, what information did you use in obtaining the outcrop

around the periphery of San Juan Basin for the Dakota formation?

A Just on the information that it is the same as the Dakota is presently.

Q In your opinion does that indicate to you that the Dakota formation is continuous throughout the whole San Juan Basin?

A Yes, it does.

Q Would you compare the extent of the Dakota formation in the San Juan Basin with that of the Mesa Verde?

A I believe the aerial extent is further than the Mesa Verde.

Q Have you had occasion to inquire as to the depth, generally, of the Dakota formation in the San Juan Basin?

A Oh, probably from around 6,000 to 8,000 feet to the top of the Dakota.

Q You mean it varies according to --

A Yes, depending on where you are in the Basin.

Q Is this the producing part of the formation that you are talking about?

A Yes.

Q Wherewould you say the deepest portion of the Dakota formation is in the San Juan Basin?

A How deep it is?

Q The area where you find the deepest portion.

A It probably would be right along in here (indicating),

about 31, 32 North, somewhere between 7, 8 and 9 West.

Q What depth is it in that area that you just indicated?

A I believe it is about 8600.

Q And you are speaking now of the producing part of it?

A Yes.

Q Have you determined the top of the Dakota formation throughout the San Juan Basin?

A Not precisely. I depicted the top within 50 to 100 feet.

Q And can you explain why it can't be done with more precision than that?

A Just based on electric log characteristics, there is sand coming in the Graneros which is above the Dakota, coming in and out, and we do not have any evidence whether it is Dakota or Graneros in age.

Q How is the top of the Dakota formation determined?

A We usually pick it up about 100 feet below the base of the Green Horn, below the first good sand coming in.

Q Can an accurate determination of the base of the Green Horn be determined?

A Yes, very well.

Q Can you determine the base of the Dakota formation?

A At present, no, but at this time we usually pick up about 250 foot of sand, and then we consider that the bottom of that is

usually the base of the Dakota. I believe we need Paleontological evidence to precisely determine where your Dakota sand, or Morris, or lower cretaceous starts.

Q And that evidence is not available to you?

A Not at this time, no.

Q How does the depth of the Dakota formation in San Juan Basin compare with that of the Mesa Verde?

A It's about 3,000 feet deeper, two or three thousand feet deeper.

Q The Dakota is about two or three thousand feet deeper than the Mesa Verde?

A Yes.

Q Based on your studies of the Dakota formation in the San Juan Basin, what would you recommend be the vertical limits?

A What do you mean?

Q That should be included in a spacing pattern?

A Well, that would be kind of hard to say, because we still do not definitely know where the base of the Dakota is. I would say several hundred feet at least, maybe three or four hundred.

Q Now, in your geological studies of the Dakota formation, you have had an objective in mind of determining the continuity of the Dakota formation throughout the whole San Juan Basin, is that right?

A Yes.

Q Do you have any exhibits which would indicate that continuity?

A Yes.

Q What is the exhibit that you have just put on the board?

A This cross section runs from Northeast --

Q First of all, that is El Paso's Exhibit Number 1?

A Three.

Q Number 3, that is right.

A This is cross section Number 1. This illustrates a cross section through the Basin from the Northeast to the Southwest, the El Paso Natural Gas Company-Allison Number 1 to El Paso Natural Gas Products Company-Frontier Number 1-B, two gamma ray logs and three neutron. The solid red indicates where gas is being produced. In this McRae-Federal you get gas and oil from the zone, and I cannot differentiate where the oil is coming from, and where the gas is coming from. And partially half filled trackindicates there is a show of gas on the drill stem test or core analysis, or something to that effect; it is not producing from there. This shows, I believe, that the Dakota is present; this horizontal line is the base of the Green Horn, and you have this continuous sand body, well sand and shale bodies, below the Green Horn, and then maybe about 100 feet, 150 feet through there which we call

the Dakota.

Q What portion of the San Juan Basin does this cross section cover?

A This should go through about the deepest portion of it.

Q Would you indicate to the Commission the particular portion of the San Juan covered by this particular exhibit?

A It is on this index.

Q Would you do that?

A It is, cross section 1 goes through this portion of the Basin right here (indicating).

Q Now, what wells are shown on this exhibit cross section?

A El Paso Natural Gas Company-Allison Unit 1, Blackwood-Nichols Northeast Blanco Number 1, Delhi-Taylor Florance Number 26, and El Paso Natural Gas Products-Frontier Number 1-B.

Q Have you studied any logs pertaining to these wells?

A Yes.

Q All of them, or some of them?

A Yes, I looked at all of them.

Q What did they show with respect to the Dakota formation?

A Mainly that it consists of alternating sands and shales.

Q Would you say that the Dakota is present in each one of them?

A Yes, I would.

Q Do you have another exhibit showing another portion of the San Juan Basin?

A Yes.

Q And this is El Paso's Exhibit 4?

A Yes, that's right.

Q What does this exhibit show?

A This is the Northwest-Southeast cross section of the San Juan Basin, and it is more or less a long strike, and the legend is the same as what was on the previous exhibit.

Q Now, would you indicate by your Exhibit Number 1, what portion of the San Juan Basin is covered by this exhibit?

A That would be the Southwest portion of the Basin.

Q The Southwest portion?

A Yes.

Q What wells are covered?

A Pardon me. This section, this is Number 2, roughly goes East-West across the Basin right along in here (indicating), and probably on a long strike to the sediments.

Q Driving from East to West?

A Yes.

Q What wells are covered by this exhibit?

A British American-Scott Number 1-D, Pan American-Gallegos Canyon Number B, McRae Oil-Federal Number 1, Byrd-Frost-Hughes

Number 2, Southern Union-Hodges Number 7, El Paso Natural Gas-Canyon Largo Number 29, Amerada Jicarilla Number F-1, Amerada Jicarilla Number A-3, and Conoco Jicarilla Number 30-1, and Magnolia Ingwerson Number 4.

Q Have you studied any geological data pertaining to these wells?

A Just electric logs.

Q Are they all electric logs, or --

A Here is a gamma ray-neutron on the McRae Federal, Byrd-Frost gamma ray-neutron, and Amerada Jicarilla F-1 and Conoco Jicarilla 30-1.

Q You studied the gamma ray also, did you not?

A Yes.

Q Your studies of this well indicate what with respect to the Dakota formation?

A That it is present in this area that this cross section covers, and also consists of sand and shale.

Q All right; now, you have another exhibit showing another portion?

A Yes.

Q This is El Paso's Exhibit 5?

A Yes.

Q Can you indicate by your Exhibit Number 1, what portion

of the San Juan Basin of that area is covered by this cross section?

A This is roughly an East-West cross section of the Basin, parallel with cross section Number 2, and a little bit North of it..

Q Running generally from East to West, a little North of what was indicated by Exhibit Number 2?

A Yes.

Q That is correct?

A Yes.

Q What does your Exhibit Number 5 indicate?

A It indicates that the Dakota is composed of sand and shales.

Q And what geological data did you study with respect to these wells?

A Electric logs, and gamma ray-neutron logs.

Q What wells are shown on the exhibit?

A British American-Scott Number 1-D, Pan American-Gallegos Canyon Number 1-B, Southern Union Culpepper-Martin Number 2, El Paso Natural Gas-Mudge Number 3, Delhi-Taylor Florance Number 26, El Paso Natural Gas-San Juan 28-7 Number 12, El Paso Natural Gas-San Juan 27-5 Number 1, El Paso Natural Gas-San Juan 27-4 Number 14, and Conoco-South Dulce Number 1.

Q Now, those first two wells that you read on this exhibit, were they not on the previous exhibit?

A Pan American and Gallegos Number 8 was; this well here --

Q What is the first well on Exhibit Number 5?

A Pardon me. I got an overlap of the map here, this was Exhibit 4, this is Exhibit 3, I had included too many wells. Southern Union Culpepper-Martin Number 2, El Paso Natural Gas-Mudge Number 3, do you want me to go through them?

Q Your Southern Union well is your first on Exhibit Number 5?

A Yes.

Q And the two that you read previously were on Exhibit 4?

A That's right.

Q What does this Exhibit Number 5 indicate to you with respect to the existence of the Dakota formation?

A I believe the Dakota is present.

Q And is the presence of the Dakota indicated in every one of those wells?

A Yes, sir.

Q All right. Do you have another exhibit, or another portion?

A Yes.

Q Will you indicate to the Commission the portion it covers?

A This portion here covers the Southwest portion of the San Juan Basin, and on a long strike.

Q Now, what wells are shown on this exhibit?

A Pan American-Davies Number 1, O. J. Lilly-O. J. Riddle Number 1, El Paso Natural Gas-Hill Number 1, Shell Oil Company-

Carson Number 1, Skelly Oil Company H-Belack Number 1, Deep Rock Oil Corporation Edgar Number 1, El Paso Natural Gas English Number 1, Great Western Chaco Canyon Number 2, and Humble Oil Company South Chaco Number 4.

Q You made a study of the geological data of each of these wells?

A Yes.

Q What has that data indicated?

A That the Dakota is present.

Q What particular data did you study?

A Electric logs, and gamma ray-neutron.

Q You say that the Dakota formation is present in each of those wells?

A Yes, sir.

Q All right. Do you have another exhibit?

A Yes.

Q Now, Exhibit 5 covers what -- Exhibit 6 covers what -- Exhibit -- this is El Paso's Exhibit Number 7?

A That's right.

Q It covers what portion of the San Juan Basin?

A It covers the San Juan Basin from North to South, starts out in Colorado in the Ignacio area, through the Allison area, and down through the Companero Field. It roughly parallels possibly

the deep axis of the Basin.

Q What wells are covered by this exhibit?

A Pacific Northwest-San Juan 33-8 Number 4-13, El Paso Natural Gas -Allison Number 1, Pan American-Rosa Unit Number 1, Phillips Petroleum Dakota Unit 30-5 Number 6-19, El Paso Natural Gas San Juan 27-5 Number 1, El Paso Natural Gas San Juan 27-4 Number 14-X, and Northwest Production Jicarilla "N" Number 8-8.

Q Did you study geological data with respect to these wells?

A Yes, sir.

Q Each of them?

A Yes, sir.

Q What data did you study?

A Electric logs and neutron logs.

Q Based on that study, what does it indicate with respect to the Dakota formation?

A That the Dakota is present.

Q In each of the wells?

A Yes, sir.

Q Now, on this particular exhibit, how many dry holes are indicated?

A Two. Pan American Rosa Unit, and Phillips Petroleum Dakota Unit 30-5 Number 6-19.

Q Can you account for those dry holes?

A This Pan American-Rosa Unit had gas on a drill stem test, and I believe they had several drill stem tests and then they shot the interval from 7866 to 8056, gauged 1,730,000 M.C.F. and from the data that I have, they did not try to complete it in that zone. And in the Phillips Petroleum-Dakota Unit, no testswhatsoever were taken in the Dakota.

Q In other words, they didn't try to --

A They didn't try a thing.

Q Now, on the dry holes on your other exhibits, cross sections, are there indications that the reasonsfor the dry holes were that there was no attempt to complete the wells in the Dakota formation?

A Yes, that is right.

Q And are there any dry holes indicated by Exhibit Number 6?

A Yes, sir, 1, 2, 3, 4, 5, 6 -- Six dry holes.

Q And what wells are they?

A El Paso Natural Gas-Hill Number 1, Shell-Carson Number 1, Skelly-Bolack Number One, Deep Rock-Edgar Number 1, El Paso Natural Gas-English Number 1, Great Western Chacon Canyon Number 2.

Q Can you account for the reason for these dry holes?

A Yes. El Paso's wells, they made one drill stem test, from 5635 to 5728, which would be this interval right here; the test failed and they did not try to do anything more with it.

The Shell Oil-Carson Unit Number 1, they made no attempt to drill stem test or anything. On Skelly-Bolack, they had no tests made, no attempt to test it. And Deep Rock-Edgar, they tested 5810 to 5845 this interval right here, but they recovered salt water, they didn't test anything up in here. And El Paso-English, they have no shows in the samples, and they didn't attempt to test anything. And Great Western Chaco Canyon they had a test, I do not remember the interval, but they got brackish water.

Q Now, you stated previously the portion of the San Juan Basin that that cross section covers, will you restate that?

A Yes, Number 4 --

Q Number 6.

A Yes. That's the Southwest portion of the Basin.

Q Is the Dakota formation considered productive of gas in that formation, in that area?

A I do not believe so; I believe you will have water trouble, based on what evidence I have.

Q Generally it is productive, is that right?

A That's right.

Q Do you regard that particular portion of the San Juan Basin outside the productive limits in the San Juan Basin of the Dakota formation?

A With what evidence I have now, I would, yes.

Q All right. Are any dry holes indicated on Exhibit Number 5?

A Yes, 1, 2, 3, 4, 5.

Q Can you account for these dry holes?

A Southern Union attempted to make a drill stem test there, and the test failed and I believe the hole caved in, and they didn't try to complete it, and besides there is 30 feet of log missing, they do not know what is there, might have been sand or shale.

Q What well is that?

A Southern Union Culpepper. El Paso-Mudge Number 3, we made a drill stem test here, got a show of gas, but didn't try to complete it there. Delhi-Taylor Florance was drilled with gas and made no attempt whatsoever to try to make a drill stem test in that area. El Paso San Juan 28-7 Number 12 had some gas shows in there apparently as they were drilling it, gauged every connection, but a frac was attempted in this area right in here (indicating); the frac didn't take so they didn't try again. And Conoco South Dulce Number 1, I think they made drill stem tests in this area partially covered with red, they had some gas and salt water in that.

Q What area is covered by this exhibit?

A That's roughly East-West across the Basin, cross section 3.

Q All right. Are there any dry holes on Exhibit Number 4?

A There are 1, 2, 3, 4, 5, 6 dry holes.

Q What wells are they?

A Dry holes are British American Scott 1-D, Southern Union Hodges Number 7, El Paso Natural Gas Canyon Largo Number 29, Amerada Jicarilla Number F-1, Conoco Jicarilla Number 30-1, and Magnolia Ingwerson Number 4.

Q Will you explain these dry holes?

A British American they made two drill stem tests in the Dakota and they recovered gas cut mud, they didn't try any other completion method so far as I know. The Southern Union Hodges they didn't attempt to make any tests in the Dakota. El Paso Canyon Largo was previously a Superior CD1-7, they made several tests in the Dakota, they got small amounts of gas, too small to measure, they didn't try to complete it. Amerada Jicarilla F-1 they recovered gas on the drill test, it was too small to measure. Conoco Jicarilla Number 30-1 had quite a number of DST's which recovered some gas, but too small to measure, and didn't try to complete it. Magnolia Ingwerson Number 4 they got some oil here in the, possibly in the basal Dakota but they didn't try to re-test that.

Q Will you state what portion of the Basin is covered?

A This is Number 2, and it is on the flank of the Basin,

getting into the deeper portion of the Basin, comes outside the Blanco-Mesa Verde Pool outline.

Q You say that that portion of the San Juan Basin is generally productive of gas in the Dakota formation?

A Portions of it, I imagine, are. Based on what evidence I have, such as this Amerada Jicarilla A-3, the Otero Field, and thereis a couple of dry holes in between there, but there is a lot of spacing and a lot more room for more drilling.

Q Are there any dry holes indicated on Exhibit Number 3?

A Yes, Delhi-Taylor Florance 26.

Q Will you explain the reason for that dry hole?

A They made no D.S.T.'s in the Dakota.

Q You mean drill stem tests?

A Yes.

Q What portion of it is covered by that?

A Roughly runs from the Northeast to the Southwest portion of the Basin.

Q Now, based on all these exhibits, and your studies of the logs of each well, what would you say with respect to the continuity of the Dakota formation in the San Juan Basin?

A I think it is continuous throughout the Basin.

Q Now, what actually makes up the Dakota formation, what sands do you include in the Dakota formation?

A What do you mean, what sands?

Q What is the composition of the Dakota formation?

A Oh, sand and shales.

Q Sand and shales?

A Yes.

Q And can you identify them?

A Well, there are, some of them are silts to very coarse sand.

Q Can you explain the nature of them?

A Will you restate that question?

Q Well, these sands and shales, do they indicate to you a continuity of the Dakota throughout the whole Basin?

A Oh, yes, they do.

Q What is the nature of the deposit with respect to these sands and shales? How were they deposited there?

A I believe they are deposits of a transgressive-regressive sea.

Q What is the result of being deposited in a transgressive-regressive sea?

A The fact that you have alternating sand and shales, and second you might take one sand zone and not be able to follow it for many, many miles.

Q Would you say that this characteristic is included in the whole Dakota formation in the San Juan Basin?

A Based on the evidence I have now, yes.

Q In your opinion, it is common to all of it?

A Yes.

Q Is that the same deposition features that you find with respect to the Mesa Verde formation in the San Juan Basin formation?

A Yes.

Q What would you say with respect to all these wells that you talked about, the difference in completion methods, if any, of the wells?

A Well, some of these wells, the reason I think they are dry holes, they were tried to be completed by shooting which I do not think was an effective method of fracing, producing artificial fractures in the Dakota,and I believe a lot of these wells, if they had a different completion method, would be producers. Some were produced before the sand-water and sand-oil fracs.

Q In your studies of these wells in Dakota formation and San Juan Basin, did you make any inquiry with respect to the thickness of the Dakota formation?

A The Dakota is about 225 feet thick.

Q Does the thickness vary?

A Well, it is hard to say, because we still do not definitely know where the base of the Dakota is.

Q Well, now, how would you compare the thickness of the

Dakota formation in the San Juan Basin with the Mesa Verde?

A It would be thinner.

Q How much?

A Oh, maybe about 500 feet.

Q Now, based on your studies also, do you have any opinion as to the likelihood of production of a well drilled to the Dakota formation in the San Juan Basin?

A Yes.

Q And what is that opinion?

A I believe that it is quite possible to get Dakota formation within the present outline of the Blanco-Mesa Verde Field, and also to the Southwest of that and parallel with the outline of the Field.

Q Do you think that would be reasonably continuous over the entire area?

A Based on what evidence I have, yes.

Q Should production obtained from the Graneros and Morrison be differentiated, or not included, from production in the Dakota formation?

A I do not think so.

Q In other words, you would include it?

A Yes.

Q Should it be produced concurrently in the same hole?

A I do not know.

Q From a well drilled to the Dakota formation?

A I think it should, yes.

Q That's all we have. Now, these Exhibits 3, 4, 5, 6, and 7 have been prepared by you, have they not?

A Yes, sir.

Q In addition to Exhibit 1?

A Yes, sir.

MR. WHITWORTH: We offer the exhibits in evidence at this time.

MR. PORTER: Any objection to the admission of these exhibits?

(No Response)

MR. PORTER: They will be admitted into evidence. Anyone have a question of the witness?

CROSS-EXAMINATION

By MR. BROWN:

Q Mr. Loleit, you have compared the Dakota with the Mesa Verde throughout the Basin, how would you say that the Dakota compares with the Mesa Verde in permeability and porosity?

A I am not qualified to answer that.

Q You are a geologist?

A Yes. We have another witness that can do that.

Q You understand permeability and porosity?

A Yes.

Q And you understand these logs?

A Yes.

Q What in your opinion as an expert, is the comparison between the Mesa Verde and the Dakota?

A Well, how do you mean, comparison?

Q How do they compare in permeability and porosity, a like section, with the Mesa Verde?

A I am not qualified to answer that.

Q You are an expert on that?

A I didn't make any study of permeability and porosity; we have another witness that will testify to that.

Q I would like your opinion on this as an expert; do you know a tight sand from a loose sand?

A How does the Dakota compare with the Mesa Verde in permeability?

MR. HOWELL: If the Commission, please, this witness has testified that he has not studied that particular point. We have a witness who will testify as to the relationship as to permeability and porosity, but this witness has not made any study upon those particular points.

MR. BROWN: If this man is an expert, he should be an expert in the entire field, and not just in one particular phase of this examination, Mr. Secretary, and I asked him for an opinion,

as an expert as to what his opinion was, and I think that if he is qualified as an expert, he should be qualified to answer the question.

MR. MORGAN: Are you questioning the witness' qualifications?

MR. BROWN: If he can't answer this question, I am.

MR. MORGAN: Are you attempting to impeach the witness?

MR. BROWN: No, I just want his opinion in this particular phase. He has stated he made a study of these wells, and if he is an expert, he should be able to answer the question.

MR. PORTER: The witness has stated that he was not able to answer the question.

MR. BROWN: Then I would like to question his ability as an expert, and impeach all of his testimony.

MR. HOWELL: If the Commission please, it would seem that when we are prepared to put on a witness who has made a study of the point of a particular study, this witness has testified that he has examined the logs, he has testified as to what he found on the logs, he has not attempted to testify as to core analysis, and we have a witness who has made a general study of that, and we submit that the testimony of the witness who is prepared on the point is much preferable and better evidence than one who has not studied or prepared for a particular point.

MR. BROWN: Mr. Secretary, if this man is an expert, and

he has studied the logs, regardless of whether or not he studied for the purpose of determining where the Dakota is or where it isn't, he can determine from that log, in his opinion, whether this is tight or loose sand, and my only question is what his opinion is as to this particular phase of the examination, as to whether the sand is tight or loose. If he can't do that, he isn't an expert.

MR. PORTER: Mr. Howell's objection is sustained.

MR. BROWN: Thank you, sir.

MR. WOODWARD: If the Commission, please, at this time, John Woodward, representing El Paso Natural Gas Products Company; I would like to suggest that the Commission grant a recess of ten minutes, in order to give all parties desiring to cross examine this witness, an opportunity to further study the exhibits, and get them spread out where we can talk about them intelligently.

MR. PORTER: We will take a 10-minute recess.

(Recess.)

MR. PORTER: The hearing will come to order, please. Will the witness resume the stand? Mr. Brown, any further questions?

Q (By Mr. Brown) You testified, Mr. Loleit, that you are familiar with the deposition of the Dakota over the San Juan Basin?

A Yes, sir.

Q And also the Mesa Verde?

A Yes, sir.

Q And that the Dakota was made up of sand and shale, I presume that they are laminated throughout the section?

A Alternating sand and shale, yes, sir.

Q What percentage of sand would you say composes the Dakota?

A I'd say about fifty percent perhaps, or more.

Q You would say there would be 125 to 150 feet of producing sand in the Dakota Basin, basing it on 250 to 300 feet as the average thickness, and what percentage of the Mesa Verde was productive sand?

A I would say about the same.

Q About fifty percent?

A Yes.

Q Or, approximately 250 feet, is that --

A Yes.

Q -- on your previous testimony?

A Yes.

Q In determining where the sand started and the shale started in these particular zones, in order to arrive at a figure, did you make any study of the sand?

A Pardon me, sir?

Q Did you make any study of sand in determining what portion of these sections were sand and what portions were shale?

A Just by mechanical logs.

Q Is there any indication on the mechanical logs as to shale or sand, or dirty sand, or --

A Yes, sir, there are in some places.

Q Did you detect that on any logs?

A Not on these sections here.

Q It was all clean sand?

A Apparently so, yes.

Q From your study, would those logs indicate any permeability or porosity, from looking at the log?

A Yes.

Q Could you determine from your study whether or not there was any permeability in the Dakota formation?

A Yes.

Q Likewise in the Mesa Verde?

A Yes.

Q Then could you compare those two zones?

A You mean the Mesa Verde and Dakota? In what way?

Q In permeability, you said you had to take the permeability in both the Mesa Verde and the Dakota formation?

A Yes.

Q How did they compare?

A I believe the Dakota was just a little more tight than the

Mesa Verde, as a whole.

Q In your opinion, then, it would be more difficult for gas to permeate in the Dakota than the Mesa Verde?

A Yes.

Q Are you familiar with any test that has been drilled in the San Juan Basin by El Paso Natural Gas in the past few years to determine the existent reserves in the Mesa Verde formation?

A No,sir, I have not.

Q You have never heard of such things being done?

A No, sir, not to my knowledge.

Q Do you know, to your knowledge, whether any test wells have been drilled in the San Juan Basin by El Paso Natural Gas on less than 320 acre spacing?

A No, sir, I do not know of any.

MR. BROWN: The witness is under oath, I guess?

MR. PORTER: Yes.

MR. BROWN: That's all.

MR. PORTER: Anyone else have a question of the witness?

MR. KELLAHIN: If the Commission please, Jason Kellahin of Kellahin and Fox, representing Phillips Petroleum Company. I have a couple of questions I would like to ask the witness.

By MR. KELLAHIN:

Q I am not quite clear on your recommendations as to the

vertical limits that you recommend as being the Dakota formation, would you clarify that for me, please?

A You mean where I pick the top of the Dakota?

Q As I understood your testimony, you recommend something on the order of three to four hundred feet, is that correct?

A Possibly so, we do not know exactly, precisely, where the base of the Dakota is.

Q Is it possible to precisely pick the top of the Dakota?

A No.

Q For that reason, what is your recommendation as to those formations which may be producing formations immediately adjacent to the Dakota formation? I believe you referred to the Graneros and the Morrison.

A Yes.

Q What is your recommendation as to those formations, should they be producing formation in any particular area?

A I would suggest doing it all together, producing oil.

Q In other words, consider it as one common source of supply?

A Yes, sir.

Q Now, you had some testimony as to the dry holes which I believe you attributed in some instances at least to the recent methods used; are those older wells that you referred to?

A Yes, sir.

Q What was the practice as to completion at that time?

A Shooting.

Q Do you know approximately when they developed this sand frac and water frac method up there?

A I think 1955.

Q Are we to understand your opinion is that some of those areas which the cross section indicates being dry, are actually productive of gas in the Dakota?

A I believe they possibly could be.

Q Now, then, in regard to the limits of the Dakota formation, the producing limits, what is that cross section, the lower one there, four.

A Number 4?

Q Yes, in general, what did they find in the Dakota formation?

A Brackish water.

Q You wouldn't consider that productive in that area?

A No.

Q How far, moving in that direction--does the Dakota formation, as a producing formation, extend further than say the Mesa Verde or the other pools?

A Yes.

Q So you would, in your recommendation to the Commission, have them consider the areas to the North and East of that cross

section Number 4 as producing formation?

A Yes, possibly this area down in here.

Q Could you describe it for the record so, with reference to the cross section you have on this, you say "this area down here", just where are you pointing, approximately?

A Within the area of cross section Number 2, that would be Exhibit 4.

Q And that would actually, what you would consider producing area would lie South of that line, but North of your cross section Number 4, is that correct?

A Yes.

MR. KELLAHIN: That's all I have.

MR. WOODWARD: John Woodward, El Paso Natural Gas Products Company. I have some questions.

Questions By MR. WOODWARD:

Q Mr. Loleit, I would like to briefly go over with you, your testimony here in summary. Beginning with El Paso Exhibit Number 1, does the area shown on this exhibit represent something like the center of the Dakota formation in the San Juan Basin?

A Yes.

Q Approximately the center two thirds?

A Yes.

Q Now, are the northern and southern limits of the Dakota

formation in the San Juan Basin shown in this area?

A No, the northern limit would be probably off the map a little bit to the North, and probably in Range 1 West, or maybe 1 East in this direction, and the Dakota on the South and West portions of the map.

Q And then there is some portion of the Dakota formation that is not shown, East or West?--

A Yes.

Q -- by this exhibit? Now, the productive limits of the Dakota formation in the area shown, I believe you have testified are limited by the presence of water to the Southwest on the flank of the Basin, is that correct?

A Yes, sir.

Q And out in the center of the Basin you have some dry holes shown on this exhibit, do you not?

A Yes.

Q And you have stated that in your opinion these dry holes in the center of the Basin are the result of failure to test properly, or a failure to frac the wells, is that correct?

A Yes, sir.

Q That with present completion and testing practices, a number of these wells would have indicated the presence of gas, is that correct?

A Yes, sir.

Q Now, turning to the vertical limits of the area to be spaced, you stated that the top of the Graneros would represent the upper vertical limits of production?--

A Yes, sir.

Q -- in your opinion?

A Yes.

Q Would the Commission, in your opinion, be safe in adopting a vertical limit from the top of the Graneros to a depth of 400 feet below the top of the Graneros at this time?

A Yes, sir.

Q Is it your recommendation that those vertical limits be assigned to the Dakota formation for the purpose of this application?

A Yes, sir.

Q Now, as a geologist, Mr. Loleit, you understand that the core analysis is the best and most accurate indication of porosity and lithology of the sand in this area?

A Yes, sir.

Q However, as a geologist, in the examination of logs, are you able in a general way to reach any conclusions concerning the lithology of the Mesa Verde and the Dakota sand?

A Yes, sir.

Q In general, what is that lithology?

A They are composed of sand and shales.

Q Are these sands relative tight, or relative loose, in your opinion?

A Relatively tight.

Q How would you compare the Mesa Verde and Dakota sand?

A I believe the Mesa Verde has a little more permeability than the Dakota.

Q But they are both relatively tight sands, is that correct?

A Yes.

Q Now, turning to your cross sections which you have shown as cross section Number 3, I believe that would be El Paso's Exhibit Number 5, would it not?

A Yes.

Q The red markers indicate the presence of gas in the well shown on this exhibit, is that correct?

A Yes, when the deep track is filled in solid, it is produced from that zone; when it is partially filled, it has a show of gas, but was not completed in that zone.

Q You have testified as to the possible reasons why gas was not found in the Southern Union Culpepper Number 2 well, the Delhi Taylor Florance 26 well, and the El Paso Natural Gas San Juan 28-7 Number 12 well?

A Yes, sir.

Q Was the reasoning because of lack of testing or completion?

A Lack of testing.

Q These cross sections that traverse the center of the area you have shown, roughly the center of the Basin, have you reached a conclusion as to the possibilities of production in the area North of the water saturated area and in the center of the Basin?

A Yes, sir.

Q What is your conclusion?

A I believe that there are a lot of gas possibilities in there.

Q You have also testified, Mr. Loleit, that the same bodies within the Dakota formation are interspersed or interlaced by sand and silt bodies?--

A Yes, sir.

Q -- as a result of fluctuations possibly in the change of an old shoreline basin?

A Yes, sir.

Q Would these sand and shale bodies interfinger over the center of the Basin?

A Yes, sir.

Q Do you have any opinion as to the possibility of these sand bodies being interconnected throughout the Basin?

A I believe they could be interconnected.

Q Let me ask you this, Mr. Loleit, if this is a picture of the situation which you have here. Would it be accurate to compare the Dakota formation, as a continuous or blanket sand body, to a peanut brittle, with the peanuts being areas of perhaps relatively tight porosity, and the brittle a continuous and interconnected sand body?

A Yes, sir, that is a very good analogy.

Q And that some of these dry holes that are shown on these maps, in your opinion, are drilled into the brittle and could have been completed, as gas wells, or would have shown some gas production?

A Yes, sir.

MR. WOODWARD: I believe that's all the questions I have.

MR. PORTER: Mr. Nutter, do you have a question?

By MR. NUTTER:

Q Mr. Loleit, I believe you described the conditions under which the Dakota was laid down as purely a transgressive-regressive sea, is that correct?

A Yes.

Q Well, as a result of these transgressive-regressive seas, are the beds in the Dakota continuous, or do they exist as trends scattered throughout the --

A I believe they exist as trends.

Q Well, now, referring to Mr. Woodward's peanut brittle, until there is more development, can you tell whether the areas of no porosity and permeability are peanuts or whether they are

brittle?

A Well, I just -- based on the evidence we have, I couldn't say. His analogy is very logical, but we do not have enough information to see if there are any definite trends.

Q And we do not know how many peanuts are in this brittle, is that correct?

A That is right.

Q Do you believe that the existence of these trends in the Dakota formation is more similar to the trend such as we find in the Pictured Cliffs, or is it more similar to a rather continuous bed, as we see in the Mesa Verde?

A Based on the evidence I have, I think it might be a little more like the Pictured Cliff.

Q I see. You are acquainted with the Pictured Cliffs and Mesa Verde formations, are you not?

A Yes.

Q Generally speaking, is the Dakota more similar to the Pictured Cliffs, or Mesa Verde?

A I think it would be more similar to the Mesa Verde.

Q Although it exists in trends similar to the Pictured Cliffs?

A Possibly exists in trends like the Pictured Cliff.

Q In what manner is it dissimilar from the Pictured Cliffs?

A Well, I do not have enough evidence to pinpoint it down to

the Pictured Cliffs, but I thihk it might end up being in trends like the Pictured Cliffs.

Q How is it dissimilar from the Pictured Cliffs?

A I do not have enough evidence to prove that it isn't dissimilar.

Q Do you have any evidence to indicate that it is dissimilar fromthe Mesa Verde?

A None so far.

Q Mr. Loleit, your cross sections there do not purport to show continuity of production across the Basin from one area to the other, do they?

A No.

Q It is more to show the existence of the Dakota formation itself?

A Yes, some of them do show continuity of production.

Q What is the major factor that you would believe to exist to cause the breaks in the production?

A Possibly permeability and sedimentation of the Dakota.

Q So that there would be very tight permeables which separate the zones of production as you go from one well to another?

A Yes.

Q How about porosity, is there variation in porosity also?

A There is, yes, based on a few core analyses we have had.

Q Now, Mr. Loleit, I noticed in discussion of some of those dry holes there, that you frequently use the term, "No test whatsoever was made of this zone".

A Yes, sir.

Q Were most of these wells drilled as Dakota tests?

A Yes, sir.

Q They probably made an analysis of the cutting, or looked at the electric logs before they abandoned the wells?

A I believe so, yes, sir.

Q So in effect, they tested the Dakota formation, even though they didn't run a drill stem test?

A What I had in mind for testing was run a drill stem test.

Q You didn't mean to imply that there is a possibility that there is gas there, but didn't run a drill stem test to determine if the gas was there?

A Yes.

Q Has oil been encountered in the Dakota formation?

A Yes.

Q Where in the Dakota is oil generally encountered?

A Probably in the upper part, if you call it the upper, or maybe upper and middle part of the Dakota, as you can see on these cross sections. Are you including the Granerous in that?

Q If the Granerous is within this 400 feet --

A Yes.

Q -- vertical limits that you have proposed, yes.

A Yes.

Q Geographically speaking, as far as the oil production is concerned, where does this occur?

A Oh, it seems to be down in the South part of the Basin in 25 North and 2 to 5 West, and then a couple here in the Angel Peak Field, that's oil and gas there.

Q Are you acquainted with Skelly-Roberts Number 3 well that is an oil well in the Dakota formation?

A Yes. I have seen the logs.

Q Isn't that in the area that you just mentioned as being oil productive?

A Yes.

Q Well, does this oil occur as a general rule in the Granerous or Dakota when you find oil?

A In the Otero Field, in the Granerous.

Q How about in the Rattlesnake area further to the West?

A It is not in the Granerous.

Q Is there oil in the Dakota?

A Yes.

Q What's the explanation for finding this oil in the updip side of the Basin when you speak of the Rattlesnake Dakota area?

A I believe those are stratigraphic traps, Rattlesnake and Tocito.

Q Now, you stated that most of the dry holes to the Southwest were in an area where you encountered lack of permeability and the presence of water; now, is this generally lower or higher than the Mesa --

A It is higher.

Q How do you account for the presence of water on an up-structure?

A Probably permeability traps.

Q I see. Are Barker Creek and Ute Dome in the same Dakota formation as the rest of this Basin?

A Yes, sir.

Q Is there any geological reason why the spacing in this pool should be greater than the rest in the Dakota formation?

A I can't answer that.

Q I meant, is there any geological reason?

A I do not know of any.

Q Well, do you have any opinion as to whether the Dakota formation as a whole in Rio Arriba and San Juan counties should be drilled and spaced on 160 or 320 acre spacing?

A Well, I do not believe I am qualified to answer that.

Q I asked if you had an opinion?

A In my opinion, it would be 320.

Q What is your reason geologically speaking for that opinion?

A Well, we do not know yet whether we, if 320, we probably figured that maybe 320 spacing will drain the area; if you had 160 you would be drilling unnecessary wells.--

Q In other words --

A -- based on the evidence of what we know about the Dakota as of this time.

Q Geologically speaking then you feel that one well will drain 320 acres?

A I believe so.

MR. NUTTER: Thank you, that's all.

By MR. ARNOLD:

Q Mr. Loleit, on the top of the vertical limits, what do you recommend that be used as a marker?

A The base of the Green Horn.

Q Base of the Green Horn?

A Yes.

Q You wouldn't recommend that you use the top of these Granerous sands which come in on the middle of Granerous shale, in other words?

A Well, sometimes they vary a little bit; I think the top of your Green Horn would be a more definite marker.

Q The base of the Green Horn?

A Base of the Green Horn, pardon me.

MR. ARNOLD: Thank you.

MR. PORTER: Off the record.

(Discussion off the record.)

MR. PORTER: Back on the record, please. Does anyone have any further questions of the witness? Mr. Stamets.

Questions by MR. STAMETS:

Q I have here the Four Corners Geological Guide Book for 1957, and on page 97, half way down on the right hand side, if I can find it, it says, "In general the Dakota of this area represents a transgressive deposit, partly fluvial, partly lagoonal, partly in sandy off-shore marine units." Does that agree with your interpretation?

A Probably inside the Basin you could have some regression of the seas too.

Q It would seem that within these sandy units there are several types of sand?

A Yes, sir.

Q In other words, within the sand units, you would expect gas to flow at probably different rates in each one of these different sands?

A Possibly.

Q Wouldn't it seem that possibly a closer spacing pattern

would more effectively drain these sands within the Dakota sand?

A I can't answer that. I do not know.

MR. STAMETS: That's all I have.

MR. PORTER: Anyone else have a question of the witness?

By MR. KENDRICKS:

Q With the type of deposition that occurred to create the Dakota formation, you have alternating sand and shales, do you not?

A Yes.

Q Does this tend to separate the sand into lenses such as they might not be continuous across a short span or long span?

A They could be in lenses, but I think there might be communication between one interval and another interval.

Q Well, are there any particular places where the Dakota formation has abrupt changes in permeability or porosity?

A Abrupt changes in permeability and porosity?

Q Yes, sir.

A I do not remember of any.

Q On your cross section Number 4, the well on the right hand side being the Magnolia English well, is that correct?

A Let's see, this one(indicating).

Q Excuse me, it is Exhibit 2, I am sorry. Cross section 2, Exhibit Number 4, on Exhibit 1, you show three wells in the very close proximity of the termination of that cross section, is that

correct?

A Yes.

Q Did you study the logs on those three wells?

A I looked at them some time ago.

Q You show those three wells, three wells as not producing, however, in 1957 one of those wells had produced twenty and three-quarter thousand barrels of oil, and something over 17 million feet of gas, and is still producing according to the September report of the Oil Proration Schedule, and it is located in the Southeast, Southeast of Section 20, I believe. Yes, sir, Southeast, Southeast of Section 20.

A Is that that Magnolia well?

Q Yes, sir.

A It is an error on my part; it is still producing.

MR. KENDRICKS: That's all.

MR. PORTER: Any further questions of this witness? The witness may be excused.

MR. LOLEIT: Sir, I wonder if I could make one correction on the record. Mr. Brown asked me before if I had any knowledge of core testing in the Mesa Verde. I misunderstood his question. I believe we have had about three. I do not know the location, or have any information on those wells.

MR. COOLEY: Mr. Chairman, at this time I would like to

state for the record that in view of the testimony and recommendations of the witness, Mr. Loleit, regarding the inclusion of Granerous formation in the proposed vertical limits in this case, that it would appear from both the application and the resulting advisement in this case that it was called by the Commission to include only the Dakota formation, and in the call of the hearings did not include spacing with regard to the Granerous formation. In view of this fact, it fails to be beyond the jurisdiction of the Commission to consider the inclusion of Granerous formation in the call of this case, and I therefore recommend that the case be continued to the regular October hearing, at which time the interested parties can make determination as to what further action they would like to take in this regard.

MR. PORTER: Is there any objection to counsel's motion?

MR. HOWELL: El Paso Natural Gas Company will concur in that motion.

MR. BROWN: We concur with that motion.

MR. PORTER: Case will be continued to the October regular hearing, to be held in Farmington.

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

I, J. A. TRUJILLO, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in stenotype and reduced to typewritten transcript by me and/or under my personal supervision, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal, this, the 6th day of October 1956, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

J. A. Trujillo
NOTARY PUBLIC.

My Commission Expires:

October 5, 1960.