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

15 May 1984

COMMISSION HEARING

IN THE MATTER OF:

Application of Llano, Inc. for special well testing requirements or expansion of its gas storage project, Lea County, New Mexico.	CASE 8088
Application of Llano, Inc. for expansion of a gas storage project, Lea County, New Mexico.	CASE 8189

BEFORE: Commissioner Joe Ramey, Chairman
Commissioner Ed Kelley

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division:	W. Perry Pearce Attorney at Law Legal Counsel to the Division State Land Office Bldg. Santa Fe, New Mexico 87501
For the Applicant:	William F. Carr Attorney at Law CAMPBELL, BYRD & BLACK P.A. Post Office Box 2208 Santa Fe, New Mexico 87501

A P P E A R A N C E S

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I N D E X

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E X H I B I T S

MR. RAMEY: Call next Case 8088.

MR. PEARCE: That case is on the application of Llano, Inc. for special well testing requirements or expansion of its gas storage project, Lea County, New Mexico.

MR. CARR: May it please the Examiner, my name is William F. Carr with the law firm Campbell, Byrd & Black, P. A., of Santa Fe, appearing on behalf of Llano, Inc.

I have one witness who needs to be sworn.

I would also request that Case 8088 be consolidated with Case 8189, which is the next case on the docket, for purposes of hearing.

MR. RAMEY: Without objection we'll consolidate Case 8088 and Case 8189 and now call Case 8189.

MR. PEARCE: That case is on the application of Llano, Inc. for expansion of a gas storage project, Lea County, New Mexico.

Other appearances, please?

MR. KELLAHIN: Mr. Chairman, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of L & B Oil Company in both cases as called, and I have one witness to be sworn.

MR. PEARCE: Are there other appearances in these matters?

Could I ask all prospective witnesses to rise at this time, please?

(Witnesses sworn.)

MR. CARR: May it please the Commission, I have a very brief opening statement.

MR. RAMEY: Okay, Mr. Carr.

MR. CARR: What we are seeking in these cases is the imposition of some special testing requirements on an L & B well which L & B proposes to drill west of the Grama Ridge Storage Unit, which is operated by Llano, or in the alternative we're seeking expansion of the gas storage project to include the acreage on which that well is proposed to be drilled.

We also have filed an application in Case 8189 seeking expansion of the gas storage project.

I want the Commission to know that Llano considers this application unnecessary. Certain questions have been raised, however, as to the horizontal extent of the gas storage project and the way the gas project has been extended, and we felt, in an effort to get the entire matter resolved by this Commission in one day, that it appropriate that we file that application so if at the

end of the hearing the Commission is of the opinion that they should by order approve the horizontal expansion of the project that they'd have an application pending for them that would be a vehicle to this end.

We believe we will show that the Grama Ridge Morrow Unit, being the first storage project in New Mexico, was properly created; that it has obtained all necessary government approvals; that the proposed well by L & B could drain the storage project; and submit that we will propose a method that will remedy the situation that is in the best interest of all parties.

MR. RAMEY: Thank you.

MR. KELLAHIN: Mr. Chairman, I also have a brief opening statement.

I represent L & B Oil Company, who is the Federal lessee in Section 5 of this township and range.

The evidence will demonstrate to you that in 1973 Llano applied to the Oil Conservation Division for approval of a unit agreement that applied for a gas storage area in Section 34 and in Section 3.

In addition to approval of the unit agreement for gas storage, using certain of the sands in the Morrow formation as identified in two wells, there was also an application and testimony for the Commission to approve a project for gas storage. The testimony will demonstrate to you that from 1973 to the present date Llano never

again came before the Oil Conservation Commission and requested approval of an expansion for the gas storage project.

The evidence will demonstrate to you that L & B in good faith acquired the oil and gas rights from the Federal Government to Section 5 without knowledge that they were within a section of what Llano contends to be a gas storage area.

The evidence will demonstrate that by a search of the Commission records and reasonable good faith search of the information available, an operator could reasonably conclude that he was more than a mile away from the gas storage area.

The testimony in 1973 of the approval of the gas storage area will demonstrate to you that these Morrow sands are typical Morrow sands. They're irregular. They're noncontinuous. Of the five zones present, none of those zones can be correlated over any kind of area to a large extent.

The evidence will further demonstrate that geologically the evidence in '73 is the same as today; that there is no reasonable probability that a well drilled in Section 5 will be in communication with any of the gas stringers encountered in the gas storage area.

We believe the testimony will demonstrate to you that it is unreasonable to require the imposition of a repeat formation test to be conducted on the

well drilled by L & B in Section 5 and the evidence will demonstrate to you that there are a significant number of factors involved in order to appropriately balance the correlative rights of the parties involved.

The evidence will demonstrate to you that L & B is prepared to spend approximately $1.7 million to drill a Morrow well on their acreage and that at the conclusion of the evidence we believe that you'll be persuaded that the repeat formation test is not an appropriate solution and that the request of Llano for that test in this case ought to be denied.

That concludes my statement. Thank you.

MR. RAMEY: Thank you, Mr. Kellahin.

Mr. Carr, I think you said this is the first gas storage area in New Mexico?

MR. CARR: It's my understanding it was the first one that was in this general area, yes.

MR. RAMEY: Okay. I think El Paso had a storage area for many years prior --

MR. CARR: That may be.

MR. RAMEY: -- to this.

You may call your first witness, Mr. Carr.

MR. CARR: I believe the El Paso Unit was constructed by use of eminent domain author-

ity, however, Mr. Ramey, and this one was the first one for which eminent domain was not required, I think that's the case.

I call Al Klaar.

MR. RAMEY: Sorry I brought it up.

MR. CARR: I'm sorry you did, too.

AL KLAAR,

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

DIRECT EXAMINATION

BY MR. CARR:

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

A My name is Al Klaar, spelled K-L-A-A-R, and I live in Hobbs, New Mexico.

Q By whom are you employed?

A I'm employed by Llano, Incorporated.

Q In what capacity?

A I'm a Vice President of Llano.

Q Mr. Klaar, have you previously testified before this Commission?

A Yes, I have.

Q Were your qualifications accepted and made a matter of record at that time?

A Yes, they were.

Q And how were you qualified?

A I was qualified as a petroleum engineer in a matter before this body.

Q Do your duties with Llano include supervision of the Grama Ridge Gas Storage Project?

A Yes, sir. I'm directly responsible for the operation of the gas storage project.

Q Are you familiar with the applications filed in this case or in these cases on behalf of Llano, Inc.?

A Yes, I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. RAMEY: Yes, they're acceptable, Mr. Carr.

Q Mr. Klaar, would you briefly state what Llano seeks with these applications?

A With these applications Llano seeks to have a way available to determine whether or not when L & B drills their well and finishes a well and drills a well which is structurally equivalent to our storage system reservoir, whether or not that well is in communication with our storage system, and as such -- if such is the case, then the second part, the other case is to provide a way of ex-

panding our storage system.

Q That's the second portion first case.

A Second portion, yes, sir.

Q What is Llano's ownership interest in this storage project?

A Llano is the operator of the Grama Ridge Morrow Unit Storage. They own one-third of the unit, of the total assets in the unit. The other two-thirds are owned by a company called New Mexico Fuels, a sister company of Llano, and both companies are direct subsidiaries of Houston Natural Gas Corporation.

Q Mr. Klaar, will you identify what has been marked for identification as Llano Exhibit Number One?

A Exhibit Number One is the Certificate of Approval from the Commissioner of Public Lands and it's dated 17th day of August, 1973, which gives approval to the unit agreement for the operation of the Grama Ridge Morrow Unit, consisting of Sections 33, Township 21 South, Range 34 East -- no, correction, Sections 34 of Range 21 South, Range 34 East, and Sections 3 of 22 South, Range 34 East.

Q Is a copy of the unit agreement attached to that approval?

A Yes, it is.

Q Is this a standard unit agreement?

A In a small part it is standard but in the major part it is not standard. It has some standard language in it as far as the unit agreement goes but overall it

is not a standard unit agreement.

Q How is it not -- how is it not standard?

A Because it provides for the operation of an underground gas storage system and it further -- it provides for several phases of operation of this underground gas storage system.

Q Was this agreement approved by the Oil Conservation Commission?

A Yes, it was.

Q Why -- why was the matter brought to the Oil Commission?

A My understanding is that the State Land Office wanted -- requested the OCD to approve it.

Q And when was the approval obtained?

A The approval of this unit came through Case Number 4895, Order No. 4473, dated January 29th, 1973.

Q Is a copy of that order marked as Llano Exhibit Number Two?

A That is correct.

Q Does this order provide for expansion of the unit?

A Yes, it does under the -- under the section labeled "IT IS THEREFORE ORDERED" No. 3. It provides that any expansion or contraction of the unit area, the unit operator shall file with the Commission within 30 days thereafter counterparts of the unit agreement.

Q Would you now refer to what has been

marked Llano Exhibit Number Three and identify this, please?

A Llano Exhibit Number Three is Case Number 4896, OCD Order No. R-4491, and it came to hearing on March 16th, 1973.

Q Into what formation does this order authorize injection of natural gas?

A This order authorizes injection and storage of gas into the Grama Ridge Morrow Gas Pool.

Q Is the injection which is authorized by this order provided for in specific wells?

A Yes, sir, it is. It is -- at the time the wells were known as the State GR-A No. 1 and the State GR-B No. 1, respectively in Section 3 and 34.

They are now called the Grama Ridge Morrow Unit Well No. 1 and Grama Ridge Morrow Unit Well No. 2.

Q Does Llano use these wells for injection purposes?

A Yes, sir, those two wells in the whole project are injectors and withdrawal wells.

Q Are there any other wells in the project that have been used by Llano for the injection of natural gas?

A No, sir.

Q Has the unit been expanded?

A Yes, it has.

Q Would you please refer to what has been marked Llano Exhibit Number Four and identify this for the

Commission?

A Exhibit Number Four in light blue indicates the two sections I've been talking about, which were the original unit approved and the original gas storage unit approved in Section 3 and 34.

In addition it shows the area in Section 33 which is also State land under the State Land Office jurisdiction, to which an amendment was worked out between Llano and the State Land Office.

It was approved on January 26, 1977. It was filed with the OCD on February 8th, 1977.

Q Would you identify for the Commission Exhibit Number Five?

A Exhibit Number Five, signed by the Commissioner of Public Lands, is a certificate of approval of an amendment of a unit agreement, specifically the Grama Ridge Morrow Unit.

Q And specifically what acreage was added to the unit area by this amendment?

A The acreage added to the original unit agreement was the acreage in Section 33 of 21 South, Range 34 East.

Q Why did Llano seek to add this acreage to the unit area?

A Because it was determined within a very short period of time after injection was initiated in April of 1973 that not only this well but other -- but another

well were receiving what's commonly called a buzz from the injection of gas into the wells in 3 and 34.

Q What do you mean when you say a buzz?

A I mean the bottom hole pressure started increasing, indicating that there was direct communication, in some instances communication which manifested itself within several hours.

Q Now, Mr. Klaar, you said the well in 33 experienced a buzz and an additional well. What other well are you talking about?

A The well in Section 4. On Exhibit Number Four it's identified, that section is identified in yellow.

Q Are references made to this additional well in the amended unit agreement?

A Yes, sir, there are specific references made by the State of New Mexico Land Office to the Federal acreage in Section 4 of 22 South, Range 34 East, and these references are on the beginning, on the first page, the third WHEREAS, where it is recognized that Section 4 will also become sooner or later a part of the storage unit.

Q Are there other references?

A On page two in the WHEREAS, the third one down from -- on page two, there is also recognition made of the fact that there will be a gas storage agreement worked out with the United States of America.

Q Mr. Klaar, what date did you say this agreement was filed with the Oil Commission?

A This State amendment to the unit agreement was filed with the OCD on February 8th, 1977.

Q Would you now identify --

A It had been approved January 26th, 1977; therefore, it was within thirty days of the -- of the date as required to be filed.

Q Would you identify now Llano Exhibit Number Six?

A Llano Exhibit Number Six is an agreement for subsurface storage of gas in the Morrow formation, Grama Ridge Area, Lea County, New Mexico, that was worked out with the United States of America under the auspices of the Secretary of the Interior for Section 4 of 22, 34, Lea County, New Mexico.

Q Would you explain to the Commission the reason for entering a separate agreement covering Section 4 instead of expanding the unit?

A The reasons way behind of why this was done separately I'm not aware of except we were told by the BLM that they did not want to enter into an agreement, a three-way agreement between Llano, the State Land Office, and the Federal Government. They wanted a separate agreement just between Llano and the Secretary of the Interior.

Q Did you adivse the State Land Office of this position taken by the BLM?

A Yes, we did.

Q And what --

A And in order to keep this on a unit basis the State Land Office recommended that their, if you'll remember their amendment makes knowledge and makes it known that the Federal would be added also. That's why they refer to those in those couple of WHEREASes to the Federal acreage. They said this will hold it all together.

Q Did you receive Land Office approval to operate in this fashion?

A Yes, we did.

Q Would you now refer to what has been marked by Llano as Exhibit Number Seven?

A Exhibit Number Seven is a document which is labeled Amendment to the Agreement Subsurface Storage of Gas Morrow Formation, Grama Ridge Area, Lea County, New Mexico.

It refers back to the original agreement number 14-08-0001-14277. It covers specifically the area labeled on Exhibit Four and identified in green in Section 10 of 22 South, Range 34 East and it includes through this amendment the area in Section 10, all of Section 10 as part of the Grama Ridge Morrow Storage Unit.

Q Was the State advised of the additional lands being operated as part of the unit through agreement with the BLM?

A Yes, they were.

Q How are the wells identified in the unit area?

A On Exhibit Four the wells are identified by their requested nomenclature from the OCD, which is the Grama Ridge Morrow Unit, starting with No. 1 through 5. The exhibit further identifies it as a triangle marked in red. That is our designation for the storage well.

Q Why were these names changed to Unit wells?

A There were two requests, one by Mr. Ray Graham of the State Land Office to take the old names and designate everything as a unit and appropriately name them that way, and there was also a request from the OCD to report on a consolidated basis all operations of the unit, and therefore designate all wells as unit wells.

Q Do you refer to the State and Federal government on the activities of the storage project?

A Yes. We report to three State agencies and two Federal governmental agencies on a monthly basis.

Q What are the State agencies to whom you report?

A The State Land Office, the OCD, and the New Mexico Oil and Gas Accounting Commission.

Q When you file these reports do you do it on a well by well basis or on a unit basis?

A We do it on both but the reports go into the details of well by well and then they are summarized, depending on which particular document it is that we're -- that we are submitting at that time. In some instances they

have to be summarized for total unit operation purposes.

Q Would you now refer to what has been marked as Llano Exhibit Number Eight and identify this for the Commission, please?

A Llano Exhibit Number Eight identifies the five sections which are the Grama Ridge Morrow Gas Storage Unit in a dashed line. It also identifies the known producing wells outside the unit plus the three wells that Llano had drilled in addition to its storage wells inside the unit boundary.

It also shows Llano's best interpretation of a known fault zone to the west side of the unit.

In addition it shows the proposed location that L & B plans to drill, a well on to the Morrow and/or deeper, I'm not sure, in Section 5.

Q Now, Mr. Klaar, this is a structure map.

A Yes, sir, it is.

Q And on what formation is it contoured?

A It is contoured on top of the Morrow Clastics which is a prominent marker not only in this area but throughout that part of the Permian and Delaware Basins in the Morrow.

Q What do the five blue triangles show?

A The five blue triangles are the same five wells as in Exhibit Four, the storage wells.

Q How many of those wells are used for injection purposes?

A Only two.

Q And would you identify those two, please?

A They are identified as Grama Ridge Unit No. 1, which is GRM 1 and GRM 2, respectively in Section 3 and 34.

The other three wells are not injection wells. They have never been --never had gas injected but yet they have produced stored gas as much as a billion cubic feet, some of them.

Q And how are the gas producers indicated on this plat?

A There has been no distinction made between the five wells. Are you talking about the five --

Q Other than -- other than --

A Morrow Unit wells?

Q Other than the unit wells how have gas wells in the area been identified on this exhibit?

A Okay. There have been three additional wells drilled in the unit area and they are identified with the code "minerals" on top of it as, such as the one on the east side of 34, on the east side of 3, and on the east side of Section 10.

Q What do the red circles around those wells indicate?

A The red circles indicate that in each case Llano demanded that the RFT tool would be run, which is a regular logging tool and that in each case an RFT was run

and successfully determined what zones were not in the storage system. On the other hand, it also successfully was determined which zones were in the storage system.

Q What is the relationship between Llano and Minerals?

A Minerals is a producing subsidiary of Houston Natural Gas Corporation, therefore it is a sister company of Llano.

Q Now if we look at the fault that you've depicted on this exhibit, why are there two lines?

A That's for ease of identifying. Everybody likes to draw a fault as a line but we don't know exactly where that fault is. Our interpretation is that somewhere inside those two lines between the upthrown side on the right or to the east, and the downthrown side on the west, somewhere inside those two lines a fault has the best chance of occurring once it is drilled and identified at a particular place.

Q Could the fault be to the east of the L & B proposed location?

A Yes, it could.

Q Could it also be to the west?

A Yes, sir. This is -- this is nothing more than interpretation.

Q Are there any other faults on the east -- on the western -- eastern side of the unit area?

A Several years back there was an interpre-

tation Llano had which showed that the east side of 34, 3, and 10 were to the east of a fault, which could have been true, but at the present, the present interpretation is that there's a permeability pinchout and that it is not a fault running right through the middle of the section.

Q Upon what do you base that conclusion?

A We base that conclusion on the fact of running the repeat formation testers in those three wells and discovering that two of the three wells are in communication with the storage system.

Q Would you now refer to what has been marked for identification as Llano Exhibit Number Nine?

A Exhibit Number Nine is a compilation of average reservoir pressure of the Grama Ridge Morrow Field, which consisted of five wells, since 1965 when the first well was discovered, and it indicates between the period 1965 through March of 1973, it indicates how the bottom hole pressure drew down through primary producing operations.

After April of '73, which is the date that Llano initiated injection into the well called the GRM Unit No. 1, average pressure in the reservoir started increasng in direct relationship to the amount of gas which was being stored and has been stored in there, and as you can see further, the pressure increased and the decrease in pressure is directly proportional to how much gas was stored at the time, or how much had been taken out.

Q Mr. Klaar, what kind of pressure communi-

cation have you experienced in the gas storage project?

A Referring back to Exhibit Number Eight, we have experienced the whole range of pressure communication. For instance, the Grama Ridge Morrow Unit No. 1, when it's injection compressor starts up, within hours a pressure increase is noted on the Grama Ridge Morrow Unit No. 4, but if the Grama Ridge Morrow Unit No. 1 keeps injecting and the No. 2 is not started up, it takes as much as weeks before the Grama Ridge Morrow Unit No. 3 sees an increase in pressure.

On the other hand, the GRM Unit No. 5 down in Section 10 did not see an increase from injection of the 1 and 2 until two and a half years later, almost three years later.

What this illustrates is -- is obvious. The permeability is highly directional, is highly varied, and at one time Llano was of the opinion that the GRM Unit No. 5 was not even connected directly to the Grama Ridge Morrow Field and has presented testimony to that effect several years back, but has had to retract that testimony once that well started feeling the effect of injection, and we were proven wrong.

One thing is evident and that is that the permeability is highly directional in an east/west orientation.

Q Mr. Klaar, will you now refer to Exhibit Number Ten and identify this, please?

A Exhibit Number Ten is the same -- I do not remember what exhibit it was presented as under the original hearing in 1973, but it illustrates the overall unitized interval that was unitized for storage purposes back in 1973.

It shows that the unitized interval consists from the top of the Morrow Clastics on down, which is not to be confused with the top of the Morrow, down to what's called the base marker. Approximately 500 feet in gross depth has been unitized as the storage, as the interval in which Llano can and should store gas.

Q Is this interval also defined in the unit agreement?

A Yes, it is, specifically by the old well designation as the State GR-A No. 1.

Q Would you refer to what has been marked as Llano Exhibit Number Eleven and review that for the Commission, please?

A Exhibit Number Eleven is a compilation of monthly data and not the total data but just the summary of the data that is requested by the OCD to be submitted to them under C-132. I think I'm correct in designating it as the proper form. I think it is called the C-132, which requests us -- is it 131 or 132?

MR. PEARCE: 131.

A 131, I beg your pardon. Which requests us to summarize the total gas in storage in Mcf at a parti-

cular moment in time, which is the first of the month, plus to let the Commission know what the average reservoir pressure is at that time, and this a tabulation here, Exhibit Eleven is, starting with January, 1980, and the latest one at the time I drew this up was a volume and a pressure for January, 1984.

Q In your opinion could the proposed L & B Well affect your storage project?

A The only way that the L & B Well could affect our storage project is obviously if they -- if they encounter the Morrow interval below the Morrow Clastics structurally equivalent to where we're storing gas, which would mean on the upthrown side of the fault and it would also mean further, that their sands would have to be in communication with our sands which have stored gas in them.

Q How can it be determined if in fact there is pressure communication with the storage interval?

A We have determined that a logging tool called a Repeat Formation Tester operated and run by Schlumberger is a rigorous method of determining what is happening in each zone through as small an interval as just two or three feet apart.

Q Could you identify Exhibit Number Twelve, please?

A Number Twelve is a view of this Schlumberger's Repeat Formation Tester. In fact it has two views. A is the closed position of the tool as it's run into the

well and as it is positioned. And it also shows that on the righthand side of A there it has a packer which is a round doughnut doughnut affair.

In B it shows that once the interval, the exact place where you want to take a pressure measurement has been located, has been identified, and you are sitting right across from it, it shows how the operator at the surface can make this tool open up, come out of the doughnut packer and sends out a probe to the formation phase through the -- all thickness, through the cake thickness of the mud, and obtain an exact pressure of that formation at that particular point.

Q Have you participate in testing the Minerals well by use of a Repeat Formation Tester?

A Yes, I have.

Q How accurate a test do you believe you received by use of this tool?

A It has been demonstrated that the tool has a repeat ability of somewhere in the range of half, plus or minus half a percent.

Q Mr. Klaar, will you now refer to what has been marked as Llano Exhibit Thirteen, explain what this is and what it shows?

A Exhibit Thirteen is the -- a copy of that portion of the CNL FDC log from the Morrow Clastics on down to the total depth of the well. This particular well is the Llano 34 State Com No. 1, which is located in the east side

of Section 34, 21 South, 34 East.

The sequence of events is such that the RFT tool does not run you a complete log. All it does is give you pressures. It has a sensor which can locate you once you have run your open hole log and get you positioned exactly where you want to be.

After this CNL FDC log was run, it was determined that there were at least three major zones in this particular well which were identified as sand zones. They had what's called the separation on the righthand side, indicating a gas effect, and the thought at that time was that this was a good gas well in three zones.

Q Have those zones been indicated in yellow on this exhibit?

A That is correct, they are indicated in yellow. They also in red and with the symbols for perforations are identified where the well was finally perforated and produced from under primary set of circumstances and gas was produced from them.

Q After you identified these zones, what did you do to perform the test?

A The RFT tool was run in the well and was identified that the upper zone, commonly called the A Zone, had 6044 pounds of initial bottom hole pressure. On a repeat a few feet lower in the same zone it was determined that on the second time it read 6043 pounds.

The second zone, commonly called the B

Zone, was found to have a pressure of only 3597 pounds.

After running the other zone down below, which indicated in excess of 7000 pounds per zone bottom hole pressure, I went back and I got an identical repeat on the B Zone, which is indicated by the R after the -- after the number. Again it indicated to me that the B Zone had 3,597 pounds initial bottom hole pressure.

Q What conclusion could you reach from this pressure differential?

A The conclusion that was reached is that the B Zone in one way or another has reached across from the west side of 34 and is part and parcel of the gas storage system, and this well has not been allowed to produce that -- from that zone.

Q How does this pressure compare with the average bottom hole pressure exhibit which you previously offered?

A On the top of the exhibit it shows that the RFT date that it was run was 9-1-79. In September, well actually in December of 1979 the average pressure in the reservoir, storage unit pressure, was estimated as being very close to 3400 pounds.

The conclusions we came to is that this -- that this zone is in connection with the storage system and cannot produce stored gas unless it is produced as stored gas and goes into a pipeline system as gas from the storage system.

Q Now, Mr. Klaar, there's a pressure difference between the B Zone and the other zones over 2500 pounds. Is that the kind of range you would anticipate in zones contrasting new zones with those that are --

A Yes, it is. We would expect them to -- primary pressures to be even more than just 2500 pounds different from our storage system.

Other zones, I do not have the exact bottom hole pressures available, but Getty wells over to the east there had primary pressures in the range of 7400 to 8300 pounds when they drilled their wells in Section 35 there were two of them drilled and two of them drilled in Section 2.

Q Would you now refer to Exhibit Number Fourteen and review that, please?

A Exhibit Fourteen is the second well drilled by Minerals on the storage unit and it is -- the well is identified as the Llano 3 State Com No. 1 in the east side of Section 3, 22 South, Range 34 East.

It had a Repeat Formation Tester tool run on it in June 9, 1980. Zone A was definitely identified as being still in its primary stage due to obtaining a pressure of 7670.

Zone B is not even present in this case in this wellbore and the lower zones, as identified with pressures of 7602, 7504, and 8046, are obviously primary zones, are not in communication with the storage system.

So this second well proved to us that there was no, at this particular location, there was no communication with the storage system.

Q Would you now review Exhibit Fifteen?

A Exhibit Fifteen is the most recent well drilled and the RFT on this well was run on January 11th, 1984.

For all practical purposes Zone A is not present. There is a thin zone evident at that location which some people wanted to call Zone A but when we tried to run an RFT right across that zone we got no pressure. In fact I call no pressure in the range of 68 to 74 pounds. Obviously that is nonproductive.

Zone B at 1300 feet was identified to have initial bottom hole pressure of 3660 pounds. Again this was a case of where our interpretation came to a conclusion that this zone is in direct communication with the storage system.

For all practical purposes with Zone B being in communication with storage from the Morrow Clastics on down in this particular well, this hole is a -- this particular well is a dry hole because there's nothing else available except the zone in storage.

Q Mr. Klaar, if the L & B Well is not tested, what would be the resulting effect on Llano?

A Well, if the L & B Well is not tested in some fashion or some form, there could be as much as a year,

year and a half, or maybe as much as a billion or billion and a half, two billion cubic feet withdrawn from our storage before it would become evident enough not just to us but to any legal body that there gas being taken from our storage unit which somebody has no right to take.

Q How should the cost of testing be allocated?

A I think since Llano is asking for the test, Llano will have to pay it all.

Q This would include additional rig time as well as just the running of the tool?

A This would include rig time, the total cost of running the tool. There is one thing that would be required, though, and that is as illustrated by the last three exhibits, that Llano have not the whole log but the portion of the log which deals with the Morrow Clastics on down to identify the zones that we're trying to run this test in.

Q In your opinion could the L & B proposed well be damaged by this testing procedure?

A Not really. We have thus far run it in three wells in the same area and we have incurred no damage but yet we would be willing to be liable for any damage which could occur in running this log.

Q What if this well, the L & B Well, should be completed in a zone which is in pressure communication with the storage project? What would you recommend?

A The recommendation would have to be that that zone cannot be producing.

Q And if it is not in a correlative zone or a zone that's in pressure communnication what would your recommendation be?

A More power to L & B; get after it; produce it.

Q Is the Morrow formation as defined in the unit agreement suitable for the underground storage of natural gas?

A I think eleven years of operation of the Grama Ridge Morrow Storage System has proven that, yes.

Q Is this formation incapable of producing oil in paying quantities through any known recovery method?

A That is correct.

Q Does this formation underlie lands which contain known commercial potash deposits?

A In this part of the basin and this far east there are no known commercial potash deposits that I'm aware of.

Q Will use of the Morrow in this area for underground storage of natural gas cause injury to surface or underground water resources?

A No, sir, for several reasons. The surface waters are cased twice by the fact that this is -- these wells are two and a half miles in depth. There are two casing strings running through the surface areas where

there is potable water.

This does not preclude casing failures but it gives double insurance to make sure that nothing will be damaged.

Q Is the formation substantially depleted of recoverable native gas?

A Yes, sir, this has been not only determined by us but also by people with the USGS and with the State Land Office.

Q Does the formation have greater value or utility as a gas storage reservoir than for the production of any remaining gas reserves therein?

A We have already determined that there are no remaining gas reserves. The only utility left for the formation is as a gas storage unit.

Q What do you believe to be the horizontal limits of the reservoir to be penetrated by injected gas?

A That is hard to say. Nobody has been down there to define exactly which direction or what size or how these sands lie there. To the present -- at the present interpretation, obviously we have determined that the stored gas which was injected through two wells in 3 and 34 is present under five sections. That does not mean that sooner or later it cannot be determined that another half section offset to any of these five sections couldn't also have stored gas under them.

Q Do you believe the reservoir also pene-

trates the east half of Section 5?

A If the east half of Section 5 is on the upthrown side of the fault I think the chances are excellent that the reservoir is also there in the east half of 5.

Q Has any portion of the formation sought to be unitized for storage purposes been appropriated or is being utilized for injection storage and withdrawal of natural gas by others?

A No, sir.

Q What do you recommend be done concerning the proposal of L & B?

A I recommend that we be given the right to either have L & B or to have us run an RFT tool in the well once it is drilled and determined to be at total depth, but to have that RFT restricted to the Morrow interval below the Morrow Clastics and to determine whether or not there are zones, one, two, or three, or none, in communication with our storage system.

Q If the Commission elects not to require that testing, what would your recommendation be as to the east half of Section 5?

A That eventuality I think would take determining that there is a good chance that they are in our storage system and upon that, then I see no recourse but to initiate some type of eminent domain proceedings, which we didn't do when we started this whole storage system.

Q To expand into the east half of 5?

A Yes, sir.

Q What if neither of these are done? What effect will it have on Llano?

A It could have a drastic effect because if -- if the gas is withdrawn by someone else who didn't pay for it and who didn't pay taxes on it, who didn't have possession of it, there could be one-fifth of Llano assets being withdrawn, possibly, that's the maximum, that would have to come off of Llano's balance sheets.

Q In your opinion would granting Llano's application be in the best interest of conservation?

A Yes, sir, it would.

Q Would granting the application prevent waste?

A It would certainly prevent about $20,000,000 of waste, yes, sir.

Q How would that waste occur?

A By the fact that we -- up to $20,000,000 which we carry on our books as an asset, they wouldn't be available as an asset any more. Somebody else got them.

Q How would this affect correlative rights?

A I don't know that it affects correlative rights because this gas is in our possession. We pay taxes on it. We pay for the gas. Correlative rights haven't got anything to do with it, as far as I'm concerned.

Q And what would it do to your rights in this area?

A Well, it would have abbrogated our rights under the statutes of New Mexico, for one thing.

Q Were Exhibits One through Fifteen prepared by you or under your direction?

A Yes, sir, they were.

Q Can you testify as to their accuracy?

A Yes, sir.

MR. CARR: At this time we would offer Llano Exhibits One through Fifteen.

MR. RAMEY: Llano Exhibits One through Fifteen will be admitted.

MR. CARR: That concludes our direct examination of Mr. Klaar.

We pass the witness for cross examination.

MR. RAMEY: Any questions of Mr. Klaar?

MR. KELLAHIN: I do believe.

MR. RAMEY: Mr. Kellahin.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Klaar, would you pull out your Exhibit Number Eight and your Exhibit Number Ten and place those in front of you?

A Exhibit Eight and Exhibit Ten.

Q Yes, sir. On Exhibit Number Eight, Mr.

Klaar, would you identify for us the Morrow wells on that plat that were drilled and completed as of 1973 when Llano applied to the Oil Conservation Division for approval of the gas storage project?

Commencing first of all with Section 34.

A The wells drilled since 1973 --

Q No, sir, the ones in existence as of 1973.

A The only wells in existence as of 1973 were the five wells identified on Exhibit Eight as storage wells plus the well in Section 6, the Southern Union Barbara Federal, and that, those five wells plus that well in Section 6 are the only known wells that were in existence in 1973, to my knowlege.

Q All right, sir, directing your attention to Section 34 and to what is now called the Grama Ridge Morrow No. 2 Well.

A Yes, sir.

Q I believe you told us that was originally called the Grama Ridge B No. 1 Well.

A State GR-B No. 1, correct.

Q When was that -- approximately when was that well first completed in the Morrow, do you recall?

A Probably 1966.

Q And it produced from some of the Morrow zones?

A It produced from the same zones that now

gas is injected into, correct.

Q All right, sir, if you'll look at Exhibit Number Ten. You've indicated for us the top of the Morrow Clastics and you've identified zones A, B, D. When I look at the A Zone, is that the distance between the line just below the letter "A" and going upwards on the log to the top of the Morrow Clastic, is that the A Zone?

A No, the A Zone goes from the line "A" down to where it indicates "B".

Q All right, sir. And similarly with "B" then we start at the line and go downwards till we hit "D".

A In that instance that is not -- that could be true but it could also be questionable because "C" in this well is completely missing.

Q All right, sir, and similarly with D then we start at the line and progress downward and that serves to identify the D Zone.

A That is correct.

Q Of the various zones that have been developed in any of the wells in the area, how many zones are we talking about?

A We're talking about five main zones.

Q And we start at the top zone and you've labeled that or call that A.

A A, B, C, D, E, but as is very apparent, you are talking about the GRM Unit No. 2, which is not this well. This is the No. 1.

Q I understand. I just want to make --

A There's only three identified here.

Q I want to make sure that when I refer to an A Zone that we're talking about the same A Zone.

A Okay.

Q All right. Now in Section 34 when we look at the Grama Ridge Morrow No. 2 Well, which of the five Morrow zones did that well produce from?

A I do not have the log with me but I do remember that A is not present in the GRM Unit No. 2.

But B is present and one or two other zones are present. I don't have the log with me.

Q All right, sir, and in what zones are you storing gas?

A B, certainly in No. 2 and several of the others that are -- that are perforated in No. 2.

Q All right, sir, can you identify other than Zone B which, if any, of the other wells you're disposing gas into?

A Storing gas into.

Q Storing gas into.

A We don't dispose of it. It costs us a lot of money.

Q Well, I hope you get it back but my question is --

A Every bit of it.

Q Other than the B Zone.

A B, D, and E, in No. 2.

Q The No. 2 Well was, I assume, produced to depletion of those zones.

A It was produced to depletion to the satisfaction of the State Land Office, yes.

Q Did you have to pay the State Land Office or anyone else compensation for their royalty or their interest in the remaining reserves for that well?

A Yes, sir.

Q And how was that done?

A It was paid on a monthly basis. A formula was worked out and a schedule was worked out with the State Land Office.

Q Was that formula based upon a volumetric calculation of the remaining producable reserves?

A That is right.

Q All right, sir, let's go to Section 3, then, to the Grama Ridge Morrow No. 1 Well. When was that well first completed for production in any of the Morrow zones?

A In the period '65 through -- 1965 through '67.

Q And from what -- which of the five Morrow zones did that well produce?

A A and D.

Q And was that well produced to its economic limit?

A I do not have the records in front of me but when the unit was worked out with the State Land Office, I do remember that the GRM Unit No. 2 had some minor amount of primary gas remaining which a formula was worked out on. I'm not quite sure whether the GRM Unit No. 1 was in the same category or not.

I do remember at the time of injection, when injection was initiated, the bottom hole pressure in the GRM Unit No. 1 was 600 pounds.

Q All right, and to what Morrow zones are you storing gas in that well, the No. 1 Well?

A A and D.

Q And I believe those are the only two wells that are using for gas storage.

A No, those are the only two wells that gas is injected into.

Q All right, are you injecting gas into any of the other three wells identified as underground gas storage wells on Exhibit --

A No, I'm not.

Q -- Three?

A No, I'm not.

Q Directing your attention to Section 33 to the Grama Ridge Morrow No. 3 Well, when was that well completed for production?

A As best as I remember, 1966.

Q And from what Morrow zones did that well

produce?

A As memory again C and D.

Q And was that well produced to its economic limit?

A Yes, sir, data was presented to the State Land Office to indicate that it was uneconomic to further produce the well. In addition, that the well had received increase in bottom hole pressure due to injection on the east and that data was accepted by the OCD and the State Land Office.

Q All right, sir, when did you stop producing Grama Ridge Morrow No. 3 Well in Section 33 as a producing Morrow well?

A Just a minute and I'll get my -- some data.

As per Commission Form C-103 in March of 1977 we indicated that the GRM Unit No. 3 was shut in in February, on February 1, 1977.

Q All right, sir, when did you commence gas storage in the Grama Ridge No. 2 Well in Section 34?

A GRM Unit No. 2 in Section 34 commenced storage in June of 1973.

Q So you produced the Grama Ridge Morrow No. 3 Well in Section 33 for some three and a half years after you started gas storage in the Grama Ridge No. 2 Well.

A That is correct.

Q Did you attempt to run a Repeat Formation

Test in the Grama Ridge Morrow No. 3 Well in Section 33 at any time?

A It can't be done. The Repeat Formation Tester tool is only for open hole intervals. This is a cased hole.

Q The correlative zone in the Morrow between the well in Section 34 we've been discussing and the one in 33 is the D Zone, is it not?

A That's as it appears, correct.

Q The C Zone that was present in the Grama Ridge No. 3 Well and produced is not present in the Grama Ridge No. 2 Well.

A Correct.

Q And correspondingly, in the Grama Ridge No. 2 Well the B Zone that produced during the productive life ot that well is not a productive zone in the Grama Ridge No. 3 Well.

A Correct.

Q All right, sir, let's go to Section 4. I direct your attention to the Grama Ridge Morrow No. 4 Well. When was that well completed as a producing well in the Morrow, Mr. Klaar?

A This was the discovery well for the whole field; used to be called the Federal GR 4 Well.

Q All right, sir, and --

A It was discovered in 1965.

Q And what -- which of the five Morrow

zones was productive in that well?

A The A and some parts of the D and E Zones.

Q The A, the B, and the E.

A The A, and as -- and my recollection says the B, possibly, and the D and E.

Q And was that well produced to its economic limit?

A This is a Federal well. I'm trying to recollect. I think this was the well that we paid some royalty on to the Federal Government because there was a small amount of primary gas remaining in the wellbore.

So to answer your question correctly, no, I don't think it was produced all the way down to the economic limit. I think we reached an agreement with the Federal Government that it would reach an economic limit soon or in a short period of time and we paid royalty on the remaining gas and therefore that gas became part of the storage system gas.

Q All right, sir, when did you stop producing that well?

A I wish I could give you an exact date but the submittal of the -- a form which is tantamount to the C-103 but which is really a Department of Interior form, sometime prior to May of 1978 we ceased producing the GRM Unit Well No. 4.

Q When you say sometime --

A As a -- as a primary well.

Q You say sometime prior to May of '78. Are we talking a matter of days or months or how long?

A I have no record of it, whether it's days or months.

Q Years?

A No, it would not have been years.

One thing that could have kept the well in a producing status whether or not it was economical would have been a time lag required in reaching an agreement and getting a signed agreement from the Secretary of Interior.

Q Other than compensating the Federal Government for its royalty interest in the remaining reserves in Section 4, did you compensate anyone else that had an interest in that well or that section?

A In Section 4?

Q Yes, sir.

A No one else has an interest in it.

Q Directing your attention to Section 3 now, Mr. Klaar.

A Yes, sir.

Q And to the Grama Ridge No. 1 Well, that well was completed for production in 1965, was it?

A '65 or '66.

Q All right, sir, and it produced out of the A and D Zones of the Morrow?

A Correct. 7-billion cubic feet of gas.

Q And you produced this well to its economic limit?

A That is correct, with a minor amount as you have noticed in the agreement with the State Land Office, minor royalty payments that were made immediately.

Q And when did you commence gas storage in the GM -- GRM No. 1?

A No. 1, April of 1973.

Q Referring back to the well in Section 4, the Grama Ridge Morrow No. 4 Well, did you run a Repeat Formation Test on that well?

A No, sir.

Q Directing your attention down to Section 10, to the Llano Grama Ridge Morrow No. 5 Well, when was that well completed for production in any of the Morrow zones?

A Sometime in '67 or '68. This was not a Llano well at the time. It was a Superior well, Superior Oil Company owned it.

Q All right, sir, and what zones of the Morrow formation did that well produce gas?

A It appears to be Zones C, D and E.

Q All right, sir, and was that well produced to its economic limit?

A No, sir.

Q At what point did that well stop producing?

A At the point that a pressure anomaly became apparent; that years after injection had taken place in the two wells to the north there a bottom hole pressure increase was noted and checked and found to be true, and Superior, upon finding that bottom hole pressur increase after having produced 2-billion cubic feet, agreed with us to sell us the well and the lands going with it.

Q Approximately when did that take place?

A The well was sold to us in 1978, as I remember, '78 to '79, and then we had the problem of the purchasers of the primary gas plus the Federal Government to prove to them that this well was in communication, which we did successfully, and the end result being that there was 413,000 Mcf of gas determined to be primary gas, determined to be available in the well which would have to be produced out of the storage system by one method or another before the Federal Energy Regulatory Commission, which had stepped in by this time, who's controlling El Paso Pipeline, would grant approval to this well becoming a storage well.

We reached that agreement with El Paso and with Phillips, their transporter, transporter for El Paso, and that 413,000 Mcf was produced by just about the end of last year, 1983.

Q You've indicated that the Grama Ridge Morrow No. 5 Well was productive in the C, the D and the E Zones.

A As I remember it. I do not have these

logs with me right now.

Q Which one of those zones was identified to be in communication with the gas storage area?

A No particular zone was identified as being in communication, except that all zones were now identified to be in communication. In other words, which zone contributed to bringing the pressure anomaly over to the wellbore? I think it was the C, but now the whole wellbore is in communication because in the wellbore it has transmitted that pressure to the other zones.

Q Was compensation to Superior arrived at based upon the volumetric formula for the remaining reserves that were due underlying Section 10?

A To Superior?

Q Yes, sir.

A Yes, sir, it was, and thank goodness it ended up being approximately the same amount that Phillips and El Paso said was left.

Q Was any compensation given to Superior with regards to the costs of the well?

A The agreement between Llano and Superior was an arms length agreement. It involved buying of primary reserves plus salvage, surface equipment, it was -- it was done as if you were buying reserves.

Q If the Commission should grant a Repeat Formation Test in the L & B Well and if everyone is persuaded that the L & B Well is in communication with the gas

storage area, would you propose to compensate L & B for the value of its well and the primary reserves underlying Section 5 in a method similar to that used to compensate Superior?

A I would have said yes until you started talking about primary reserves. If they're in communication with the storage system, there are no primary reserves, except maybe in other strata, in other horizons.

But if they're in -- if they end up being in communication with the storage system, there are no primary reserves, no correlative rights.

Q Didn't you tell me you compensated Superior in Section 10 for those primary reserves left under Section 10, that were in communication with the gas storage area?

A That is correct. They had those primary reserves before the storage unit ever came into being. You can't come in ten years later and all of a sudden I want part of something that's already been going on for eleven years.

It's a totally different situation.

Q How will you identify the primary reserves that are in existence underlying Section 5?

A I'm not interested in the primary reserves under Section 5. I fail to understand your question.

The only way I'd be interested in primary reserves under Section 5 is if they -- if L & B hits an Ato-

ka well or a Strawn well or an Ellenburger well and makes gas, then I'm interested. I'll write them a contract for it because I'm a purchaser of gas.

Q The Repeat Formation Test is a test that was conducted on the three wells that you've identified having tests for. Is that a test that you have analyzed and interpreted yourself or did someone else do that?

A The numbers are generated directly from the tool at the bottom of the hole. The interpretation of what those numbers mean, the numbers themselves as listed in the middle of those three exhibits are a direct read-out from the tool. There has -- there has been no interpretation put on it.

My interpretation is that when the pressure is within 100, 200 pounds of what I perceive my average storage pressure, that I am in communication.

Q For example, on Exhibit Number Thirteen, those numbers identified in the blue shading represent the actual bottom hole pressure measured by the tool at that location?

A That is correct.

Q And then you have gone to the log section and interpreted the interval involved and shaded that in yellow.

A That is correct. In no way am I trying to indicate that these were the only -- these were the only pressures that were obtained. There were what are called

mud cakes. In other words, the tool would not fit because there was too much mud cake. I have not indicated those on here. These were bona fide tests that were run, though.

This RFT is tantamount ot running a mini drill stem test; instead of taking hours it only takes minutes to tell you exactly what that small interval will produce, or what pressure it's got.

Q All right, let's start with Exhibit Number Thirteen, Mr. Klaar, which is the repeat formation test on the well in Section 34, the Minerals 34 State Com Well.

A Yes, sir.

Q I believe you've indicated in your testimony that you've identified the B Zone in that well as being in communicatin with the gas storage.

A That is correct.

Q At what point in the life of that well was the repeat formation test conducted?

A Immediately after reaching total depth and obviously prior to running casing in the hole because this tool only works in an open hole.

Q All right, sir, and what, if any, compromise or solution was arrived at with Minerals, Inc. with regards to that wellbore?

A Minerals, even though Llano is a sister company, Minerals signed the definitive agreement which spelled out that any zone which is intrpreted as being in communciation with the storage system, they would not per-

forate, and they haven't.

Q They perforated the A Zone?

A That is correct.

Q And they perforated what other zones in that well?

A It looks -- it appears to be D and E in here.

Q Well, they produced the --

A And another zone which is a stray, what you might call a new animal in the ballgame, way down at the bottom there, about 13,200 on Exhibit Thirteen.

Q All right, in Section 34 in the storage well, Grama Ridge Morrow No. 2, we have the B, D and E as storage zones.

In the Minerals Well in the east half of the section they're allowed to produce out of the A, D and E and not out of the B.

A That is correct.

Q Let's go down to Section 3. When was the repeat formation test conducted on that well in relation to when it was completed?

A At the same time, right after reaching TD and running a CNL log and prior to running the casing in the hole.

Q All right, sir, and you didn't find any of the Morrow zones in that well that were in communication with the gas storage area.

A That is correct.

Q And so that well is producing out of the A Zone, I believe, and some lower zones.

A That's where it was perforated. Since that time we have developed mechanical difficulties. To be perfectly right, the well at the present time is not producing from the Morrow.

Q All right, sir, it was perforated in the A and which of the lower zones?

A Again it appears to be D and E.

Q All right, sir, and in Section 10, the Minerals Government A-2 Well, I believe you've identified the B Zone as being the zone that you --

A At 13,000 feet, correct.

Q That was in communication with the gas storage and the A Zone was not present and what about the other zones?

A It appears that the E Zone is, according to the RFT, is so tight that it will not produce, and as it turns out, subsequent tests have proven that this, except for the B Zone, this well here is not productive below the Morrow Clastics.

Q I notice that there are various offset producers, particularly on the east side of the storage area, primarily Getty, that have Morrow gas wells that offset the storage area.

A Correct.

Q Have you required Getty or any other operator that offsets the storage area to subject its wellbores to a repeat formation test?

A No, sir, but they have allowed us to be there during their testing of the Morrow.

Q Okay. Now let's look at the geology on Exhibit Number Eight, Mr. Klaar. Who is Mr. D. R. Matthews?

A Our geologist. Exhibit Number Eight, did you say?

Q Yes, sir.

A Okay.

Q Mr. Matthews prepared the structural contours?

A That is correct.

Q And looking at the fault that's depicted on the exhibit running through Section 5, do you have an opinion, Mr. Klaar, as to what the magnitude of the throw is on the fault?

A In that area I would say the throw, if you end up on the downthrown side, could be as much as 6 to 800 feet.

Q Would that be enough difference in faulting to adequately isolate Section 5 from the gas storage area in the Morrow, if you were on the opposite side of it?

A It wouldn't even take 5 to 600 feet. If it was just 2 or 300 feet, that -- any separation would do.

Q All right. In working with the various

Morrow formations involved in the gas storage area, Mr. Klaar, have you attempted to Isopach any of the five zones in the Morrow?

A Several times.

Q And you have -- have you been successful in that effort to Isopach those Morrow sands in this area?

A Every time we're successful somebody else or we drill our own well out there and we have to toss out whatever we've done.

Q All right, what's the difficulty in trying to Isopach those Morrow zones, Mr. Klaar?

A The sands line in there, one way to describe it would be like a bunch of cigars laying on a table that a child tossed up there. Nobody seems to know which way they -- their strike is or -- this we've tried not just since '73 but before '73, and we find it very difficult to Isopach any sands in this area.

Q Let me direct your attention back to your Exhibit Number Three, which is a copy of the Commission Order entered in March of '73. It's Order No. R-4491. It's the Gas Injection Approval order.

Do you have a copy of that exhibit, Mr. Klaar?

A Exhibit Three?

Q Yes, sir, and I ask you to turn to page two of that order and directing your attention to finding number four, it says that while there are other wells then

the aforesaid State GR-A Well No. 1 and State GR-B No. 1 producing from the Morrow formations in said Grama Ridge Morrow Gas Pool, the evidence indicates that said other wells are producing from separate sand stringers not in communication with the proposed injection zone.

Do you agree or disagree with that finding, Mr. Klaar?

A At the time back in 1973 I would have agreed wholeheartedly. Eleven years later I cannot agree with it.

Q Subsequent to Llano receiving that order for gas injection, has Llano requested the Commission to conduct hearings to modify that order based upon your opinion that these facts are no longer accurate?

A No, sir.

Q Have you obtained from the Oil Conservation Commission any order that modifies Division Order No. R-4491?

A No, sir. We felt it has not been necessary since there has -- there is a way available to expand the system and we have utilized it.

Q Can the well in Section Number 4, the Llano Grama Ridge No. 4 Well, can that well be used as a monitored well to determine whether the well in Section 5 that L & B proposes to drill, can your well in Section 4 be used as a monitor well in order to protect the gas storage area that's taking place in Sections 3 and 34?

A No, sir.

Q Why not?

A If I could identify and see how wide the sand body was around the No. 4 and if that was all there is of the sand body, just the width of the whole wellbore of the No. 4, then I might be able to work out some type of monitoring device, but if I have 100 feet of sand body that contributes to the storage of the No. 4 around the No. 4, I don't see how I can monitor anything.

Q Can't you run pressure interference tests between the well in Section 4 and the one in 5?

A Why should I want to do that?

Q To see if they're in communication.

A The gas that I'm pulling out at that time is my gas. I have no incentive to do that.

Q Well, we want you to prove it's your gas, Mr. Klaar. Can't you do that with an interference test?

A You certainly can.

Q All right, can't you do it with radioactive tracers of some kind put in the storage gas?

A I have no way of injecting gas into the No. 4.

Q Okay.

A It is a withdrawal well. It's not an injection well.

Q What is the maximum surface pressure you're using on the gas storage wells?

A There are two maximums. First of all there is a maximum of the surface equipment, 6000 pounds, and as of this date we have never injected at any pressure higher than 5400 pounds surface pressure.

Q All right, sir, and what would be the bottom hole -- the bottom hole pressure in the storage formation?

A At the time you're injecting at 5400 pounds the bottom hole injection pressure will probably be around 3900 or 4000 pounds, the difference being friction.

MR. KELLAHIN: Mr. Chairman, I believe I'll have questions that will take us into the lunch hour. What's your pleasure, Mr. Chairman?

MR. RAMEY: We'll recess till 1:15.

(Thereupon the noon recess was taken.)

MR. RAMEY: Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Chairman.

Q Mr. Klaar, before the luncheon recess I had asked you the bottom hole pressure in the gas storage area and you gave me a number and it now escapes me. What is that number?

You said you had a surface injection pressure of somewhere in the neighborhood of 5500 to 6000

pounds and what's the bottom hole pressure?

A We are limited by our surface equipment at 6000 pounds. That is the most our surface equipment can put out.

Q That is a pressure in the formation at the point of storage?

A No, sir, that is -- that is at the surface.

Q All right, sir, what is the corresponding bottom hole pressure?

A The corresponding bottom hole pressure will obviously depend upon the amount that's in storage at the time that you're injecting at 6000 pounds, but at the present time we've never had it more than half full, so the bottom hole pressure has not exceeded -- the highest it's been is 4400 pounds.

Q And what is the lowest it has been?

A On the day that the injection was initiated, 600 pounds.

Q All right, sir, and what is the approximate pressure now?

A Let me look at one of the exhibits then I'll be able to tell you.

I would expect the bottom hole pressure at the present moment or at the beginning of May, 1984, to have been in the range of 3350 pounds.

That's extrapolating a January pressure

and realizing that we have pulled some more gas out of storage, and I'm referring to Exhibit Eleven now.

Q I understand what you have requested of the Commission is that when the L & B well is drilled, that at an appropriate time the formation -- that the formations in the Morrow be tested with the Repeat Formation Test.

A If the zones, these Morrow zones are found to be structurally equivalent.

Q And if they're structurally equivalent, the Repeat Formation Tester will test those formations or those zones in the Morrow and that if the pressure is within what range of the pressure, of the gas storage pressure, would you assume then that the Section 5 gas is gas storage gas?

A If it is within the range, yes, sir, I would.

Q Within what range?

A I would -- within the range of plus or minus 150 to 200 pounds.

Q Is that the sole criteria or the sole test upon which you would rely to conclude that the gas underlying Section 5 was gas storage gas?

A Is your question is that going to be the sole criteria?

Q Yes, sir, is that it?

A That is the initial criteria.

Q All right, what else?

A There conceivably could be a case of

where somebody drills a well whether it's offset or further away from the storage system, and drains that storage system and I don't find out about it until a half a billion cubic feet, a billion cubic feet are gone.

By that time I've already lost $2 or $3-million.

Q I didn't make myself clear, Mr. Klaar. The application that has been filed on behalf of Llano requests that the Repeat Formation Tester be run on the well to establish the pressure in each Morrow stringer and thereby determine if the well is in communication with Llano's storage project.

A That's correct.

Q My question is that test and that test alone the criteria for establishing that the well is in communication with the gas storage project?

A From my standpoint that will be the only test in this situation.

Q You talked a little bit this morning about the discontinuity of the various Morrow zones between wells and among wells in the immediate area and you told us that you were unable to map an Isopach of those Morrow zones.

Let me ask you, Mr. Klaar, if you've made any effort to either calculate or test the reservoir limits for any of those Morrow zones to determine the boundaries of the reservoir, meaning the gas storage reservoir.

A There was testimony presented several years back which on a backtrack basis used cumulative production, the height, the porosity, and water saturation, and all the rest of the numbers, which indicated that the typical, average well of the five wells which had been produced or at the time drained 327 acres.

And that's -- that's on record with the OCD. I forget what case number it was.

Q Do you have any reason to believe that the wells involved in the gas storage area have reservoirs that exceed the 320-acre number you've just given us?

A You have to remember that that 327 acres was an average of five. There was one in there as much as 488 acre as I remember, and one in there as low as 207 acres, I think.

So to answer your question, using that criteria at that time, yes, there are one or two wells which have drained more than 320 acres.

Q Have you established, Mr. Klaar, to any reasonable geologic or engineering certainty that the acreage involved in Section 9 is the same reservoir that will be -- in which you are storing gas in Sections 3 and 34?

A No, sir. I have no idea what's in Section 9.

Q I'm sorry, I'm making reference to Section 5. If I said 9 I misspoke. I was talking about Section 5 in comparison to the gas storage reservoir in Sec-

tions 34 and 3.

A I have no idea whether there is or is not any under Section 5.

Q Have you used any computer generated models or patterns to establish a configuration for the drainage patterns that were developed by any of the wells that are now part of the gas storage when they were in primary production?

A We have but subsequent drilling has invalidated those generations.

Q Let me direct your attention to Section 2, Mr. Klaar, to the east of the gas storage area, to the Getty 00 is it State 2?

A Yes, sir.

Q Getty No. 2 State 1, whichever well that is.

A It started out being called the 2 State No. 1.

Q All right. The Getty 2 State No. 1 Well. Do you know what the surface shut-in pressure is on that well?

A The latest or initial?

Q The initial.

A The initial surface shut-in pressure was in the range of 5000 pounds and the bottom hole pressure in the range of 7500.

It's an unusual well even though it's

perforated in intervals correlative to our storage system, it is not producing from those intervals. It is producing from the top of the Morrow, which is above the storage interval.

Q You've indicated to me this morning in Section 10, the Minerals Government A-2 Well had some mechanical difficulties in it and is not now producing?

A No, it was the well in 3 -- in Section 3 that has mechanical difficulties.

Q What is the ability of that well to flow? Do you know?

A Which one?

Q The No. 3, State 3 Com Well in Section 3. The one that you said had mechanical difficulties.

A There is a slight difference of opinion within the company. I happen to be one who thinks that the well is capable of flowing 2 to 2-1/2 million a day, but some of my people tell me it won't make that.

Q Are there others in your company who think that's a dry hole?

A There is even one who thinks it's a dry hole, yes, sir.

Q All right, sir.

A That shows you the diversity of opinions.

Q Let me ask you one more question, Mr. Klaar. Is -- is the Minerals Government A-2 Well in Section 10, is that well capable of production in the Morrow?

A It is not producing out of the Morrow right now. In fact it's producing out of the Strawn, but I feel that it will be productive in the Morrow when we're through with the Strawn.

Q All right, sir, why do you feel that?

A Based upon a test that we ran and this test indicated that the well was -- had a bottom hole pressure of 7200 pounds; was flowing approximately a million cubic feet a day and about 115 barrels of water a day.

I feel that the water is something that was injected during the drilling process and we didn't feel like wasting any more money on it so we went to another zone within the last couple of months.

Q With regards to Section 5 and the L & B Well, if the well is drilled and if it's established that one or more of the zones is in communication with the gas storage area, and let's assume for the sake of the question that that pressure is approximately 3500 pounds bottom hole, are you prepared to compensate L & B for the value of the gas that would be produced between that pressure and the abandonment pressure?

A No, sir.

Q Why not?

A Because that's stored gas.

Q Well, how do you know it's stored gas, Mr. Klaar?

A If you remember the bottom hole pressure

was down to 600 pounds when we started injecting but we're in communication --

Q The bottom hole pressure in --

A The storage system was down to 600 pounds when we started injecting.

Q That's in Section 3 and Section 34.

A Right.

Q All right, sir. We will still not know that that is gas storage gas. It certainly could have been produced by drainage from the Llano Grama Ridge M-4 Well in Section 4.

A It sure could have but we just proved that it was stored gas then, because if 4 produced it, 4 is a storage well, there's no question about it.

Q Have you run any tests in the Llano Grama Ridge No. 4 Well in Section 4 to determine what the area of reservoir drained by that well was?

A There's no known test that will tell me exactly which way that area is facing, whether it's a long cigar or whether it's a block, a square, for instance.

All I can tell you is if I had the data in front of me from several years ago, I could tell you what we figured was the acres that it drained, but I couldn't tell you what configuration that particular acreage took.

MR. KELLAHIN: Thank you, I have no further questions.

MR. CARR: I have just one on

redirect.

MR. RAMEY: Let me ask a question first.

CROSS EXAMINATION

BY MR. RAMEY:

Q Mr. Klaar, Llano would be willing to pay for tests, or test, plus, you know, rig time?

A Correct.

Q Under our Rule 111, which is the deviation rule, why any operator can request a directional survey be run on, say, an offset operator's well, but it's first secured by a $5000 bond.

Would -- would you think it would be proper to -- for Llano to post a bond in this case if the Commission --

A Yes, sir.

Q To cover any possible damage to the well?

A Yes, sir, certainly.

Q That might result.

A This was not, obviously, the first, nor will it be the last time that somebody else hit the storage system, so yes, we would be willing to post a bond, enter into an agreement, you name it, with L & B.

Q Do you know of any instances where this tool has been lost in the hole or stuck in the hole?

A No, sir. This is a tool that was devel-

oped, as I understand it, within the last three to four years. It is electrically operated at the surface. They have had no problems in retracting it, meaning in making that one exhibit where it shows how it expands and making it go flat again, you know, and go back in on itself, and then it's just a cylinder about 4-1/2 inches in diameter, which is pulled out.

Q This is run on a drill string, I assume.

A No, sir. No, sir, this is a logging tool. This is a Schlumberger logging tool that looks like a -- if one didn't know any better, it looks like it might be pipe run in the hole.

MR. RAMEY: Thank you. Mr. Carr?

REDIRECT EXAMINATION

BY MR. CARR:

Q Mr. Klaar, you've testified that you had, I believe you said, no incentive to use the well in Section 4 for monitoring purposes. Was that correct?

A Yes, sir.

Q Would monitoring in your opinion be an effective way to assure that this storage project was not being drained?

A Monitoring would be one way to determine whether or not the project was drained. The trouble with monitoring by the time you made a definite determination

that drainage had taken place a couple of million dollars are gone, or conversely, a billion cubic feet of gas is gone.

MR. CARR: I have no further questions.

MR. RAMEY: Any other questions of Mr. Klaar? He may be excused.

Anything further, Mr. Carr?

MR. CARR: Nothing further on direct.

MR. RAMEY: Okay. Mr. Kellahin, you may proceed.

MR. KELLAHIN: Mr. Chairman, at this time we would move that that portion of Llano's application that seeks in the alternative the expansion of the gas storage project to include the Morrow formation in Section 5 be dismissed.

We believe that Llano has failed to prove the essential elements that -- upon which the Commission could enter an order requiring the expansion of the project at this time. We believe that that request is premature. We believe that until it has been established conclusively by the Oil Conservation Commission or some other appropriate administrative or judicial body, that the gas underlying Section 5 belongs to the gas storage used by Llano, then there can be no decision about that portion of the application.

We would request that the application be dismissed insofar as it seeks the expansion at this time of the gas storage.

Mr. Klaar's testimony, and I asked him several ways at several different times whether or not he knew the extent of the horizontal limits of the reservoir used for gas storage and he did not and he did not know whether it extended into 5 at this point.

Therefore we would request that the application be dismissed as to that point.

MR. MOTE: May it please the Commission, I'm Clyde Mote, representing Amoco Production Company. We own an interest in Section 5 and I don't think I was here at the time you called for appearances but we've made a farmout of that to Synterra or L & B and we would join in the motion just made by Mr. Kellahin that that portion of the application be dismissed at this time.

MR. CARR: Mr. Ramey, in response to that, I would state that before the rights in the east half of Section 5 could be taken an action in the District Court would have to be filed whereby we would exercise our rights of eminent domain.

Section 70-6-5 of New Mexico Statutes sets out findings that must be made by the Oil Conservation Division as a condition precedent to filing that petition.

We think that it's inappro-

priate for you now to dismiss this action. We submit that we have submitted sufficient testimony on each of the matters set forth in that paragraph and that it would be appropriate for you to evaluate the record in this case and make your determination once the case has been taken under advisement.

We submit, however, that we have made all presentations necessary under that section of the statute and we are entitled to an order that contains sufficient findings so that we could, to protect our interest, go into the District Court and seek to acquire that tract through eminent domain authority.

MR. KELLAHIN: Mr. Chairman, in response I show you a copy of 70-6-5 from which Mr. Carr quotes. We believe that it's premature to ask for those findings so he can race to the courthouse and exercise eminent domain until someone establishes gas underlying Section 5 is gas storage gas.

We propose that the Repeat Formation Tester is not the absolute and conclusive decision as to whether this is gas storage gas and we anticipate that this will require subsequent hearings at the Commission if you deem it appropriate to require the test in the first place.

For Mr. Carr to ask for findings so he can go and exercise eminent domain in this case based upon these facts is premature.

MR. RAMEY: Mr. Kellahin, I won't act on your request for dismissal at this time. We'll proceed with the hearing and we can make that determination in any order that comes out of the Commission.

MR. KELLAHIN: All right, sir, may I have just one moment?

May I have just a few more minutes?

MR. RAMEY: Certainly, why don't we just take a five minute recess. Will that be enough?

MR. KELLAHIN: Yes, sir, thank you.

(Thereupon a recess was taken.)

MR. RAMEY: The hearing will come to order.

MR. KELLAHIN: Mr. Chairman, we propose to rest our case without placing a witness. Nothing further and we're prepared for closing statements.

MR. RAMEY: All right, you may proceed with closing statements, Mr. Kellahin.

MR. KELLAHIN: Mr. Chairman, we believe the record at this point is inadequate to grant the application that Llano seeks to burden L & B Oil Corporation with and we believe the record has established very conclu-

sively that Llano seeks to operate the wells within this area in a fashion that benefits them and yet does not apply the same rules to people outside the area.

I think it's particularly interesting that Llano uses Section 3 and 4 as gas storage wells and for some 3-1/2 or more years after gas storage is commenced in the wells in Sections 3 and 4 they continue to produce gas out of the offsetting wells in Sections 3 and 4 and correspondingly, produce those reserves without any concern about whether or not it's gas storage gas.

I'm additionally concerned that they appear to treat Superior Oil Company in Section 10 differently they propose to treat us in Section 5. I think there is an absence of geologic and engineering data to document that there is a reasonable probability that there is either geologic or engineering data to show that the reservoir involved in the gas storage extends to Section 5.

We believe without that element of proof that the ordering of the Repeat Formation Test is inappropriate and will not stand -- withstand judicial scrutiny.

I also think it's important that of the offset operators, particularly to the east, looking at Getty in Sections 2 and 35, that they have not been requested to run repeat formation tests on their wells.

Mr. Klaar has admitted to us that it's impossible to Isopach the reservoir; it's impos-

sible to know its extent, and you can see that from the testimony he's given us. The zones that have produced in the wells involved are very hard to track between wells and certainly, we think, have not established for purposes of the record that they extend or will be in communication with any well drilled in Section 5.

Mr. Klaar, in fact, has placed our well on the downthrown side of a fault. We believe his evidence has demonstrated that there is no reasonable probability that we'll be in a communication with the gas storage area and therefore the test ought not to be conducted.

We think that there is a substantial lack of proof with regards to how you determine whether or not the gas underlying Section 5 is gas storage gas. We find it hard to believe that Superior and others can be compensated for the balance of the primary reserves that they would be entitled to under their tracts and yet there is no proposal to compensate us.

The Chairman asked Mr. Klaar the posting of a bond and equated that to the directional drilling bond of $5000. We suggest that the more appropriate bond be one that indemnifies us for the total dry hole cost of the well.

We propose, Mr. Chairman, that subsequent to the hearing that if you'll grant us an opportunity, we would prepare a detailed order for consideration in this case. We think that order has got to detail in spe-

cific ways what the repeat formation test will do and how it will be conducted and whether or not it will be conducted at all.

We think it's unreasonable to require us to conduct this test when Llano has not thought enough about its gas storage to come before the Commission in the last ten years and have the Commission approve the additional sections that have been tacked onto the gas storage area.

Now Mr. Carr has attempted to equate that with the expansion of a secondary unit with regards to the unit expansion. We all know that typically with secondary recovery units there are two cases filed. One is for the unit approval. I'll venture to say that all those unit agreements have clauses in them for the expansion of the unit, but you must remember, and as you know in this case, there is a companion case in which the mechanics of the waterflood operation itself are also passed upon by the Commission.

That process was taken in the gas storage. The evidence of record, and it was conclusive at least at that point, as the wells in Sections 3 and 4 were not in communciation with the ones in 34 and 3. We do not believe that Llano can have the gas storage project expanded by using expansion clauses in the unit agreement.We believe it's a fatal flaw to their project not to have requested from the Commission supplemental orders approving

the inclusion as gas project of Sections 10, 4, and 33.

We think that the testimony is conclusive at this point that there is significant discontinuity, a lack of conformity, and certainly no evidence in the record to establish any reasonable probability that this test ought to be conducted, and therefore we will propose in the order that we draft and send to you that ultimately Llano's application be denied.

MR. RAMEY: Thank you, Mr. Kellahin. Mr. Carr?

No, Mr. Mote?

MR. MOTE: Thank you. May it please the Commission, speaking for Amoco Production Company again, we support the position of Mr. Kellahin and Synterra.

We believe that the evidence has failed to show, first of all, the necessity of including Section 5 into the storage reservoir. As I remember the testimony, that fault could float several hundred feet one direction or the other, and if there's any native gas there I've yet to hear testimony anything would happen to it.

So I don't believe there's anything conclusive in the record that Section 5 should be a part of the storage reservoir.

That's the main part of our objection.

At the time Amoco bought that lease there was a full mile between it and the storage re-

servoir. Section 4 was part of the storage reservoir. Maybe by some administrative hearing, which we don't believe has any validity, but at the time we bought that lease, Section 4 was not within the storage reservoir and it was at least a full mile over to their storage reservoir and we paid quite a bit of money for that lease. We don't want to see it turned into a storage reservoir. We'd like to see the fruits of the farmout which we made to Synterra, L & B, be fruitful and we respectfully suggest that the position of Synterra that Section 5 not be included in that reservoir be upheld.

MR. RAMEY: Thank you, Mr. Mote.

MR. CARR: May it please the Commission, a few initial comments in response to those of Mr. Kellahin to be certain we don't have any confusion here.

Mr. Kellahin stated that the evidence showed that Llano continued to produce gas from certain wells within the storage unit after injection commenced and that there was no regard for the primary reserves under the other tracts which are now within the unit.

That simply isn't true. The agreements which are admitted into evidence in this case and the testimony of Mr. Klaar show that when those other tracts were entered agreements were reached with the State and with the Bureau of Land Management whereby a certain volume of gas was calculated to be the remaining primary reserves.

They produced those for a period of time and it was agreed to in those agreements and they paid royalty on it.

Only at that point in time was the gas that was produced and taken from those other wells treated as storage project gas.

We agree that the evidence does not show that the reservoir extends all the way to the proposed L & B location. That's why we propose to test it. We simply cannot show that without being able to test the well. If we're denied that millions of dollars worth of gas will be lost before there's any other way for us to ascertain that gas which has been reduced to ownership by Llano which does not belong to any other operator in the area.

Yes, the operators to the east, Getty, were not required to run Repeat Formation Testers. The device had not been developed at that time.

They did, however, permit Llano to witness the testing of the wells.

Superior was compensated. Yes, it was. There again we had a different situation where there were proven primary reserves and Llano paid for those reserves.

Mr. Kellahin is concerned that the unit has not properly been constructed or put together and that for ten years we haven't come back before you and asked you to extend the storage project.

I think it's important to look

at the order that approved the storage project. This Commission did not approve a storage project to be comprised of Sections 3 and 34. This Commission approved the injection of gas for storage purposes into the Grama Ridge Morrow Gas Pool, and that is exactly what we have done, and as the limits of that pool are defined, we submit we stand entirely within the provisions of Order R-4491 and the order paragraph which permits us to inject in two wells into the Morrow into the Grama Ridge Morrow Gas Pool. That's all we've done. There's been no reason to come back.

We filed an application in Case 8189 to provide you with a vehicle for expanding the horizontal limits of the storage project but we advised you we thought that was inappropriate. We now contend it is unnecessary. If you look at the statutes which govern underground storage of natural gas, you will find in Section 76-3 provisions for the acquisition of storage rights and this section reads in part, any public body, any executor, administrator, guardian, receiver, or trustee shall be authorized to grant any such natural gas company, which we qualify as under this statute, right for underground storage of natural gas in land subject to its or his control in the same manner as provided by law for entering into oil and gas leases. That's what we've done. We've acquired those rights through agreement with the State Land Office. We have acquired those rights through agreement with the Bureau of Land Management. We've operated consistent with those

agreements. We've made payments in accord with those agreements and we submit to you that this storage project has been put together in strict compliance with the laws that govern underground storage of natural gas in New Mexico.

And having done that, we have reduced to ownership the gas which w e inject and we submit that that is our gas and that you, under your general grant of authority to protect this acreage from damage from wells on adjoining properties have a duty to require that the well that L & B proposes to drill is tested so that we can establish whether or not they are producing our gas.

Underground storage of natural gas been declared by the Legislature to be in the best interest of conservation, and to be in the public interest. And they confer certain duties on this Commission. They also expressly provide in Section 76-6 that laws and rules of the Oil Conservation Commission shall apply to underground storage.

We came before you, we obtained a proper order permitting us to inject gas into the Grama Ridge Morrow Field. That injected gas under Section 76-8 belongs to us and you have a duty under Section 72-12 to protect our property from damage from offsetting wells.

No evidence has been presented by L & B. I'm certain if they had testified they would say that they weren't drilling a well to produce somebody else's -- from someone else's storage project. We submit, however,

that their actions do not comport with that sort of a position.

We stand before you asking for a provision which would require that this well be tested. We're prepared to pay the cost. We're prepared to indemnify against any damage that would accrue to them. We're prepared to post a bond, and we submit that the application filed in Case 8088 should be granted.

MR. RAMEY: Thank you, Mr. Carr.

I would request that you submit a suggested order to the Commission, Mr. Carr.

Mr. Mote, if you desire to do so, you can.

MR. MOTE: Thank you.

MR. RAMEY: Of course, Mr. Kellahin has already said he will.

Is there anything further in Cases 8088 and 8189?

If not, the Commission will take the cases under advisement.

(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