

Case Number

4895

Application  
Transcripts.

Small Exhibits

ETC.

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BEFORE THE  
NEW MEXICO OIL CONSERVATION COMMISSION  
OIL CONSERVATION COMMISSION CONFERENCE ROOM,  
STATE LAND OFFICE BUILDING  
SANTA FE, NEW MEXICO

EXAMINER HEARING

IN THE MATTER OF:

Application of Llano, Inc. for a unit  
agreement, Lea County, New Mexico.

and

IN THE MATTER OF:

Application of Llano, Inc. for gas  
injection, Lea County, New Mexico.

Case No. 4895

Case No. 4896

BEFORE: Elvis A. Utz,  
Examiner

TRANSCRIPT OF HEARING

1 MR. UTZ: Call Case 4895.

2 MR. CARR: Case 4895, application of Llano, Inc. for  
3 a unit agreement, Lea County, New Mexico.

4 MR. COX: Louis Cox of Hinkle, Bondurant, Cox and  
5 Eaton appearing on behalf of the applicant.

6 Mr. Examiner, I move to consolidate Cases 4895 and  
7 4896, since the testimony in the two cases is overlapping and  
8 repetitious. For the purpose of hearing, we would move that  
9 the two cases be consolidated.

10 MR. UTZ: 4895 is a case for a unit agreement, and  
11 4896 is the storage area within the boundaries of this unit.

12 MR. COX: Gas injection procedures within the unit.

13 MR. UTZ: The cases will be consolidated for the  
14 purposes of testimony, separate orders will be written.

15 MR. MORRIS: I'm Richard Morris of Montgomery,  
16 Federici, Andrews, Hannahs and Morris, of Santa Fe appearing  
17 in this case, in these cases, on behalf of Southern Union  
18 Production Company and Southern Union Gas Company.

19 MR. UTZ: Are there other appearances?

20 (No response.)

21 MR. COX: I call as a witness Bob Wilson.

22 ROBERT B. WILSON,

23 a witness, having been first duly sworn according to law, upon  
24 his oath, testified as follows:  
25

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DIRECT EXAMINATION

1  
2 BY MR. COX:

3 Q State your name, address, and place of employment.

4 A I'm Robert B. Wilson, my address is Post Office Box 1320,  
5 Hobbs, New Mexico. I work for Llano, Incorporated, in  
6 the capacity as a petroleum engineer.

7 MR. UTZ: What was the name again?

8 THE WITNESS: Robert B. Wilson.

9 Q (By Mr. Cox) Have you ever testified before the New  
10 Mexico Oil Conservation Commission, or an examiner?

11 A I have not.

12 Q What is your position with Llano?

13 A I'm a petroleum engineer.

14 Q And what is your educational background as a petroleum  
15 engineer?

16 A I'm a graduate of Texas Technological College. I received  
17 a degree in petroleum engineering in 1954. For 18 and a  
18 half years, I have practiced petroleum engineering.

19 Q You've been actively engaged in petroleum engineering for  
20 the last 18 years?

21 A That's correct.

22 MR. COX: Are there any further questions about his  
23 qualifications?

24 MR. UTZ: Other than if he is familiar with the cases  
25 he is about to testify in.

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1 Q (By Mr. Cox) You are familiar with the two consolidated  
2 cases?

3 A Yes, sir. Case 4895 is an application for approval of  
4 the unit agreement for the Grama Ridge Morrow Unit; and  
5 Case 4896 is an application for approval of injection of  
6 gas for secondary recovery and gas storage purposes into  
7 the Morrow formation through the State GRA No. 1 and State  
8 GRB No. 1. The approval of these applications will enable  
9 Llano to conduct storage and secondary recovery operations  
10 on the Grama Ridge Morrow reservoir.

11 Q How does the unit agreement differ from the standard State  
12 approved secondary recovery unit agreement, Mr. Wilson?

13 A Well, with the exception of the storage concept, it's  
14 essentially the same unit agreement.

15 I will point out the areas where there is a difference.

16 In Article 11, under 11-B, it calls for an annual storage  
17 fee, or rental fee, and Article 22, it calls for  
18 renegotiation of this storage fee every five years, and

19 Article 23 is an indemnity clause which holds harmless the  
20 Commissioner of Public Lands and of the State of New Mexico.

21 Q Now, the storage fee has not been agreed upon by the  
22 Llano and State Land Commissioner yet, is that correct?

23 A That is correct, that's still being negotiated.

24 Q Attached to the proposed form of the unit agreement which  
25 has been filed with the Commission is an exhibit. Would

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1 you explain that exhibit, please, sir?

2 A Yes, sir. On the unit agreement, Exhibit A shows the  
3 wells and their locations. It shows the acreage that  
4 comprises the proposed unit and it also shows the State  
5 tracts that are involved within the unit boundary.

6 Q And that shows the ownership of the record title to the  
7 State leases in that area?

8 A Yes, sir. In this case, Shell, Gulf, and Texaco, within  
9 the parentheses, are the record owners of title of the  
10 leases as indicated.

11 Q But Llano owns the operation rights in the units form, in  
12 this agreement?

13 A That's correct.

14 Q And would you tell us about Exhibit B attached to the  
15 unit agreement?

16 A Exhibit B shows the tracts that are involved within the  
17 unit, and specifies the number of surface acres, basic  
18 royalty, the working interest, and to whom that belongs,  
19 and the percentage of surface tract participation, or the  
20 surface tract participation is based upon the total  
21 surface acre in the unit.

22 Q And what is Exhibit C attached to the unit agreement  
23 intended to reflect?

24 A Exhibit C is a time extrapolation of the remaining primary  
25 relative gas reserves, and this is the amount of gas that

1 would be produced from under the unit area if it were to  
2 remain on primary production.

3 We are proposing, of course, that we not continue  
4 to produce it under primary conditions, and this is an  
5 attempt to break it down under time extrapolation, to  
6 show what the production would have been.

7 Q And upon which to base the royalty due to the State?

8 A That's correct.

9 Q Has the Commissioner of Public Lands, or his staff,  
10 finally approved this method of determining the remaining  
11 gas reserves?

12 A The Commissioner of Public Lands has requested that we  
13 make an alternate method, which we have, based on BHP over  
14 Z, or BHP over Z versus the accumulative production. We  
15 have prepared this, we have it, and is entered into  
16 evidence later as Exhibit 3.

17 Q Has the general form and content of the proposed unit  
18 agreement, with the exception of these minor details that  
19 remain to be worked out, been generally accepted by the  
20 Land Office personnel?

21 A Yes, sir. The general form has been, more or less,  
22 tentatively approved, with the exception of Article 11 under  
23 B, but as we said, it's still being negotiated with the  
24 State Land Office.

25 MR. COX: I'll tender into evidence the exhibits which

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1 are marked Exhibit 1, the little brown folder marked as Exhibit  
 2 1, and there are charts which are Exhibits 1-A, 1-B, 1-C, 1-D,  
 3 and 1-F; and also Exhibits 2 and 3.

4 Q (By Mr. Cox) Would you, at this time, Mr. Wilson,  
 5 explain to the Examiner the purpose of the respective  
 6 exhibits that are contained in Exhibit 1, beginning with  
 7 Exhibit 1-A?

8 A All right, sir. Exhibit 1-A is more or less just a  
 9 relative location showing Lea County and then showing the  
 10 proposed unit area and then finally getting down to a  
 11 detail of the respective sections of Section 34, Township  
 12 21 South, Range 34 East, and Section 3, Township 22 South,  
 13 Range 34 East.

14 We go to Exhibit 1-B. This is a sonic log of the  
 15 State GRA No. 1 Well, and it shows the log through the  
 16 recommended verticle interval of unitization, which we  
 17 propose to make from the top of the Morrow Clastics to the  
 18 base of the marker zone, and it shows the respective zones  
 19 in this well that are producing; A, B, and D.

20 Exhibit 1-C is a map that shows the area lease  
 21 ownership, and again we see the proposed unit area outlined  
 22 there in dashed lines, and to the west of the proposed  
 23 unit area we see two wells, the State GR4-1, and -- Pardon,  
 24 that's the Federal GR4 No. 1, and the South Wilson Deep  
 25 Unit wells. And, in these particular wells, while they are

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1 not being proposed for the unit area, Llano owns 100 per  
2 cent of the working interest in the Federal GR4 No. 1  
3 Well, and in the South Wilson Deep Unit Well, they own  
4 99.5 per cent of the working interest, and they are  
5 negotiating with Superior on the south end of Section 10  
6 for their working interest in that particular well.

7 Exhibit 1-D is a structure map based on top of the  
8 Morrow Clastics, and while we feel this is not a  
9 structural-type reservoir, we picked it to show the  
10 structural topography, structural position of what could  
11 be the reservoir there in that area.

12 1-E is going back to Table 1 and Exhibit 1, and it  
13 more or less gives a general data for all the field wells.  
14 I would like to point out to the Examiner that the  
15 completion dates on most of the wells are fairly  
16 consistent, 65, 66; and over in Column 5, the initial  
17 potential on the wells, I think there is quite a diversity  
18 there; also, on the bottomhole pressures, seems like the  
19 South Wilson D Unit No. 2 and the Superior Government No.  
20 1 are anomalous to the other three wells. The equivalent  
21 production, it looks as if the State GRA No. 1 and the  
22 GRB No. 1 are going to produce the majority of the gas that  
23 will be produced from the area; and again, in Column 10,  
24 which is the last column on the right, the calculated flow  
25 capacity made from the four-point back pressure test,

1 indicates that the flow capacity is better on these two  
2 respective wells.

3 Exhibit 1-F is a cross section coming from the south  
4 part of the area through the Superior Government A No. 1  
5 Well on the left side of your cross section, and then it  
6 traverses towards the north as shown on your inset map  
7 over on the right-hand side. Again, this points out how  
8 irregular the Morrow sands are through this area. We see  
9 that we have approximately five zones; there are A, B, C,  
10 D, E; and we see no continuity across the reservoir of  
11 any one particular sand. I would like to point out in  
12 particular the unitized interval again from the top of the  
13 Morrow Clastics through the base of the marker zone, and  
14 it seems like we do have pretty good correlation through  
15 those two points. Also, I think over on the left, if you  
16 will look at the Superior Government A No. 1 Well, the  
17 C zone there is productive and, as you look across the  
18 reservoir, well, it appears in only one other well, which  
19 is the South Wilson D Unit No. 2, and it was pointed out  
20 on Exhibit 1-E. These two wells had anomalously low  
21 bottomhole pressures.

22 The difference in the coloring on the map indicates  
23 the sand intervals in yellow, the gross interval in the  
24 red is the attempt to show the effective pay thickness  
25 through this gross.

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1 Q Now, would you explain to the Examiner the purpose of  
2 Exhibit 2?

3 A Exhibit 2 is the plan of operation. I would like to  
4 point out in this plan of operation we referred to Phase  
5 I, Phase II, and Phase III; and I believe this might be  
6 confusing if we was not pointing out that this all takes  
7 place in Phase I of what we are referring to as the  
8 unit agreement.

9 In particular, I think we'd like to point out in  
10 Phase I what we will be doing is trying to condition our  
11 wells and get the type of equipment that would be useable  
12 for both injection and withdrawal purposes. Then, we  
13 intend to start a pilot operation in order to determine if  
14 the amount of gas we put into these wells will give us the  
15 amount of pressure rise that we expect to have from the  
16 fact that we can measure the volume of the reservoir  
17 approximately from the amount of gas that has been taken  
18 out of it.

19 After having passed this Phase I, if we do, we will go  
20 into Phase II, which will be a period of installing  
21 permanent-type compression equipment and increasing the  
22 injectivity rate, and then we will corroborate the Phase I  
23 results and if they are up to our expectations, then we will  
24 go into Phase III, which is a full stage injection, which  
25 will be effected by putting on more permanent-type

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compression equipment.

I point out that we will be monitoring the offset wells during these different phases in order to find out if we do have any gas escaping from the unit area, from the area that is not proposed as being the unit area. And if this should occur, then we will take steps to try to enlarge the unit, to try to enlarge the contiguous area into our unit.

I'd like to refer to the diagramatic sketches of the State GRB No. 1 and the State GRA No. 1, as attached to the plan of operation. This essentially shows the type of equipment we will have downhole for our injection and withdrawal purposes and this consists of the permanent-type packer installations with the usual off and on tools that we have in this type of application, so that we can pull the tubing in case we had a leak without having the pressure come above the packer. We could isolate the pressure from above the packer by setting the blank off tool. We will keep pickle water in our annular space, pickle water being something to keep the annular space from corroding, as well as giving us some means of protection in case we had to drop the work on the formation. In other words, it would keep the place from swelling in the formation.

We intend to also file the usual monthly reports that

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1 are made for the units that are involved with State  
2 minerals, and we also will file six-month reports to show  
3 the progress that we've made on all the phases that we  
4 are undertaking. At the termination of our Phase III  
5 stage of operation, we will file a new plan of operation  
6 with the Commissioner in order to inform him as to how we  
7 will make injection and withdrawals after we have filled  
8 up.

9 Q To clarify just a bit, Phase I, II, and III of your plan  
10 of operation are the plans that you currently have for the  
11 period of time designations in the unit agreement as Phase  
12 I?

13 A That's correct.

14 Q And is that basically the secondary recovery operation as  
15 proposed by the unit agreement?

16 A That's correct.

17 Q And Phase II of the unit agreement, then, is what, as  
18 contemplated by the unit agreement?

19 A Phase II is the gas storage part of the unit agreement;  
20 and this will be also a period where we will be recovering  
21 additional liquids from the reservoir; and we also incur  
22 a certain amount of BTU enrichment by vaporizing the  
23 liquids that are now in the reservoir and bringing it on  
24 out with the gas on withdrawal. So, we expect to, I think,  
25 provide at least two means, another source of revenue to

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1 the State, one being the liquids and two being the BTU  
2 enrichment.

3 Q Would you briefly explain the formula for payment of  
4 royalty and revenue to the State as set forth in the unit  
5 agreement?

6 A In Phase I or Phase II?

7 Q Both phases.

8 A In Phase I, it would be allocated on whichever plan the  
9 Commissioner accepts. As we pointed out in Exhibit C of  
10 the unit agreement, or that was the time extrapolation,  
11 the BHP over Z to be introduced, we will pay royalty in  
12 Phase I, or a predetermined amount of liquids that would  
13 be fair, that would be in an equitable manner based upon  
14 what we and also the State of New Mexico thinks would be  
15 fair for remaining primary reserves.

16 Phase II would be based upon the amount of liquid  
17 that we would recover from the formation. We would pay  
18 again, one-eighth of the royalty there; and on the BTU  
19 content or enrichment, we would pay one-eighth royalty  
20 there; and we propose to measure the amount of gas going  
21 into the reservoir and also measure the amount of gas  
22 that's withdrawn. We will make tests on the withdrawal  
23 amount and also on the injection amount and take an average  
24 to see if we are actually taking any BTU from the reservoir;  
25 and on this basis, we will make the payment for BTU

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1 enrichment.

2 Q Now, would you tell us what Exhibit 3 is?

3 A Exhibit 3 is the result of the composite royalty production,  
4 and it shows the amount of BHP over Z method, and it shows  
5 the amount of the equivalent BTU that would be allocated  
6 to the GRA No. 1 and the GRB No. 1 Wells over their  
7 economic lives, under remaining primary reserve conditions.

8 MR. UTZ: Now, is this BTU or Mcf?

9 THE WITNESS: These are Mcf, should be total Mcf on  
10 the column there, Mr. Utz. It would be equivalent Mcf since  
11 we inverted any liquid that might be coming out on the basis  
12 of 3,500 cubic feet for one barrel of liquid.

13 MR. UTZ: 3,500 cubic feet per one barrel?

14 THE WITNESS: Yes, sir. This conversion factor is  
15 referred to in Exhibit 1.

16 Q (By Mr. Cox) The diagramatic sketch that you submitted  
17 as part of the plan of operation, does that reflect the  
18 procedure that you propose to use for a gas-injection  
19 well, as well as your withdrawal wells?

20 A Yes, sir, they are one and the same. It would take no  
21 special equipment for withdrawal or injection. We can use  
22 the same facilities right along.

23 Q If the unit agreement and the application for approval,  
24 application for approval of the unit agreement, and the  
25 application for injection of the gas into the storage area

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1 into the secondary recovery, ultimately the storage area,  
2 is approved, is it your opinion that this will tend to  
3 prevent waste and promote conservation?

4 A Yes, sir.

5 MR. COX: I have no further questions.

6 MR. UTZ: Are there further questions of the witness?

7 MR. MORRIS: Yes, sir.

8 MR. UTZ: You may proceed.

9 CROSS-EXAMINATION

10 BY MR. MORRIS:

11 Q Mr. Wilson, which of these zones are you proposing to  
12 inject gas into, all of them?

13 A Well, in the case of GRA and GRB, if you will refer to  
14 your cross section, you can see the GRA No. 1 is completed  
15 in the A Zone and D Zone, the GRB No. 1 is completed in  
16 the B Zone and the D Zone and the E Zone; and, again, we  
17 feel that, this is just more or less from my volumetric  
18 interpretations, that is in the GRB No. 1 Well, only the  
19 B and D Zones are affected. So, therefore, we only  
20 propose, in this particular unit area, that we will be  
21 putting gas into those respective zones.

22 Q What criterion have you used in showing the portion of  
23 these zones marked in red on your Exhibit 1-F?

24 A We tried to relate it to volumetrics, going with the  
25 average porosity and water saturation in using the proration

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1 acreage of 640, putting this much gas back underground  
2 within the respective wells, according to the ultimate  
3 production that they would make.

4 Q Maybe I didn't make myself clear. In showing the portions  
5 of these zones colored in red on Exhibit 1-F, have you  
6 used any porosity cut-off prameter?

7 A As far as average pay on the logs?

8 Q Yes.

9 A We felt that we couldn't use a porosity cut-off because  
10 we were looking at gross intervals over the log that were  
11 not representative of the amount of gas that was being  
12 produced from a particular well.

13 Our gross interval, or what would be net log pay,  
14 was really larger than what we were actually able to  
15 produce on, I think, performance; and on this basis, we  
16 felt that we could come up with a representative cut-off  
17 porosity.

18 Q On either side of your cross section, you have a  
19 designation, "0 Pay from Isopachous Map."

20 Now, do you have an Isopachous Map presented here as  
21 part of your exhibits?

22 A No, sir, I do not. I have an Isopachous Map that I think  
23 I could introduce into evidence. It's more or less just a  
24 general effective pay over the area, entire area.

25 This is the only one I have (indicating).

1 MR. MORRIS: Could we have this marked as an exhibit?  
2 (Whereupon, Llano's Exhibit No. 4 was marked into  
3 evidence.)

4 MR. MORRIS: Mr. Cox, is it satisfactory with you,  
5 if this is offered as an exhibit?

6 MR. COX: This is the information from which you  
7 prepared that map?

8 THE WITNESS: That's correct.

9 MR. COX: We have no objection.

10 Q (By Mr. Morris) Mr. Wilson, I'm not too good at reading  
11 Isopachous maps, will you tell us what this shows, please?

12 A This gives the average pay that would be under the area  
13 of these five wells over the entire area, or the Grama  
14 Ridge Morrow Field; and, it's based on, again, volumetrics  
15 and trying to put the gas that they produce back into the  
16 ground and coming up with a number of acre of feet that  
17 would be required for that purpose.

18 Q All right. Now, is the outermost contour there a 0 contour?

19 A That's correct.

20 Q And then what is the contour interval?

21 A 0, 5, 10, 15, so forth.

22 Q Now, what control did you have in preparing this map in  
23 the southwesterly direction?

24 A Southwesterly direction, we had the GR4 No. 1 and then the  
25 Superior Government Well. This gave us the only control

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1 we had in this area. It was an interpretation made from  
2 the study of these two wells, the GR4 No. 1 and the  
3 Government.

4 Q Now, I notice on this exhibit that you put a cross mark  
5 across Section 8, which is the Southern Union Production  
6 Company acreage. Does that have any significance?

7 A Well, no, sir, not really. I don't think it did at the  
8 time, I think we one time thought about using that as a  
9 unit area, and then it was just blocked out, was the  
10 reason for it.

11 Q Does your control in this area definitely dictate against  
12 that acreage being productive of gas, or being in  
13 communication with the unit area as you are proposing it

14 in this hearing at this time?

15 A I'd say definitely we don't think we are trying to say it's  
16 non-productive. The only thing we are trying to point out  
17 from our Isopach Map would be that we think that these  
18 sands are rather limited, they are irregular; and, again,  
19 looking at the cross section, you can take any particular  
20 sand and I think if you go across the area, they are very  
21 irregular.

22 So, we feel that they certainly could come in again on  
23 your particular Section 8 and while this would be  
24 geologically the same sand, we feel that historically it  
25 would not be connected. So, therefore, we are not -- We

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1 are looking at the combined volume under the area that we  
2 propose to pick as a gas storage unit.  
3 Q Before you can definitely say whether the acreage in  
4 Section 8 is or is not productive and is or is not  
5 connected with the proposed unit acreage, you'd really  
6 have to have some additional development, would you not?  
7 A We wouldn't mind if you drilled a well down there, if we  
8 had a storage area, if you want to spend the money.  
9 Q Now, is the accumulation here in your unit area, is it  
10 controlled structurally or stratigraphically?  
11 A Stratigraphically. We feel structure has no importance  
12 whatsoever on the accumulation of the hydrocarbons. It's  
13 more of a porosity-permeability feature within the  
14 individual sands.  
15 Q Now, your Exhibit 1-D, is that a structured map?  
16 A That's correct.  
17 Q If structure has no bearing in this hearing, I was just  
18 wondering what the significance of the structure map was  
19 as an exhibit here.  
20 A It was merely to point out the structural configuration of  
21 the reservoir in this area. We are not trying to place  
22 any importance on it as a producing mechanism, we feel  
23 it's strictly stratigraphic.  
24 Q Your plan of operation, Phase I, calls for computability  
25 testing.



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1 Is the gas that you are going to be putting in here,  
2 is it Morrow gas?  
3 A I feel that it would be a mixture of gases. In all  
4 probability, some of it would be Morrow, but it would be  
5 a mixture of gases that have been put into the Llano  
6 transmission lines.  
7 Q Do you know at this time what the source of gas is that you  
8 would propose to store in this reservoir?  
9 A I don't feel that I could answer that question. I think,  
10 Mr. Morris, possibly we have someone here that could.  
11 Q You don't know?  
12 A I do not know.  
13 Q Do you propose to make these compatability tests available  
14 to the Commission before you proceed to Phase II or III of  
15 your program?  
16 A Well, we will furnish the Commissioner with a report every  
17 six months in order to give him the progress of the Phase  
18 I, Phase II, and Phase III and certainly it would be no  
19 trouble at all to inform the Commissioner at the end of  
20 any particular phase if he so desires.  
21 Q I wasn't referring to the Commissioner of Public Lands, I  
22 was referring to the Oil Conservation Commission, as to  
23 whether you are proposing to make reports to them and gain  
24 further approval from this Commission before you proceeded  
25 into your storage project.

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1 A I don't think that's our intention. Our intention is to  
2 go ahead and file this with the Commissioner and then  
3 we'll go with our reports to him every six months and  
4 furnish him monthly reports of any injection, withdrawal,  
5 or liquid production. This will be furnished to the  
6 State, of course, and they will be in turn furnished a  
7 copy of it.

8 Q In other words, you don't propose to have any further  
9 hearings before the Oil Conservation Commission itself  
10 when you go from a pilot project into a full-scale storage  
11 project?

12 A One is not contemplated.

13 Q What are the total amounts of the gas that you propose to  
14 store in this unit area?

15 A After we get past Phase I, we will design our permanent  
16 compression equipment for a maximum of 2,500 PSI surface  
17 pressure, which in turn will enable us, under the volume  
18 pressure concept we have of the reservoir, to inject  
19 something close to 8,000,000 cubic feet.

20 If we should desire to go to any higher pressures,  
21 we would have to modify our equipment and, there again,  
22 we would come back to the Commission for approval of a  
23 plan of operation in order to surface the 2,500 PSI surface  
24 pressure.

25 Q Now, here again, are you talking about coming back to the

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1 Commissioner of Public Lands, or back to the Oil  
2 Commission?

3 A To the Commission of Public Lands, Commissioner of Public  
4 Lands.

5 Q In your Direct testimony, I think you stated that after you  
6 made your test to determine limits of the Morrow  
7 reservoir, that you might have to take steps to enlarge  
8 the unit, and that your unit agreement so provides.

9 A We have talked this over with the State Land Office and  
10 they were of the opinion that if it had to be enlarged,  
11 that we certainly would have to negate this unit agreement  
12 and start from scratch and have another one.

13 MR. MORRIS: Mr. Cox, I did not receive a copy of the  
14 unit agreement itself. Do you have one I could look at?

15 MR. COX: I have an office copy.

16 Q (By Mr. Morris) The unit agreement that you have proposed  
17 for approval by the Commission, has it be tentatively  
18 agreed upon between your company and the Commissioner of  
19 Public Lands as to form?

20 A As to form, I think we are in some agreement. We are, as  
21 I said before, still negotiating under Article 11, under  
22 11-B.

23 MR. MORRIS: I think that's all the questions I have.

24 Thank you.

25

CROSS-EXAMINATION

1  
2 BY MR. UTZ:

3 Q Mr. Wilson, your testimony was that your maximum pressure  
4 at this time for injection purposes would be 2,500  
5 surface?

6 A Yes, sir.

7 Q The original pressure of this pool is something like  
8 7,000-pound surface, or was that bottomhole?

9 A Referring again to Exhibit 1-E, the pressures were 7,500  
10 on three of the wells, and I think one of them was 58 and  
11 the other was 69. This is well below the original  
12 bottomhole pressures.

13 Q How are you closed on this structure, is it water,  
14 permeability pinch out?

15 A Permeability pinch out, Mr. Utz.

16 Q Do you feel that your Isopachous Map, showing a 0 pay,  
17 is the pinch out? Does it seal there, or is it further  
18 away?

19 A We feel that we are within limits. As I said before, we  
20 worked this up on a volumetric basis and it's the best  
21 way that we can do from the information available without  
22 going to the additional expense of development.

23 We feel there is no pressure anomalies shown on the  
24 surface that we can see that would call for further  
25 development. So, that's one of the bases that makes it

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1 the depleted reservoir, that it will go for gas storage.  
2 Q Referring to your Exhibit 1-D, which is your structure  
3 map, can you state which of those contours you feel is  
4 the limit of your reservoir?  
5 A Well, sir, as I said before, I don't think structure is  
6 significant in this particular case because these are  
7 sands that I think are stratigraphic in nature; and I  
8 think if you went up structure or down structure, you  
9 would come into an entirely different area of permeability  
10 and porosity, where you could have hydrocarbons; and  
11 structure has no bearing whatsoever on the ability of  
12 these sands to produce.  
13 Q May I see your Isopach Map? Do you still have that with  
14 you?  
15 A Yes, sir.  
16 Q Do you feel that Sections 3 and 34 include the entire  
17 structure in which you will store gas?  
18 A Sections 3 and 34 include the entire structure, no, sir,  
19 I don't consider that they do.  
20 Q You don't?  
21 A No, sir, I don't.  
22 Q Are we just unitizing Sections 3 and 34, rather than 33  
23 and 4, the other sections?  
24 A We feel that the individual sands within the wells are  
25 limited, and while we will be storing gas into Sections 3

1 and 34, we will be able to, as the work interest operator,  
2 as I said before, we have 100 per cent of GR4-1 and 99.5  
3 per cent of the South Wilson D Unit No. 2 Wells. We  
4 feel that we can monitor these offset wells and if we do  
5 have a show of gas over to these respective sections, 33  
6 and 4, we can then take enlargement measures.

7 Q Does Llano own the leases on Section 33 and Section 4?

8 A They are not the lessee of the record.

9 Q Do you have an agreement with them of any nature in regard  
10 to this storage area?

11 A In regard to this Section 34 and 3?

12 Q No, Sections 33 and 4, the sections immediately to the  
13 west.

14 A Well, as working interest operator, we could effect an  
15 agreement should it be shown that communication exists.

16 MR. COX: I believe he testified that they own 99.5  
17 per cent of Section 33 and 100 per cent of Section 4, the  
18 operating rights in this zone.

19 Q (By Mr. Utz) Well, that's what I was trying to ask you,  
20 we just didn't communicate too well.

21 A I'm sorry.

22 Q Well, what are you going to do with those wells, keep them  
23 shut in?

24 A No, sir, we will continue to produce them and we will be  
25 able to find anomalies, I believe, from our rate-time

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extrapolation, and also by BHP over Z extrapolation; and we can tell if there is any communication between these wells that should be depleting from the gas that's been injected to build up the pressure on Section 34 and Section 3.

Q Okay. Now, you are going to use GRB 1 and GRA 1 for injection. Can you produce those wells if you so desire?

A Yes, sir, we can.

Q Now, in regard to your Exhibit Number 2, I guess there are two parts to it, aren't there?

A Plan of operation and the diagramatic sketches, yes, sir.

Q Is this the manner in which these wells are now completed?

A Yes, sir, it is. I say "now completed." This is the way we propose to complete it in regard to the tubing, but there are production packers in the well, and the GRB No. 1 is not exactly as depicted, but this is the way that we propose to put the tubing string in order to produce and inject the gas.

Q You are going to load the annulus with inert fluid, I believe you said.

A Yes, sir.

Q How are you going to monitor the annulus, with a gauge or leave it open?

A We will have gauges on the annulus in order to observe any pressure increase.

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1 MR. UTZ: Are there other questions of the witness?

2 MR. STAMETS: Just a couple.

3 CROSS-EXAMINATION

4 BY MR. STAMETS:

5 Q The gas will be processed before storage to knock out  
6 the liquids?

7 A The gas will be coming from the transmission lines and it  
8 will have been processed before it gets to the storage  
9 area.

10 Q Through a gasoline plant?

11 A Well, whatever way they do that, I wouldn't tell you for  
12 sure I know.

13 Q I don't believe that the Commission has a gas storage  
14 project form. I assume Llano would work with the  
15 Commission to come up with an acceptable form for our  
16 use, something we might use in cooperation with the State  
17 Land Office?

18 A We would be happy to.

19 Q One other thing that may be a problem would be the liquids  
20 produced with any gas coming back up. I'm sure that you  
21 would not report your storage gas to us on a Form C-115,  
22 but I would think that the liquids produced would have to  
23 be reported on a C-115.

24 A Right.

25 MR. STAMETS: That's all.



CROSS-EXAMINATION

1  
2 BY MR. UTZ:

3 Q Mr. Wilson, do you feel that there is any communication  
4 between Section 8 and your storage area?

5 A Between Section 8. From the calculations I've made on the  
6 volume, I feel it unlikely. I feel there is communication  
7 geologically, I think, between these two areas; but  
8 historically, I don't see that there is any apparent.

9 Q All right, sir. Referring to your two methods at arriving  
10 at future reserves, is there a considerable difference by  
11 using the BHP method and the production-time method?  
12 A There is an approximate difference of 2,200, or probably  
13 22,000 Mcf, which would be royalty. This was 34 on the  
14 original and I think it comes out to approximately 56,000  
15 on the BHP over Z extrapolation.

16 Q Is that just for one well, or for both wells?  
17 A That's for both wells.

18 Q What's this 50,260 I see at the bottom of the GRA Well?

19 A That's the GRB, that's just from the date 1/1/73 through  
20 the entire operation of what would be the remaining primary.  
21 In February of 1970, there is cumulative of 50,260 Mcf,  
22 which when added back with the production that would come  
23 from the GRA, 6,210 Mcf, that would total up to 56,470 Mcf.

24 MR. UTZ: Okay. Are there other questions of the

25 witness?

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1 MR. MORRIS: Mr. Examiner, I have one more that was  
2 prompted by your question.

3 CROSS-EXAMINATION

4 BY MR. MORRIS:

5 Q Mr. Wilson, Mr. Utz asked your opinion concerning the  
6 probability of communication between Section 8 and the  
7 unit area. Would the pressure analyses that you undertake  
8 during the pilot test put you in a position to answer that  
9 question more definitively?

10 A I think our answer now would be on what we have observed  
11 from performance and from history, is that the area that  
12 would have to be allocated under this unit area in the  
13 direction of your well would have to be enlarged in so  
14 large a manner that we don't feel it could be probable  
15 that you have communication in Section 8. All that we  
16 hope to get from our tests, as we start our injection, is  
17 the answer that will confirm the volumetrics that we have  
18 come up with from our past history.

19 In other words, it's just a situation of taking  
20 pressure and volume measurements and then trying to put  
21 them up as a different pressure and then you can come up  
22 with a volume that you expect to get at a point after so  
23 much gas has been injected; and if your pressure comes up  
24 to the point that you expected it would have under the  
25 volume of sums that you have made, then you feel that your

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1 calculations are correct.

2 Q And if it does not?

3 A Then, that means that it is leaving us and it's going in  
4 the direction of, I think, these other wells.

5 Q It could be going in the direction of Section 8.

6 A Well, I would not say Section 8 so much as Section 33 and  
7 Section 4, and, say, Section 10.

8 Q I see. But it is an objective of your pilot test to  
9 determine by pressure analysis the limits of the Morrow  
10 reservoir?

11 A It is.

12 Q That's what you have stated here in the plan of operation.

13 A The purpose of our Phase I, in other words, we have said  
14 in Phase I, in order to determine by pressure analysis the  
15 limits of the Morrow reservoir and the compatibility for  
16 gas storage of the well, we have a limit of the Morrow  
17 reservoir now in mind and if we can establish this limit  
18 again by fill-up operation, we feel that what we have come  
19 up with, as far as our calculations from history, we feel  
20 that we have corroborated our case and we have a good  
21 storage reservoir. We have a tight jug.

22 MR. MORRIS: That's all.

23 MR. UTZ: Other questions?

24 MR. COX: Mr. Utz, I would like to offer Exhibits 1  
25 through 4, inclusive, now, in evidence. Exhibit 1, including

1 A, B, C, D, E, and F.

2 MR. UTZ: They will be accepted in evidence.

3 Are there statements in the case?

4 MR. MORRIS: I have just a very brief statement, Mr.

5 Examiner.

6 I think it's apparent from the plan of operation and  
7 Mr. Wilson's testimony here today that the applicant is not  
8 certain of the limits of the Morrow reservoir. It has a  
9 tentative conclusion in that direction, but this is one of the  
10 avowed purposes of the pilot test, is to determine whether  
11 those tentative conclusions are valid.

12 We would recommend to the Examiner that the Commission  
13 retain jurisdiction of this matter and make provision in any  
14 order approving this unit agreement and project for reopening  
15 of this matter and further hearing concerning this matter before  
16 the plan of operation proceeds from Phase I into the permanent  
17 phase of the project.

18 Certainly, there is adequate precedent in Commission  
19 practice for this type of provision. It's been common in the  
20 Commission's practice as far as water injection is concerned,  
21 in making the transition from pilot project to full scale water  
22 project, that the matter be reviewed by the Commission so that  
23 all interested parties can be apprised of the information that  
24 is available at that time; and make a determination as to  
25 whether, Number 1, continuation of the project would cause waste,

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1 or Number 2, whether the correlative rights of any interest  
2 owner in the area can be adversely affected.

3 We would recommend that the Commission enter an  
4 order in this matter, as it sees fit, otherwise, to approve  
5 the agreement and the project, that would make definite  
6 provision for reopening the case at the time Phase I of the  
7 plan of operation is completed.

8 MR. COX: I'd like to just say in closing, Mr. Utz,  
9 that this, I believe, the proposal contained in this  
10 application, is probably a first for all of us. I don't think  
11 there is anything like it in the State Land Office; the State  
12 Land Office certainly hasn't had anything like this.

13 This is explicitly an experimental project. The  
14 applicant is making an effort to find a way to utilize New  
15 Mexico gas in New Mexico, and the objective is one that has been  
16 a considerable matter. They are willing to spend a pretty good  
17 hunk of change to see whether it will work or not, and it is  
18 going to be an expensive operation, one which will be most  
19 beneficial if their projected hopes are realized.

20 For those reasons, we feel definitely that the  
21 application should be granted and the unit agreement approved  
22 and the method of injection approved. The Commission, of  
23 course, does have jurisdiction to reopen these matters, and I  
24 don't think that we want to be coming back up here every year  
25 on this project if it can be avoided; but, certainly, it would

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1 be amenable to discussing the matter and coming to a hearing  
2 before the Commission, or the Examiner, at such time as there  
3 is a need for it, at such time as the Commission deems it  
4 necessary.

5 MR. UTZ: Would Llano object to coming in at the  
6 end of Phase I with a full-scale report on it?

7 THE WITNESS: No, sir. We would be happy to.

8 MR. UTZ: Does anyone have anything further in this  
9 case?

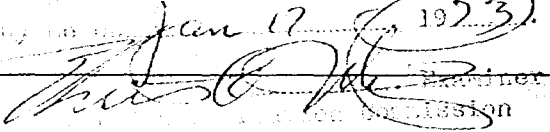
10 (No response.)

11 MR. UTZ: The case will be taken under advisement.

12 STATE OF NEW MEXICO )  
13 ) ss  
14 COUNTY OF BERNALILLO )

15 I, JOHN DE LA ROSA, a Court Reporter, in and for the  
16 County of Bernalillo, State of New Mexico, do hereby certify  
17 that the foregoing and attached Transcript of Hearing before  
18 the New Mexico Oil Conservation Commission was reported by  
19 me; and that the same is a true and correct record of the said  
20 proceedings to the best of my knowledge, skill and ability.

21   
22 COURT REPORTER

23 I hereby certify that the foregoing is  
24 a true and correct record of the proceedings in  
25 Case No. 4895  
Jan 17, 1973  
  
Examiner  
New Mexico Oil Conservation Commission

I N D E X

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E X H I B I T S

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LLANO, INC.  
P.O. BOX 1320  
HOBBS, NEW MEXICO 88240

To: New Mexico State Land Office  
P.O. Box 1148  
Santa Fe, New Mexico 87501  
Attn: Oil & Gas Department  
Mr. Alex Armijo

New Mexico Oil Conservation Commission  
P.O. Box 2088  
Santa Fe, New Mexico 87501  
Attn: Mr. Joe Ramey

New Mexico Oil Conservation Commission  
P.O. Box 1980  
Hobbs, New Mexico 88240  
Attn: Mr. Jerry Sexton

Gentlemen:

In accordance with New Mexico Oil Conservation Commission Order No. R-4491 and Unit Agreement for the Operation of the Grama Ridge Morrow Unit Area, Lea County, New Mexico, Llano, Inc. hereby submits the following Report:

FOR THE MONTH OF July 1976

GRAMA RIDGE MORROW UNIT

MCF VOLUMES @ 15.025# pb.

Gas Injected MCF	Accumulated Gas Injected MMBTU	Gas Withdrawn MCF	Accumulated Gas Withdrawn MMBTU	Gas Balance (Inj.-Withdrawn) MCF	Accumulated Gas Balance (Inj.-Withdrawn) MMBTU
GRA					
150,083	160,698	4,545,850	4,783,337	24,593	26,333
GRB					
103,216	110,516	2,472,232	2,614,767	36,821	38,406
Totals					
253,299	271,214	7,018,082	7,398,104	61,414	64,739
				385,126	405,767
				125,490	134,365
				66,395	72,110
				191,885	206,475
					4,359,543
					2,273,458
					4,586,694
					2,405,721
					6,992,415

Dist: JFM  
CCM  
TUCCO-JC  
File  
JM(x)WLS(x)GWE(x)DLG(x)TJJ

Remarks:

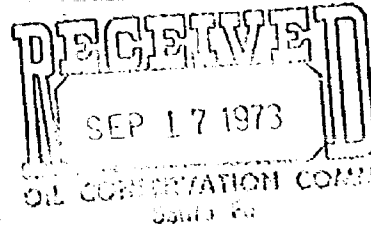
Initial Injection 4/26/73

Prepared By *Torrey Johnson*  
Verified By *W. H. Hagan*

8-19-76  
8-20-76



LLANO, INC.  
P. O. BOX 1320  
HOBBS, NEW MEXICO 88240



September 14, 1973

Commissioner of Public Lands  
P. O. Box 1148  
Santa Fe, New Mexico 87501

Attention: Mr. Ray D. Graham

Re: Grama Ridge Morrow Unit Agreement  
Lea County, New Mexico

Gentlemen:

With reference to your letter dated August 27, 1973, we have previously forwarded our check #3053 in the amount of \$10.00 to cover the additional filing fee referred to in your letter.

Please find enclosed a copy of the New Mexico Oil Conservation Commission Orders No. R-4473 and No. R-4491 pertaining to the subject unit as requested.

Very truly yours,

*Donald L. Garey*  
Donald L. Garey

DLG/zs

Enclosures

cc: Oil Conservation Commission-Santa Fe  
cc: R. F. Montgomery

Unit Name GRAMA RIDGE MORROW UNIT (SECONDARY RECOVERY AND GAS STORAGE)  
Operator Llano, Inc.  
County Lea

OCCE

4895 &

DATE	OCC CASE NO.	4896	EFFECTIVE DATE	TOTAL ACREAGE	STATE	FEDERAL	INDIAN-FEE	SEGREGATION CLAUSE	TERM
APPROVED	OCC ORDER NO.	R-4473 &							
Commissioner	1-29-73 &	R-4491	4-25-73	1,287.16	1,287.16	-0-	-0-	Yes	5 yrs.
8-27-73	3-16-73								

UNIT AREA

TOWNSHIP 22 SOUTH, RANGE 34 EAST NMPM  
Section 3: All

TOWNSHIP 21 South, Range 34 EAST NMPM  
Section 34: All

Unit Name GRAMA RIDGE MORROW UNIT (Secondary Recovery and Gas Storage)  
Operator Llano, Inc.  
County Lea

STATE TRACT NO.	LEASE NO.	INSTI-TUTION	SEC.	TWP.	RGE.	SUBSECTION	RATIFIED DATE	ACRES	ACREAGE NOT RATIFIED	LESSEE
1	B-158-3	C.S.	3	22S	34E	S/2	7-18-73	320.00		Texaco Inc.
2	E-9141	C.S.	3	22S	34E	N/2	6-7-73	327.16		Llano, Inc.
3	E-9659	C.S.	34	21S	34E	S/2	7-20-73	320.00		Gulf Oil Corporation
4	K-3592-2	C.S.	34	21S	34E	N/2	6-7-73	320.00		Llano, Inc.



## OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO  
P. O. BOX 2088 - SANTA FE

87501

January 29, 1973

GOVERNOR  
BRUCE KING  
CHAIRMAN

LAND COMMISSIONER  
ALEX J. ARMJO  
MEMBER

STATE GEOLOGIST  
A. L. PORTER, JR.  
SECRETARY - DIRECTOR

Mr. Lewis Cox  
Hinkle, Bondurant, Cox & Eaton  
Attorneys at Law  
Post Office Box 10  
Roswell, New Mexico 88201

Re: Case No. 4895

Order No. R-4473

Applicant:

Llano, Inc.

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.  
Secretary-Director

ALP/ir

Copy of order also sent to:

Hobbs OCC X

Artesia OCC

Aztec OCC

Other Mr. Richard S. Morris

UNIT AGREEMENT  
FOR THE OPERATION OF THE  
GRAMA RIDGE MORROW UNIT AREA  
LEA COUNTY, NEW MEXICO

THIS AGREEMENT entered into as of the 2nd day of January, 1973 by and between the parties subscribing, ratifying or consenting hereto, and herein referred to as the "parties hereto".

WITNESSETH:

WHEREAS, the parties hereto are the owners of working, royalty or other oil or gas interests in the unit area subject to this agreement; and

WHEREAS, the Commissioner of Public Lands of the State of New Mexico (hereinafter referred to as "Commissioner") is authorized by law to consent to and approve the operation of state lands under agreements made by lessees of state lands jointly or severally with other lessees where such agreements provide for the unit operation of part of or all of any oil or gas pool, field or area (Section 7-11-39, 7-11-40 N.M. S.A. 1953); and

WHEREAS, the Commissioner of Public Lands of the State of New Mexico is authorized by law to amend with the approval of lessee, evidenced by lessee's execution of such agreement or otherwise, any oil and gas lease embracing state lands so that the length of the term of said lease may coincide with the term of such agreement for the unit operation of part or all of any oil or gas pool, field or area (Section 7-11-41 N.M.S.A. 1953); and

WHEREAS, the Oil Conservation Commission of the State of New Mexico (hereinafter referred to as "Commission") is authorized by law to approve this agreement and the conservation provisions thereof (Art. 3, Chap. 65, Vol. 9, Part 2 N.M.S.A. 1953); and

WHEREAS, the parties hereto hold sufficient interest in the Grama Ridge Morrow Unit Area covering the lands hereinafter described

to give reasonably effective control of operations therein; and

WHEREAS, it is the purpose of the parties hereto to conserve natural resources, prevent waste, store gas and secure other benefits obtainable through development and operation of the area subject to this agreement under the terms and conditions and limitations herein set forth.

NOW, THEREFORE, in consideration of the premises and the promises herein contained, the parties hereto commit to this agreement their respective interests in the below defined unit area, and agree severally among themselves as follows:

1. UNIT AREA: The following described land is hereby designated and recognized as constituting the unit area:

Township 21 South, Range 34 East, N.M.P.M.

Section 34 - All

Township 22 South, Range 34 East, N.M.P.M.

Section 3 - All

containing 1287.16 acres, more or less.

Exhibit "A" attached hereto is a map showing the unit area and the boundaries and identity of tracts and leases in said area to the extent known to the unit operator. Exhibit "B" attached hereto is a schedule showing to the extent known to the unit operator the acreage, percentage and kind of ownership of oil and gas interests in all lands in the unit area. However, nothing herein or in said schedule or map shall be construed as a representation by any party hereto as to the ownership of any interest other than such interest or interests as are shown on said map or schedule as owned by such party. Exhibits "A" and "B" shall be revised by the unit operator whenever changes in ownership in the unit area render such revisions necessary or when requested by the Commissioner.

All land committed to this agreement shall constitute land referred to herein as "unitized land" or "land subject to this agreement".

2. UNITIZED SUBSTANCES: All oil, gas, natural gasoline and associated fluid hydrocarbons in the unitized formation as hereinafter defined are unitized under the terms of this agreement and herein are called unitized substances.

3. UNITIZED FORMATION: That subsurface portion of the unit area commonly known as the Morrow sands which is the same zone as the top and bottom of which were encountered at log depths of 12,722 feet and 13,208 feet in the Shell Oil Company State GRA Well No. 1 as shown on the Schlumberger Sonic Log - Gamma Ray Log of said well dated July 5, 1965, which said well is located 1980 feet from the North line and 660 feet from the west line of Section 3, Township 22 South, Range 34 East, is unitized under this agreement and is hereinafter referred to as the "unitized formation".

4. UNIT OPERATOR: Llano, Inc. with offices at Hobbs, New Mexico (P.O. Drawer 1320) is hereby designated as unit operator and by signature hereto commits to this agreement all interest in unitized substances vested in it as set forth on Exhibit "B" and agrees and consents to accept the duties and obligations of unit operator for the operation of the Grama Ridge Morrow Unit Area. Whenever reference is made herein to the unit operator, such reference means the unit operator acting in that capacity and not as an owner of interests in unitized substances, and the term "working interest owner" when used herein shall include or refer to unit operator as the owner of a working interest when such interest is owned by it.

5. RESIGNATION OR REMOVAL OF UNIT OPERATOR: Unit operator shall have the right to resign at any time, but such resignation shall not become effective until a successor unit operator has been selected and approved in the manner provided for in Section 6 of this agreement. The resignation of the unit operator shall not release the unit operator from any liability or any default by it hereunder occurring prior to the effective date of its resignation.

Unit operator may, upon default or failure in the performance of its duties or obligations hereunder, be subject to removal by the same percentage vote of the owners of working interests determined in like manner as herein provided for the selection of a new unit operator. Such removal shall be effective upon notice thereof to the Commissioner.

The resignation or removal of the unit operator under this agreement shall not terminate his right, title or interest as the owner of a working interest or other interest in unitized substances, but upon the resignation or removal of unit operator becoming effective, such unit operator shall deliver possession of all equipment, materials and appurtenances used in conducting the unit operations and owned by the working interest owners to the new duly qualified successor unit operator, or to the owners thereof if no such new unit operator is elected, to be used for the purpose of conducting unit operations hereunder. Nothing herein shall be construed as authorizing removal of any material, equipment and appurtenances needed for the preservation of any wells.

6. SUCCESSOR UNIT OPERATOR: Whenever the unit operator shall resign as unit operator or shall be removed as hereinabove provided, the owners of the working interests according to their respective acreage interests in all unitized land shall by a majority vote select a successor unit operator; provided that, if a majority but less than seventy-five percent (75%) of the working interests qualified to vote is owned by one party to this agreement, a concurring vote of sufficient additional parties, so as to constitute in the aggregate not less than seventy-five percent (75%) of the total working interests, shall be required to select a new operator. Such selection shall not become effective until (a) a unit operator so selected shall accept in writing the duties and responsibilities of



unit operator, and (b) the selection shall have been approved by the Commissioner. If no successor unit operator is selected and qualified as herein provided, the Commissioner at his election may declare this unit agreement terminated.

7. ACCOUNTING PROVISIONS: The unit operator shall pay all costs and expenses incurred in conducting unit operations hereunder. In the event the ownership of the unitized formation should hereafter be divided or owned in whole or in part by parties other than unit operator, from and after such time unit operator shall pay in the first instance all costs and expenses incurred in conducting unit operations hereunder, and such costs and expenses and the working interest benefits accruing hereunder shall be apportioned among the owners of the unitized working interests in accordance with an operating agreement entered into by and between the unit operator and the owners of such interests, whether one or more, separately or collectively. Any agreement or agreements entered into between the working interest owners and the unit operator as provided in this section, whether one or more, are herein referred to as the "Operating Agreement". No such agreement shall be deemed either to modify any of the terms and conditions of this unit agreement or to relieve the unit operator of any right of obligation established under this unit agreement and in case of any inconsistencies or conflict between this unit agreement and the operating agreement, this unit agreement shall prevail.

8. RIGHTS AND OBLIGATIONS OF UNIT OPERATOR: Except as otherwise specifically provided herein, the exclusive right, privilege and duty of exercising any and all rights of the parties hereto which are necessary or convenient for producing, storing, allocating and distributing the unitized substances are hereby delegated to and shall be exercised by the unit operator as herein provided.

Acceptable evidence of title to said rights shall be deposited with said unit operator and, together with this agreement, shall constitute and define the rights, privileges and obligations of unit operator. Nothing herein, however, shall be construed to transfer title to any land or to any lease or operating agreement, it being understood that under this agreement the unit operator, in its capacity as unit operator, shall exercise the rights of possession and use vested in the parties hereto only for the purposes herein specified.

9. PURPOSE OF UNIT AND PLAN OF OPERATION: It is recognized and agreed by the parties hereto that the unitized formation as to all of the lands subject to this agreement is reasonably proven to be productive of unitized substances or necessary for unit operations and that the object and purpose of this agreement is to formulate and put into effect a secondary recovery and gas storage project in order to effect the greatest economic recovery of unitized substances, prevent waste and conserve natural resources consistent with good engineering practices expected of a prudent operator. The parties hereto agree that the unit operator may, subject to the approval of a plan of operation by the Commissioner, inject gas produced from lands other than the unit area into the unitized formation through the Shell Oil Company State GRA Well No. 1 located in the SW $\frac{1}{4}$ NW $\frac{1}{4}$  Section 3, Township 22 South, Range 34 East and the Shell State GRB Well No. 1 located in the NW $\frac{1}{4}$ SW $\frac{1}{4}$  Section 34, Township 21 South, Range 34 East for secondary recovery and storage purposes. Unit operator shall furnish the Commissioner, between the first and twentieth of each month, reports showing the amount of gas produced and injected into the unitized formation for the preceding month.

A plan of operation shall be filed with the Commissioner concurrently with the filing of this unit agreement for final approval. Said plan of operation and all revisions thereof shall be as complete

and adequate as the Commissioner may determine to be necessary in connection with operations hereunder. Upon approval of this agreement and the aforementioned plan of operation by the Commissioner, said plan and all subsequently approved plans shall constitute the operating obligations of the unit operator under this agreement for the period specified in the plan. Thereafter, from time to time before the expiration of any existing plan, the unit operator shall submit for approval a plan for an additional specified period of operation. Reasonable diligence shall be exercised in complying with the obligations of the approved plan of operation. The unit operator shall furnish to the Commissioner, within 30 days from the expiration of each 6 month period, a report giving full factual information as to the manner in which the plan in effect for such period has been carried out.

If the unit operator should fail to comply with any approved plan of operation or supplement to or modification thereof, this agreement may be terminated by the Commissioner; provided, however, the Commissioner shall give notice to the unit operator and the lessees of record in the manner prescribed by Section 7-11-14 N.M.S.A. 1953 of intention to cancel because of any alleged breach of said plan of operation and any decision entered therein shall be subject to appeal in the manner prescribed by Section 7-11-17 N.M.S.A. 1953; and provided further in any event unit operator shall be given a reasonable opportunity after a final determination within which to remedy said default, failing in which this agreement shall be terminated.

10. TRACT PARTICIPATION: Exhibit "B" attached hereto shows the percentage of participation of each of the tracts embraced by leasehold interests which are committed to this agreement. These participation factors have been obtained by dividing the number of acres contained in each tract by the total number of acres contained in the unit area.

The unitized substances produced from the unit area shall be allocated to the respective tracts as hereinafter set forth in accordance with said percentages of participation and such unitized substances shall be deemed to have been produced from the respective tracts to which allocated.

11. ALLOCATION OF PRODUCTION:

A. PHASE I: It is recognized that there is still some primary gas and liquid hydrocarbons left in the unitized formation underlying the unit area which would otherwise be produced in the normal producing life of the existing wells before they reach their economic limit upon which the state would be entitled to royalty. It is contemplated that gas produced from lands outside the unit area will be injected into the unitized formation for a considerable length of time before any appreciable amounts of gas are withdrawn. The primary production which would normally have been produced from January 1, 1973 to its economic limit has been determined by rate-time extrapolations based upon prior production and Exhibit "C" attached hereto shows the royalty gas to which the state is entitled. In order that the State of New Mexico will continue to receive royalties on the same basis as if the existing wells had continued normal production until they reached their economic limits the amount of gas shown for the respective months on Exhibit "C" shall be allocated to the tracts in accordance with the percentages set forth on Exhibit "B" and unit operator shall pay to the state royalties on the gas allocated to the respective tracts on the basis provided in the leases covering said tracts exactly the same as if the gas had actually been produced therefrom. Such payments based upon the gas for each of the months from January 1, 1973 through September 1975 shall be considered as full payment to the state for all remaining primary gas reserves. The period from January 1, 1973 through September 30, 1975 shall constitute Phase I.

B. PHASE II: It is contemplated that after the unitized formation has been reasonably repressured by the injection of gas produced from lands outside the unit area, there will be withdrawals from time to time. Unit operator shall install and at all times operate and maintain metering equipment and other facilities approved by the Commissioner so that an accurate cumulative account can be kept of the quantity of gas as well as the total number of British Thermal Units in the gas injected into the unitized formation through the existing wells. Operator shall also keep an accurate cumulative account of the total number of British Thermal Units in all gas withdrawn from the unitized formation.

Operator shall also install, operate and maintain at all times the necessary separation equipment to separate the gas from the liquid hydrocarbons produced in connection with the withdrawal of gas from the respective wells, as well as all other related equipment which may be required to transfer all liquids so separated.

Operator shall cause monthly analyses by chromatograph or other mutually acceptable method of all the gas injected into or withdrawn from the reservoir in order to compute the net change in British Thermal Unit content.

Operator shall pay royalties to the state at the rates provided in the respective leases on all liquid hydrocarbons which are separated from the gas withdrawn and allocated to the respective tracts in accordance with the percentages of participation set forth on Exhibit "B" regardless of the time said gas is withdrawn. In addition, should the total cumulative British Thermal Units in the gas withdrawn exceed the total British Thermal Units in the gas

injected plus the pre-determined number of British Thermal Units in the remaining primary gas reserves and for which the state has been or will be paid during Phase I, then operator shall pay royalties on said increase in British Thermal Units at the prevailing market price in Lea County, New Mexico as set by the Federal Power Commission for gas of like quality. Payment for British Thermal Unit enrichment as set forth herein shall be made on a monthly basis as the result of the chromatograph analyses.

In addition to the rentals and royalty provided in the leases covering the respective tracts, beginning as of October 1, 1975 unit operator shall pay an annual storage fee or rental of \$ to be allocated to the respective leasehold interests on the basis of the percentage of participation set forth on Exhibit "B". Said storage fee or additional rental shall be paid during the month of October of each year.

All gas produced from the lands outside the unit area and injected into the unitized formation, as well as all primary gas if, as and when produced, except for the payments to be made to the state in accordance with Phase I, may be withdrawn from the unitized formation from time to time royalty free except as to any enhancement in value through an increase in British Thermal Units. Notwithstanding the above, royalty shall be paid on all liquid hydrocarbons separated from gas withdrawn.

12. LEASES AND CONTRACTS CONFORMED AND EXTENDED: The terms, conditions and provisions of all leases, subleases, operating agreements and other contracts relating to the exploration, drilling, development or operation for oil or gas of the lands committed to this agreement shall, as of the effective date hereof, be and the same are hereby expressly modified and amended insofar as they apply to lands within the unitized area to the extent necessary to make

the same conform to the provisions hereof and so that the respective terms of said leases and agreements will be extended insofar as necessary to coincide with the term of this agreement and the approval of this agreement by the Commissioner and the respective lessees shall be effective to conform the provisions and extend the term of each such lease as to lands within the unitized area to the provisions and term of this agreement; but otherwise to remain in full force and effect. Each lease committed to this agreement, insofar as it applies to lands within the unitized area, shall continue in force beyond the term provided therein so long as this agreement remains in effect. Termination of this agreement shall not affect any lease which pursuant to the terms thereof or any applicable laws would continue in full force and effect thereafter. The continued operation or production of a well or wells for unitized substances on the unit area or for gas storage purposes shall be construed and considered as the continued operation or production on each of the leasehold interests committed to this agreement and operations or production or gas storage pursuant to this agreement shall be deemed to be operations upon and production from each leasehold interest committed hereto and there shall be no obligation on the part of the unit operator or any of the owners of the respective leasehold interests committed hereto to drill offsets to wells as between the leasehold interests committed to this agreement.

Any lease embracing lands of the State of New Mexico having only a portion of its lands committed hereto shall be segregated as to the portion committed and as to the portion not committed and the terms of such leases shall apply separately as to such segregated portions commencing as of the effective date hereof. Notwithstanding any of the provisions of this agreement to the contrary, any lease embracing lands of the State of New Mexico having only a portion of

its lands committed hereto shall continue in full force and effect beyond the term provided therein as to all lands embraced in such lease, if oil and gas, or either of them, are capable of being produced from or gas is being stored within some part of the unitized formation covered by the leases committed to this agreement at the expiration of the secondary term thereof.

13. CONSERVATION: Operations hereunder and production of unitized substances shall be conducted to provide for the most economical and efficient recovery and storage of said substances without waste, as defined by or pursuant to state laws or regulations.

14. DRAINAGE: In the event a well or wells producing oil or gas in paying quantities should be brought in on land adjacent to the unit area draining unitized substances from the lands embraced therein, unit operator shall drill such offset well or wells as a reasonably prudent operator would drill under the same or similar circumstances.

15. COVENANTS RUN WITH LAND: The covenants herein shall be construed to be covenants running with the land with respect to the interests of the parties hereto and their successors in interest until this agreement terminates, and any grant, transfer or conveyance of interest in land or leases subject hereto shall be and hereby is conditioned upon the assumption of all privileges and obligations hereunder by the grantee, transferee or other successor in interest. No assignment or transfer of any working, royalty or other interest subject hereto shall be binding upon unit operator until the first day of the calendar month after the unit operator is furnished with the original, photostatic or certified copy of the instrument of transfer.

16. EFFECTIVE DATE AND TERM: This agreement shall become effective as of January 2, 1973 upon approval by the Commissioner and shall remain in effect so long as unitized substances are being



produced from or stored within the unitized formation. This agreement may be terminated at any time by not less than seventy-five per cent (75%) on an acreage basis of the owners of the working interests signatory hereto with the approval of the Commissioner.

17. RATE OF PRODUCTION: All production and the disposal thereof shall be in conformity with allocations, allotments and quotas made or fixed by the Commission and in conformity with all applicable laws and lawful regulations.

18. APPEARANCES: Unit operator shall, after notice to other parties affected, have the right to appear for and on behalf of any and all interests affected hereby before the Commissioner of Public Lands and the New Mexico Oil Conservation Commission, and to appeal from orders issued under the regulations of the Commissioner or Commission or to apply for relief from any of said regulations or in any proceedings on its own behalf relative to operations pending before the Commissioner or Commission; provided, however, that any other interested party shall also have the right at his own expense to appear and to participate in any such proceeding.

19. NOTICES: All notices, demands or statements required hereunder to be given or rendered to the parties hereto shall be deemed fully given if given in writing and sent by postpaid certified mail, addressed to such party or parties at their respective addresses set forth in connection with the signatures hereto or to the ratification or consent hereof or to such other address as any such party may have furnished in writing to party sending the notice, demand or statement.

20. UNAVOIDABLE DELAY: All obligations under this agreement requiring the unit operator to produce unitized substances from or store gas within the unitized formation covered by this agreement shall be suspended while, but only so long as, the unit operator, despite the exercise of due care and diligence, is prevented from

complying with such obligations, in whole or in part, by strikes, war, acts of God, federal, state or municipal law or agencies, unavoidable accidents, uncontrollable delays in transportation, inability to obtain necessary materials in open market, or other matters beyond the reasonable control of the unit operator, whether similar to matters herein enumerated or not.

21. LOSS OF TITLE: In the event title to any tract of unitized land or substantial interest therein shall fail and the true owner cannot be induced to join the unit agreement so that such tract is not committed to this agreement or the operation thereof hereunder becomes impracticable as a result thereof, such tract may be eliminated from the unitized area, and the interest of the parties readjusted as a result of such tract being eliminated from the unitized area. In the event of a dispute as to the title to any royalty, working or other interest subject hereto, the unit operator may withhold payment or delivery of the allocated portion of the unitized substances involved on account thereof without liability for interest until the dispute is finally settled, provided that no payment of funds due the State of New Mexico shall be withheld. Unit operator as such is relieved from any responsibility for any defect or failure of any title hereunder.

22. SUBSEQUENT ADJUSTMENT OF STORAGE OR RENTAL FEE: The gas storage or rental fee provided for in Section 11B shall be subject to adjustment at the end of each 5 year period during the life of this agreement. If in the opinion of the Commissioner of Public Lands the rental or storage fee being paid under this agreement is not commensurate with rental and storage fees being paid in the State of New Mexico in connection with gas storage projects, the Commissioner, at his option, may at least 60 days prior to the expiration of any 5 year period give notice thereof to operator and thereupon the rental or storage fee for the next 5 years shall be re-negotiated and agreed.

upon between the unit operator and Commissioner to the end that rental or storage fees will be paid which are commensurate with conditions existing as of that time.

23. HOLD HARMLESS CLAUSE: Notwithstanding any of the provisions contained herein, unit operator shall save, hold and protect the Commissioner of Public Lands and the State of New Mexico harmless from all claims and liabilities of whatsoever kind, nature or description arising from or growing out of operations carried on by unit operator pursuant to this agreement.

24. COUNTERPARTS: This agreement may be executed in any number of counterparts, no one of which needs to be executed by all parties or may be ratified or consented to by separate instrument in writing specifically referring hereto, and shall be binding upon all those parties who have executed such a counterpart, ratification or consent hereto with the same force and effect as if all such parties had signed the same document and regardless of whether or not it is executed by all other parties owning or claiming an interest in the lands within the above described unit area.

IN WITNESS WHEREOF, the undersigned parties hereto have caused this agreement to be executed as of the respective dates set forth opposite their signatures.

ATTEST:

\_\_\_\_\_  
Secretary

LLANO, INC.

By \_\_\_\_\_  
President  
UNIT OPERATOR AND WORKING INTEREST OWNER

LESSEES OF RECORD

ATTEST:

\_\_\_\_\_

SHELL OIL COMPANY

By \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

Secretary

By \_\_\_\_\_

Address: \_\_\_\_\_

Secretary

By \_\_\_\_\_

Address: \_\_\_\_\_

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of January, 1973 by \_\_\_\_\_ President of Llano, Inc., a New Mexico corporation, on behalf of said corporation.

My Commission Expires:

Notary Public

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of January, 1973 by \_\_\_\_\_ of Shell Oil Company, a Delaware corporation, on behalf of said corporation.

My Commission Expires:

Notary Public

COUNTY OF \_\_\_\_\_  
 The foregoing instrument was acknowledged before me this \_\_\_\_\_  
 day of January, 1973 by \_\_\_\_\_  
 of Gulf Oil Corporation, a Pennsylvania corporation, on behalf of said  
 corporation.

My Commission Expires:

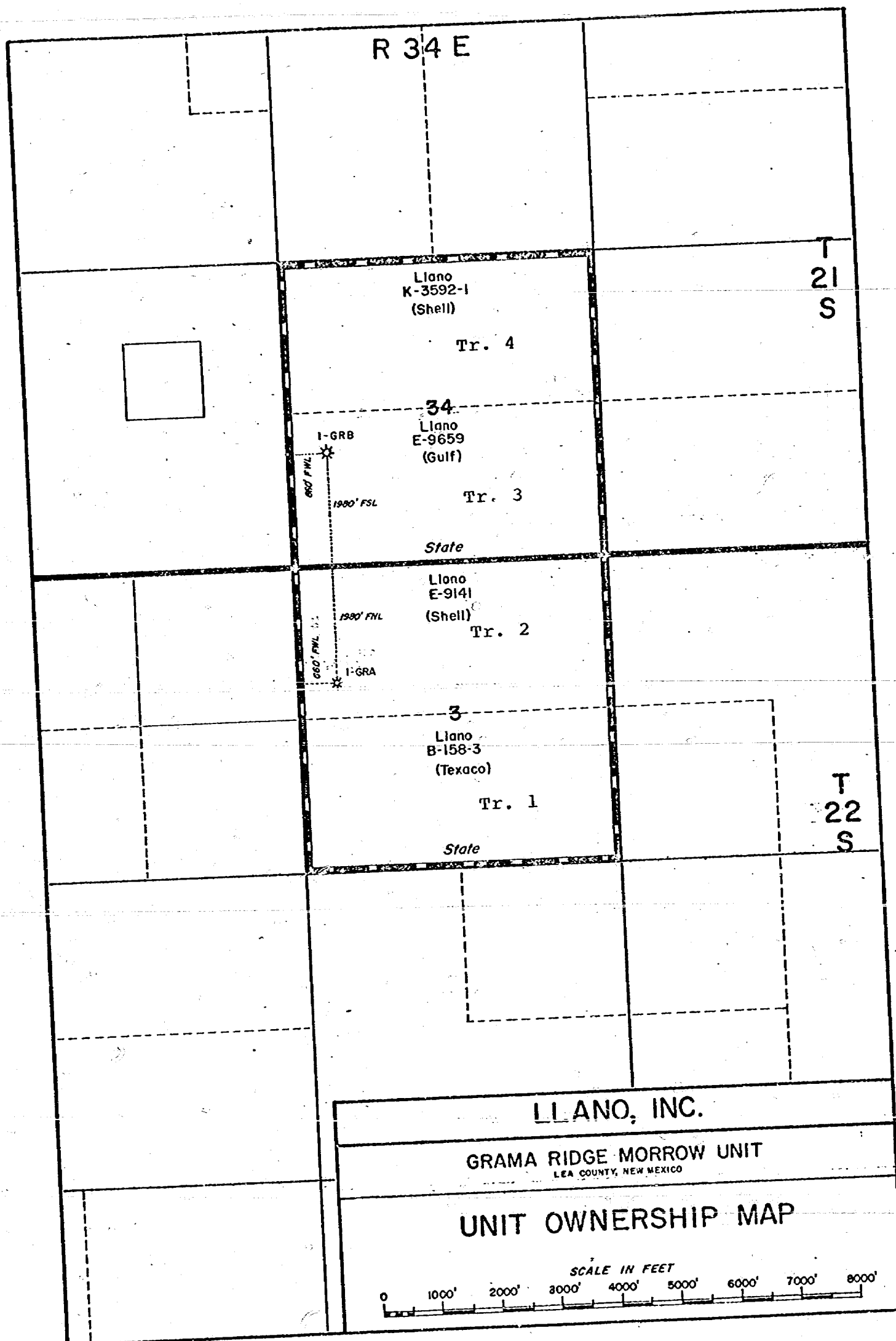
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of January, 1973 by \_\_\_\_\_  
of Texaco Inc., a \_\_\_\_\_ corporation, on behalf of said cor-  
poration.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public



**EXHIBIT "B"**  
**GRAMA RIDGE MORROW UNIT AGREEMENT**

Tract No.	Description	No. Surface Acres	Lease No.	Basic Royalty	Lessee of Record	Overriding Royalty or Prod. Pymt.	Working Int. Owner and Percentage	Percentage Tract Participation
1	S½ Sec. 3, T. 22 S., R. 34 E.	320.00	B-158-3	12½%	Texaco Inc.	None	Llano, Inc. 100%	24.861
2	N½ Sec. 3, T. 22 S., R. 34 E.	327.16	E-9141	12½%	Shell Oil Company	None	Llano, Inc. 100%	25.417
3	S½ Sec. 34, T. 21 S., R. 34 E.	320.00	E-9659	12½%	Gulf Oil Corporation	None	Llano, Inc. 100%	24.861
4	N½ Sec. 34, T. 21 S., R. 34 E.	320.00	K-3592-1	12½%	Shell Oil Company	None	Llano, Inc. 100%	24.861
<b>Total</b>		<b>1287.16</b>						<b>100.000</b>

EXHIBIT "C"

Rate-time extrapolation of remaining primary royalty gas reserves, Grama Ridge Morrow Unit Area, Lea County, New Mexico

1973		1974		1975	
Month	Equivalent Gas Production MCF	Month	Equivalent Gas Production MCF	Month	Equivalent Gas Production MCF
Jan.	2,370	Jan.	1,211	Jan.	407
Feb.	2,252	Feb.	1,137	Feb.	389
Mar.	2,125	Mar.	1,085	Mar.	361
Apr.	2,002	Apr.	1,020	Apr.	344
May	1,902	May	962	May	335
June	1,793	June	905	June	316
July	1,689	July	859	July	299
Aug.	1,607	Aug.	813	Aug.	280
Sept.	1,509	Sept.	767	Sept.	270
Oct.	1,428	Oct.	479	Oct.	-
Nov.	1,351	Nov.	453	Nov.	-
Dec.	1,282	Dec.	434	Dec.	-
Total	21,310		10,125		3,001



CASE 4893: Application of Continental Oil Company for three non-standard proration units, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the following non-standard gas proration units, Eumont Gas Pool, Lea County, New Mexico:

A 200-acre unit comprising the N/2 NE/4, SE/4 NE/4, and N/2 SE/4 of Section 18, Township 21 South, Range 36 East, to be dedicated to the Meyer A-1 Well No. 6 located in Unit B of said Section 18; a 320-acre unit comprising the S/2 of Section 12, Township 19 South, Range 36 East, to be dedicated to the State KN-12 Well No. 1 located in Unit P of said Section 12; and a 158.9-acre unit comprising the N/2 S/2 of Section 7, Township 19 South, Range 37 East, to be dedicated to the State A-7 Com No. 1 located in Unit I of said Section 7.

CASE 4894: Application of Felmont Oil Corporation for a dual completion, contraction of vertical limits, creation of a new pool, and special pool rules, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the contraction of the vertical limits of the Atoka-Pennsylvanian Gas Pool, Eddy County, New Mexico, to exclude the producing interval from 8894 feet to 8914 feet as found in its Aaron Unit Well No. 1, located in Unit N of Section 11, Township 18 South, Range 26 East, and to re-designate said Atoka-Pennsylvanian Gas Pool as the Atoka-Lower Pennsylvanian Gas Pool, and for the creation of a new pool for the above-described producing interval to be designated Atoka-Upper Pennsylvanian Gas Pool. Applicant also seeks the adoption of special rules for said proposed new pool similar to the pool rules for the presently existing Atoka-Pennsylvanian Gas Pool; applicant further seeks approval for the dual completion of the above-described well to produce from the aforesaid two pools.

CASE 4895: Application of Llano, Inc. for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the Grama Ridge Morrow Unit Area comprising 1,280 acres, more or less, of State Lands in Townships 21 and 22 South, Range 34 East, Lea County, New Mexico.

CASE 4896: Application of Llano, Inc. for gas injection, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to inject gas for secondary recovery and gas storage purposes in the Morrow formation through its State GRA Well No. 1 located in Unit N of Section 3, Township 22 South, Range 34 East, and its State GRB Well No. 1 located in Unit L of Section 34, Township 21 South, Range 34 East, Grama Ridge-Morrow Gas Pool, Lea County, New Mexico.

CASE 4890: (Continued from the January 3, 1973 Examiner Hearing)

Application of Texaco Inc. for downhole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks as an exception to Rule 303 of the Commission Rules and Regulations, authority to commingle production from the North Vacuum-Abo, Vacuum-Wolfcamp, and Vacuum-Upper Pennsylvanian Pools in the wellbore of its Mobil State Well No. 1 located in Unit H of Section 25, Township 17 South, Range 34 East, Lea County, New Mexico.

DOCKET: EXAMINER HEARING - WEDNESDAY - JANUARY 17, 1973

9 A. M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM,  
STATE LAND OFFICE BUILDING - SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Elvis A. Utz, Alternate Examiner:

- ALLOWABLE: (1) Consideration of the allowable production of gas for February, 1973 from seventeen prorated pools in Lea, Eddy, Roosevelt and Chaves Counties, New Mexico;
- (2) Consideration of the allowable production of gas from nine prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico for February, 1973.

CASE 4875: (Continued from December 19, 1972 Examiner Hearing)

Application of ESH Corporation for salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water in the Lower San Andres formation in the perforated interval from 5144 feet to 5170 feet in its Hobbs State Well No. 5 located in Unit F of Section 29, Township 18 South, Range 38 East, Hobbs Field, Lea County, New Mexico.

CASE 4860: (Continued from the December 19, 1972 Examiner Hearing)

Application of Craig Folsom for an unorthodox oil well location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks authority to drill a well to test the Queen formation at an unorthodox oil well location 1340 feet from the South line and 1300 feet from the East line of Section 12, Township 13 South, Range 31 East, Caprock-Queen Pool, Chaves County, New Mexico.

CASE 4482: (Reopened) (Continued from the January 3, 1973 Examiner Hearing)

In the matter of Case 4482 being reopened pursuant to the provisions of Order No. R-4093-A, which order continued the special rules and regulations for the Parkway-Strawn Pool, Eddy County, New Mexico, for a period of one year. All interested parties may appear and show cause why said special pool rules should be further extended.

CASE 4892: Application of Mobil Oil Corporation for a dual completion and water injection, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dually complete its Carson Watson Com Well No. 13 located in Unit G of Section 33, Township 21 South, Range 37 East, in such a manner as to permit the production of gas from the Tubb Gas Pool and the injection of water into the Drinkard formation underlying the Central Drinkard Unit, Drinkard Pool, Lea County, New Mexico.

4895 Grant Plans, Inc. a unit  
agreement for their Kiana  
Ridge snow unit area.  
Consisting of sections  
34 - 215 - BEE.  
3 - 225 - 34E.

Thos. B. [Signature]

DRAFT

dr/

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE No. 4895

Order No. R-4413

APPLICATION OF LLANO, INC.  
FOR APPROVAL OF THE GRAMA RIDGE MORROW  
UNIT AGREEMENT, LEA, COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on  
January 17, 1963, at Santa Fe, New Mexico, before Examiner  
Richard L. Stamets *EAU*

NOW, on this \_\_\_\_\_ day of January, 1963, the Commission,  
a quorum being present, having considered the testimony, the record,  
and the recommendations of the Examiner, and being fully advised  
in the premises,

FINDS:

(1) That due public notice having been given as required by  
law, the Commission has jurisdiction of this cause and the subject  
matter thereof.

(2) That the applicant, Llano, Inc.,  
seeks approval of the Gramma Ridge Morrow Unit Agreement  
covering 1,280 1287.16 acres, more or less, of State,  
~~Federal~~ lands  
~~and~~  
described as follows:

LEA COUNTY, NEW MEXICO  
TOWNSHIP 21 South, RANGE 34 EAST, NMPM  
Section 34: All

TOWNSHIP 22 SOUTH, RANGE 34 EAST, NMPM  
Section 3: All

(3) That approval of the proposed unit agreement should promote the prevention of waste and the protection of correlative rights within the unit area.

IT IS THEREFORE ORDERED:

(1) That the Gramma Ridge Morrow Unit Agreement is hereby approved.

(2) That the plan contained in said unit agreement for the development and operation of the unit area is hereby approved in principle as a proper conservation measure; provided, however, that notwithstanding any of the provisions contained in said unit agreement, this approval shall not be considered as waiving or relinquishing, in any manner, any right, duty, or obligation which is now, or may hereafter be, vested in the Commission to supervise and control operations for the exploration and development of any lands committed to the unit and production of oil or gas therefrom.

(3) That the unit operator shall file with the Commission an executed original or executed counterpart of the unit agreement within 30 days after the effective date thereof; that in the event of subsequent joinder by any party or expansion or contraction of the unit area, the unit operator shall file with the Commission within 30 days thereafter counterparts of the unit agreement reflecting the subscription of those interests having joined or ratified.

(4) That this order shall become effective upon the approval of said unit agreement by the Commissioner of Public Lands for the State of New Mexico, ~~and the Director of the United States Geological Survey~~, that this order shall terminate ipso facto upon the termination of said unit agreement; and that the last unit operator shall notify the Commission immediately in writing of such termination.

(5) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE NO. 4895  
Order No. R-4473

APPLICATION OF LLANO, INC. FOR  
APPROVAL OF THE GRAMA RIDGE  
MORROW UNIT AGREEMENT, LEA  
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on  
January 17, 1973, at Santa Fe, New Mexico, before Examiner  
Elvis A. Utz.

NOW, on this 29th day of January, 1973, the Commission,  
a quorum being present, having considered the testimony, the  
record, and the recommendations of the Examiner, and being  
fully advised in the premises,

FINDS:

(1) That due public notice having been given as required  
by law, the Commission has jurisdiction of this cause and the  
subject matter thereof.

(2) That the applicant, Llano, Inc., seeks approval of  
the Grama Ridge Morrow Unit Agreement covering 1,287.16 acres,  
more or less, of state lands described as follows:

LEA COUNTY, NEW MEXICO  
TOWNSHIP 21 SOUTH, RANGE 34 EAST, NMPM  
Section 34: All

TOWNSHIP 22 SOUTH, RANGE 34 EAST, NMPM  
Section 3: All

(3) That approval of the proposed unit agreement should  
promote the prevention of waste and the protection of correlative  
rights within the unit area.

IT IS THEREFORE ORDERED:

(1) That the Grama Ridge Morrow Unit Agreement is hereby  
approved.

-2-

Case No. 4895  
Order No. R-4473

(2) That the plan contained in said unit agreement for the development and operation of the unit area is hereby approved in principle as a proper conservation measure; provided however, that notwithstanding any of the provisions contained in said unit agreement, this approval shall not be considered as waiving or relinquishing, in any manner, any right, duty, or obligation which is now, or may hereafter be, vested in the Commission to supervise and control operations for the exploration and development of any lands committed to the unit and production of oil or gas therefrom.

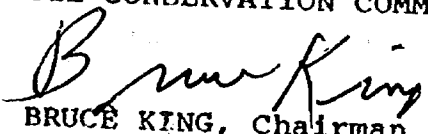
(3) That the unit operator shall file with the Commission an executed original or executed counterpart of the unit agreement within 30 days after the effective date thereof; that in the event of subsequent joinder by any party or expansion or contraction of the unit area, the unit operator shall file with the Commission within 30 days thereafter counterparts of the unit agreement reflecting the subscription of those interests having joined or ratified.

(4) That this order shall become effective upon the approval of said unit agreement by the Commissioner of Public Lands for the State of New Mexico; that this order shall terminate ipso facto upon the termination of said unit agreement; and that the last unit operator shall notify the Commission immediately in writing of such termination.

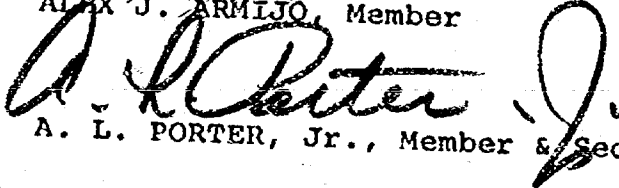
(5) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

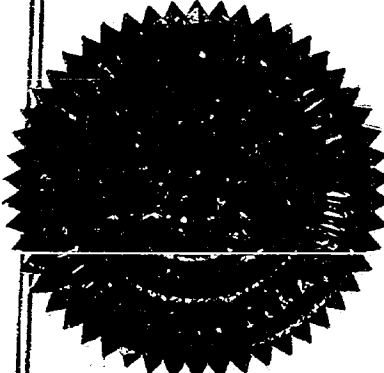
DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

  
BRUCE KING, Chairman

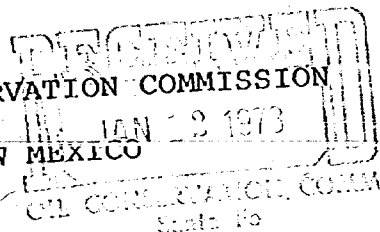
  
ALEX J. ARMIJO, Member

  
A. L. PORTER, Jr., Member & Secretary

  
S E A L

dr/

BEFORE THE OIL CONSERVATION COMMISSION  
STATE OF NEW MEXICO



APPLICATION OF LLANO, INC. FOR APPROVAL  
OF THE UNIT AGREEMENT FOR THE GRAMA  
RIDGE MORROW UNIT EMBRACING SECTION 34,  
TOWNSHIP 21 SOUTH, RANGE 34 EAST AND  
SECTION 3, TOWNSHIP 22 SOUTH, RANGE 34  
EAST, LEA COUNTY, NEW MEXICO FOR SECOND-  
ARY RECOVERY AND GAS STORAGE PURPOSES.

No. 4895

Oil Conservation Commission  
Box 2088  
Santa Fe, New Mexico 87501

Comes Llano, Inc., acting by and through the undersigned attorneys, and hereby makes application for approval of the Unit Agreement for the Grama Ridge Morrow Unit embracing Section 34, Township 21 South, Range 34 East and Section 3, Township 22 South, Range 34 East, Lea County, New Mexico for secondary recovery and gas storage purposes, and in support thereof respectfully shows:

1. There is attached hereto, made a part hereof and for purposes of identification marked Exhibit "A", a plat showing the outlines of the proposed unit area consisting of Section 34, Township 21 South, Range 34 East and Section 3, Township 22 South, Range 34 East, Lea County, New Mexico, containing 1280 acres, more or less.

2. All of the lands within the unit area are lands of the State of New Mexico. On August 19, 1965 the State GRA Well No. 1 was completed in the SW $\frac{1}{4}$ NW $\frac{1}{4}$  Section 3, Township 22 South, Range 34 East and on March 21, 1966 the State GRB Well No. 1 was completed in the NW $\frac{1}{4}$ SW $\frac{1}{4}$  Section 34, Township 21 South, Range 34 East. Both of said wells were completed as gas wells in the Morrow formation and were initially potentialed at 26.5 and 34.2 MMCF/D. Applicant is now the owner of the oil and gas leases covering the lands within the proposed unit area.

3. The unit agreement is being formed for both secondary recovery and gas storage purposes and applicant contemplates injecting gas into the above mentioned wells from time to time and withdrawing the same and separating the liquid hydrocarbons at the time of withdrawal. Said gas will be obtained from non-unitized land. One hundred



percent of the leasehold interests will be committed to the unit agreement and it is anticipated that applicant will be operator of the unit.

4. Applicant believes that the formation of the unit for the purposes indicated will be in the interest of conservation and the prevention of waste and will tend to protect correlative rights.

5. There are filed herewith three copies of the proposed unit agreement, which has been approved as to form by the Commissioner of Public Lands.

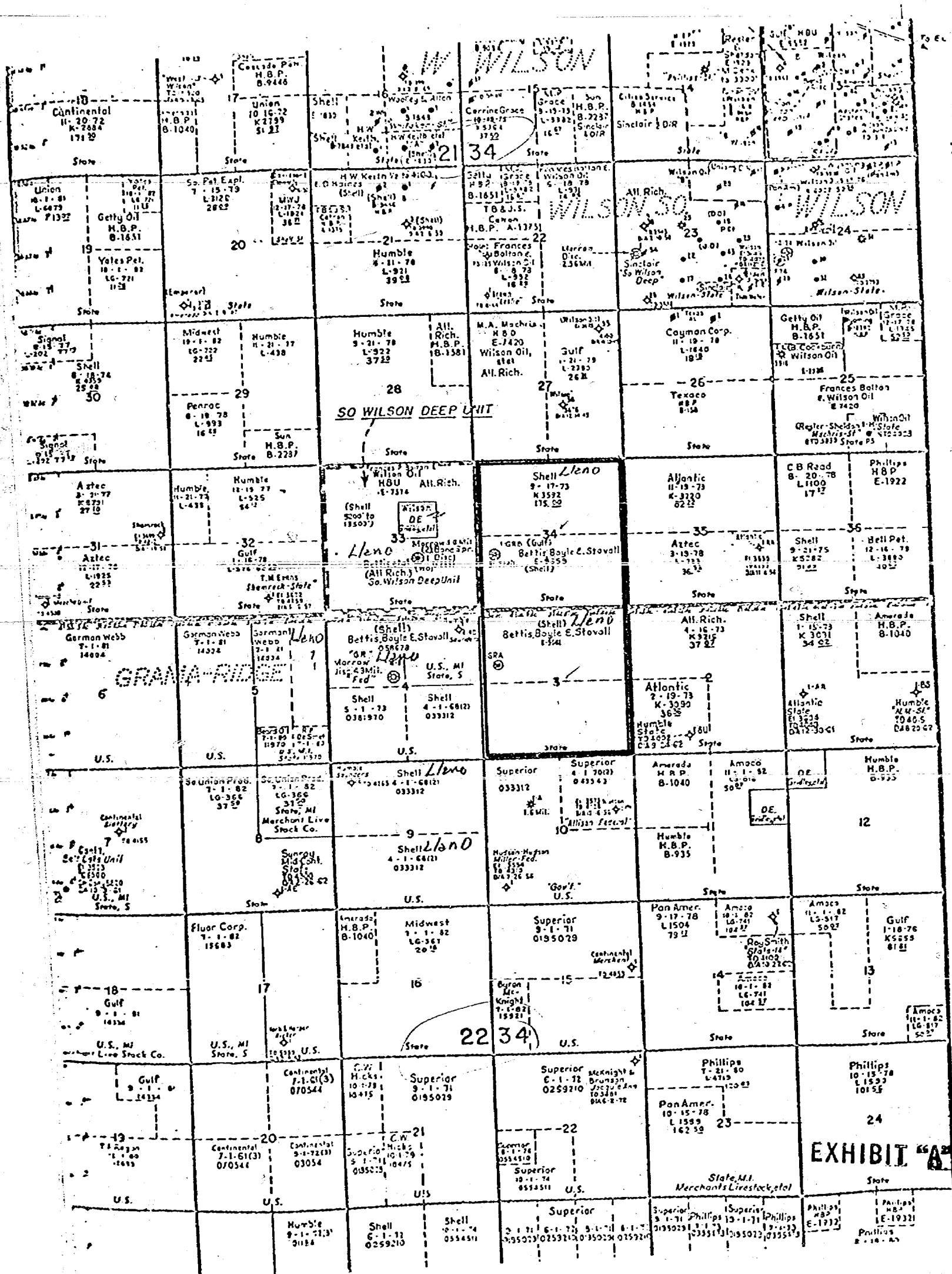
6. Applicant requests that this matter be included on the docket for the examiner's hearing on January 17, 1973.

Respectfully submitted,

LLANO, INC.

By 

HINKLE, BONDURANT, COX & EATON  
P.O. Box 10  
Roswell, New Mexico 88201  
Attorneys for Applicant



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22  
S

EXHIBIT "A"

A REVIEW

FOR THE

UNDERGROUND STORAGE OF GAS  
IN THE GRAMA RIDGE MORROW UNIT  
LEA COUNTY, NEW MEXICO

December, 1972

BEFORE EXAMINER UTZ  
OIL CONSERVATION COMMISSION

EXHIBIT NO. 1

CASE NO. 4895 - 4896

Submitted by *Alon Inc*

Hearing Date *1/27/73*

## I. INTRODUCTION

Llano, Inc., a New Mexico Corporation with offices in Hobbs, New Mexico, desires to form an underground gas storage facility to include the State GRA No. 1 and State GRB No. 1 wells in the Morrow Sand Formation of the Grama Ridge Field. The object of this review is to determine the feasibility of storage in the two-well area.

## II. SUMMARY

The Grama Ridge Field is located in Southeastern New Mexico approximately 18 miles west of the Eunice townsite (as shown in Fig. 1). The field was discovered in June, 1965 by the Shell Oil Company - Federal "GR" No. 4-1. The reservoir is the Morrow Sand Formation at approximately 13,000 feet and consists of numerous sandstone members that are irregularly interbedded with impermeable shales. Cross-sections indicate that any individual sand is not continuous throughout the field and, therefore, communication between wells is not thought to be prevalent. The proration spacing is 640 acres per well.

Areal extent of the proposed storage unit is 1280 acres. The effective reservoir volume under this surface area is estimated to be 13,220 acre-feet. Original gas-in-place was established from rate-time extrapolations. The reservoir was considered to be 85 percent depleted of original gas-in-place at abandonment.

Cumulative equivalent gas volumes within the proposed storage unit are as follows:

15.65 billion cubic feet originally-in-place

13.32 billion cubic feet of recoverable gas

13.05 billion cubic feet cumulative (est.) to 1/1/73

The storage system can be pressure monitored in offset well and enlarged if communication is evident.

### III. CONCLUSIONS

1. The producing mechanism is by gas expansion.
2. Ultimate primary recovery on the State GRA No. 1 and State GRB No. 1 is estimated at 13.32 billion standard cubic feet of equivalent gas which is 85 percent of the 15.65 billion standard cubic feet of equivalent gas-in-place.
3. Remaining estimated primary production as of 1/1/73 will be 0.276 billion standard cubic feet of equivalent gas which is approximately 2.1% of the recoverable 13.32 billion standard cubic feet.
4. The reservoir does not have sufficient hydrocarbons to support economical secondary operations.
5. No production anomalies exist to justify future development.
6. Volumetric calculations show a limited reservoir.
7. The geological interpretation shows a limited stratigraphic trap.

8. The reservoir is useable for the storage of gas in view of the limited volume, depletion state and geologic nature.

9. Pressure monitoring in offset wells will determine if expansion is needed due to communication.

#### IV. RECOMMENDATIONS

1. Contract with the Commissioner of Public Lands for underground gas storage under the state area as shown outlined by Map 1(attached).

2. Utilize the interval to extend from the top of the Morrow Clastics to the base of the Morrow Marker Zone as shown on type log (Fig. 2).

#### V. DISCUSSION

##### Storage Area

The proposed storage area is as shown on Map 5.

##### Vertical Limits of Storage

The vertical interval proposed for storage utilization is from the top of the Morrow Clastics to the base of the bottom Marker Zone as shown on type log (Fig. 2).

##### Performance Data

Table No. 1 is a summary of the data from the State GRA No. 1

and State GRB No. 1 wells. Completion and production data was obtained from the Oil Conservation Commission files in the Hobbs, New Mexico office. Other data is as follows:

- (a) Completion Sands
- (b) Equivalent Cumulative Gas Production
- (c) Equivalent Ultimate Gas Production
- (d) Calculated Flow Capacity From 4-Point Test

#### Geology

(a) Structure - As contoured on top of the Morrow Clastics, the area is reflecting structural relief with southwest nosing (see Map 2).

(b) Morrow Sands - The sand development indicates five correlable zones between wells that vary from 0 to 60 feet in gross thickness with up-structure thinning. The sands are extremely irregular and non-continuous in nature and are embedded in a shale matrix. Permeability pinch-outs occur with increased shaliness toward the sand/shale facies. Cross-section No. 1 shows the five correlable zones as A, B, C, D and E. The sands in these zones are perforated for the most part where test data indicated permeability. The sand irregularity is apparent in the cross-section and it is thought that communication between wells is not prevalent. Fig. No. 2 is a typical gamma-ray sonic log of the Morrow Formation.

#### Original Gas-In-Place

The original gas-in-place under the State GRA and GRB leases was calculated to be 15.65 billion Standard cubic feet by considering the summation of the individual well rate-time production extrapolations to

be 85 percent of the original gas-in-place.

Volumetric calculations based on this original gas-in-place of 15.65 billion cubic feet indicates an average effective pay thickness of 10.32 feet with the parameters as shown below.

Average Porosity	10%
Water Saturation	20%
Ultimate Equivalent Primary Gas Production	13.21 BCF
Initial Reservoir Pressure	7500 PSI
Reservoir Temperature	182°F
Spacing (2 wells)	1280 Acres

#### Primary Recovery

Cumulative production to January 1, 1972 from the State GRA No. 1 was 6,830,087 MCF of gas and 20,315 barrels of condensate and from the State GRB No. 1 it was 5,777,279 MCF of gas and 23,412 barrels of condensate. Using an estimate of 3500 SCF/STBO the condensate production when converted to equivalent gas production is 0.153 BCF. Ultimate primary equivalent gas production has been estimated at 13.32 billion cubic feet of gas by extrapolating the individual lease rate-time decline curve to an economic limit of \$300 per well per month. This ultimate primary gas production represents an empirical recovery of 85 percent of the original 15.65 billion standard cubic feet of gas-in-place estimated under the State GRA and State GRB leases.



### Plan of Operation

The day to day operation of the storage facility will depend on market demand and wellhead obligations. The availability of underground storage facility will enable Llano to operate its pipeline system near 100 percent annual capacity. During low demand periods, gas in excess of market requirements will be injected into storage. This "stored gas" would then be available for use in periods of peak demand with controlled deliverability.

Gas will be injected into the State GRA No. 1 and State GRB No. 1 wells after they have been converted for injection purposes. When there is a demand for the stored gas the injection wells will become withdrawal wells until the demand is met.

It is anticipated that 13 billion cubic feet will be the maximum storage capacity at a shut-in wellhead pressure of 6000 psi. This facility will enable Llano's pipeline system to operate at or approaching a 100 percent load factor which will enable Llano to maintain a more efficient operation.

## GRAMA RIDGE MORROW UNIT

L. Lano, Inc

GRAMA RIDGE FIELD  
LEA COUNTY, NEW MEXICO

1/15/73

GRA No. 1 &amp; GRB No. 1

McFis

COMPOSITE ROYALTY PRODUCTION - BHP/Z METHOD

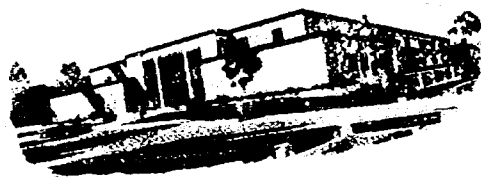
	GRA	GRB	TOTAL			GRB	TOTAL		GRB	McFis Total
1973 Jan	990	1400	2390		1974	1060	1060	1975	810	810
Feb	880	1360	2240			1040	1040		790	790
Mar	760	1340	2100			1010	1010		775	775
Apr	680	1290	1970			990	990		750	750
May	600	1260	1860			960	960		740	740
Jun	520	1250	1770			950	950		710	710
Jul	450	1210	1660			925	925		700	700
Aug	400	1190	1590			900	900		690	690
Sep	350	1160	1510			890	890		675	675
Oct	310	1140	1450			860	860		650	650
Nov	270	1110	1380			840	840		640	640
Dec	-	1090	1090			825	825		625	625
			40							
Tot	6210	14800	21,010			11,250	11,250		8555	8555
Cum	6210	14,800	21,010			26,050	32,260		39,605	40,815
	GRB	TOTAL		1976	GRB	TOTAL		1978	GRB	TOTAL
1976 Jan	610	610		1977	460	460		1978	350	350
Feb	600	600			450	450			345	345
Mar	590	590			445	445			340	340
Apr	575	575			430	430			330	330
May	550	550			425	425			325	325
Jun	540	540			410	410			310	310
Jul	525	525			400	400			305	305
Aug	510	510			395	395			300	300
Sep	500	500			390	390			295	295
Oct	495	495			375	375			290	290
Nov	490	490			370	370			280	280
Dec	475	475			360	360			275	275
TOT	6460	6460			4910	4910			3745	3745
CUM	41,065	41,275			45,975	52,185			49720	55,930
	GRB	TOTAL								
1979 Jan	270	270								
Feb	270	270								
Mar										
Apr										
May										
Jun										
Jul										
Aug										
Sep										
Oct										
Nov										
Dec										
TOT	540	540								
CUM	50,260	56,470								

3500/1



ALEX J. ARMIJO  
COMMISSIONER

State of New Mexico



Commissioner of Public Lands  
August 27, 1973

TELEPHONE

505-827-2748

P. O. BOX 1148  
SANTA FE, NEW MEXICO

4895

Llano, Inc.  
P. O. Drawer 1320  
Hobbs, New Mexico 88240

Re: GRAMA RIDGE MORROW  
UNIT AGREEMENT  
LEA COUNTY, NEW MEXICO

ATTENTION: Mr. Donald L. Garey

Gentlemen:

The Commissioner of Public Lands has this date approved your Grama Ridge Morrow Unit, Lea County, New Mexico. Your Initial Plan of Operation has also been approved as of this date.

Enclosed are five (5) Certificates of approval.

Please remit an additional Ten (\$10.00) Dollar filing fee. The filing fee is ten dollars for each section or fractional part thereof, with a minimum of ten dollars whether the acreage is federal, state or privately owned. We would also like to have a copy of the Order by the New Mexico Oil Conservation Commission.

The effective date to be retroactive to April 25, 1973.

Very truly yours,

RAY D. GRAHAM, Director  
Oil and Gas Department

AJA/EDG/s  
encls.  
cc:

New Mexico Oil Conservation Commission  
Santa Fe, New Mexico

CLARENCE E. HINKLE  
W. E. BONDURANT, JR. (1914-1973)  
LEWIS C. COX, JR.  
PAUL W. EATON, JR.  
CONRAD E. COFFIELD  
HAROLD L. HENSLEY, JR.  
STUART D. SHANOR  
C. D. MARTIN  
PAUL J. KELLY, JR.  
  
JAMES H. BOZARTH  
RONALD G. HARRIS  
JAMES H. ISBELL  
DOUGLAS L. LUNSFORD  
PAUL M. BOHANNON

LAW OFFICES  
HINKLE, BONDURANT, COX & EATON

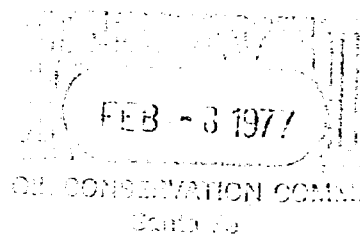
600 HINKLE BUILDING  
POST OFFICE BOX 10  
ROSWELL, NEW MEXICO 88201

February 7, 1977

1895  
TELEPHONE (505) 622-6510

MR. ISBELL LICENSED  
IN TEXAS ONLY

MIDLAND, TEXAS OFFICE  
521 MIDLAND TOWER  
(915) 683-4691



Oil Conservation Commission  
P.O. Box 2088  
Santa Fe, New Mexico 87501

Re: Grama Ridge Morrow Unit

Gentlemen:

We enclose for your information and files copy of Amendment to the above unit agreement which was originally approved by the Commission on January 29, 1973. The Amendment expands the unit to include Section 33, Township 21 South, Range 34 East.

Yours very truly,

HINKLE, COX, EATON, COFFIELD & HENSLEY

By 

CEH:cs  
Enc.

CERTIFICATE OF APPROVAL

BY COMMISSIONER OF PUBLIC LANDS, STATE OF NEW MEXICO

AMENDMENT OF UNIT AGREEMENT

GRAMA RIDGE-MORROW UNIT

LEA COUNTY, NEW MEXICO


There having been presented to the undersigned Commissioner of Public Lands of the State of New Mexico for examination, the attached Amendment of Unit Agreement for the development and operation of the Grama Ridge-Morrow Unit Area, Lea County, New Mexico for the purpose of expanding the Unit Area.

The attached Amendment of Unit Agreement was entered into as of September 1, 1976 by and between the parties to the original Unit Agreement for the purpose of expanding the unit area to include all of Section 33, Township 21 South, Range 34 East, N.M.P.M. The Amendment also ratifies and confirms the Original Unit Agreement as amended and upon examination of said Amendment, the Commissioner finds:

- (a) That such Amendment to this Agreement will tend to promote the conservation of oil and gas and the better utilization of reservoir energy in said area.
- (b) That under the proposed amended Agreement the State of New Mexico will receive its fair share of the recoverable oil or gas in place under its lands in the area.
- (c) That each beneficiary Institution of the State of New Mexico will receive its fair and equitable share of the recoverable oil and gas under its lands within the area.
- (d) That such Agreement is in other respects for the best interests of the State, with respect to State lands.

NOW, THEREFORE, by virtue of the authority conferred upon me under Sections 7-11-39, 7-11-40, 7-11-41, 7-11-47, and 7-11-48, New Mexico Statutes Annotated, 1953 Compilation, I, the undersigned, Commissioner of Public Lands of the State of New Mexico, for the purpose of more properly conserving the oil and gas resources of the State, do hereby consent to and approve the said Amendment, and any leases embracing lands of the State of New Mexico within the area shall be and the same are hereby amended to conform with the terms and conditions of said Agreement. This approval is subject to all of the provisions of the aforesaid statutes.

IN WITNESS WHEREOF, this Certificate of Approval is executed, with seal affixed, this 26th day of January, 1977.

  
COMMISSIONER OF PUBLIC LANDS  
Of the State of New Mexico

AMENDMENT TO UNIT AGREEMENT  
FOR OPERATION OF THE GRAMA  
RIDGE-MORROW UNIT AREA  
LEA COUNTY, NEW MEXICO

THIS AMENDMENT entered into as of the first day of September, 1976, by and between the parties subscribing, ratifying or consenting hereto and herein referred to as the "parties hereto".

WHEREAS, as of April 25, 1973 the Unit Agreement for the Operation of the Grama Ridge-Morrow Unit Area was entered into by and between Llano, Inc. as unit operator and as a working interest owner and by Gulf Oil Corporation and Texaco Inc. as record title owners of oil and gas leases embracing lands in the unit area, which said agreement was approved by the Commissioner of Public Lands of the State of New Mexico, herein referred to as "Commissioner", on August 27, 1973, and

WHEREAS, the original unit agreement covered all of Section 34, Township 21 South, Range 34 East and all of Section 3, Township 22 South, Range 34 East and was entered into for the purpose of formulating and putting into effect a secondary recovery and gas storage project as to the Morrow formation which was unitized under said agreement and which is specifically defined in Section 3 thereof, and

WHEREAS, the unit operator has injected gas into wells located on the unit area which has resulted in a pressure increase in the South Wilson Deep Unit No. 1 gas well producing from the unitized formation located in the NW $\frac{1}{4}$ SE $\frac{1}{4}$  Section 33, Township 21 South, Range 34 East and has likewise resulted in an increase in pressure in the Llano Federal GR-4 No. 1 Morrow gas well located in the SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$  Section 4, Township 22 South, Range 34 East and such communication indicates that said wells are located in the same reservoir as the two gas wells within the unit area, which wells

have been used for the injection and withdrawal of gas pursuant to the terms of said unit agreement, and

WHEREAS, it now appears that the Morrow gas reservoir underlies Sections 33 and 34, Township 21 South, Range 34 East and Sections 3 and 4, Township 22 South, Range 34 East, and

WHEREAS, all of Section 33 is owned by the State of New Mexico except the SW $\frac{1}{4}$ NE $\frac{1}{4}$  of said section which is fee land and the minerals underlying said 40 acres, subject to the existing lease, are owned 32.37% by Don E. Gridley and wife, Alice F. Gridley, John E. Bosserman and wife, Carol Jean Bosserman and 67.63% by The Merchant Livestock Company, and

WHEREAS, all of Section 4, Township 22 South, Range 34 East is federal land and Llano, Inc. has entered into an agreement with the United States, acting by and through the Secretary of the Interior, effective as of November 1, 1975 for the storage of gas in the Morrow formation which is unitized under the terms of said unit agreement. Said gas storage agreement with the United States recognizes that the gas reservoir underlies the 4 sections hereinabove referred to and also provides that all injection and withdrawal fees payable to the United States shall be based upon 1/4 of all gas injected or withdrawn from the reservoir through any wells located on the 4 sections above referred to, and

WHEREAS, it is the purpose of this amendment to expand the unit area to include all of Section 33, Township 21 South, Range 34 East so that the unit agreement, taken into consideration with the gas storage agreement with the United States covering Section 4, will cover the entire reservoir, and

WHEREAS, the unit agreement recognized that there was still some primary gas and liquid hydrocarbons left in the unitized formation when the unit agreement was entered into and said agreement provided for the payment of royalty thereon on a monthly basis beginning in May, 1974 through February, 1979 and the unit operator has agreed to pay in full all royalty payments provided for in Exhibit "C"

attached to the unit agreement, as well as the royalty for the remaining 318,519 MCF of primary gas and the liquid hydrocarbons attributable thereto underlying said Section 33 (15/16 of which is to be allocated to Tract 5 and 1/16 to Tract 6 shown on Exhibit "B") so that Phase I provided for in Section 11(a) of the original agreement will no longer be applicable; and

WHEREAS, the parties are desirous of amending said unit agreement to provide for the same gas injection and withdrawal fees (on an average basis) as are provided under the terms of the gas storage agreement with the United States covering Section 4 as to 1/4 of the gas injected and withdrawn from said reservoir; subject, however, to the right of the unit operator to withdraw gas previously injected from extraneous sources up to and including August 31, 1976 amounting to 6,727,987 MCF at a pressure base of 15.025 psia without payment of withdrawal fees as to any portion thereof withdrawn prior to March 1, 1979.

NOW, THEREFORE, in consideration of the premises, the parties hereby mutually agree that the Unit Agreement for the Operation of the Grama Ridge-Morrow Unit Area shall be and is hereby amended as hereinafter set forth:

1. Section 1 of the unit agreement is amended as follows:

1. UNIT AREA: The following described land is hereby designated and recognized as constituting the unit area:

Township 21 South, Range 34 East, N.M.P.M.  
Section 33 - All  
Section 34 - All  
Township 22 South, Range 34 East, N.M.P.M.  
Section 3 - All  
containing 1,927.16 acres, more or less

Exhibit "A" attached hereto is a map showing the unit area and the boundaries and identity of tracts and leases in said area to the extent known to the unit operator. Exhibit "B" attached hereto is a schedule showing to the extent known to the unit operator the acreage, percentage and kind of ownership of oil and gas interests



in all lands in the unit area. However, nothing herein or in said schedule or map shall be construed as a representation by any party hereto as to the ownership of any interest other than such interest or interests as are shown on said map or schedule as owned by such party. Exhibits "A" and "B" shall be revised by the unit operator whenever changes in ownership in the unit area render such revisions necessary or when requested by the Commissioner.

All land committed to this agreement shall constitute land referred to herein as "unitized land" or "land subject to this agreement".

2. Section 9 of the unit agreement is amended as follows:

9. PURPOSE OF UNIT AND PLAN OF OPERATION: It is recognized and agreed by the parties hereto that the unitized formation as to all of the lands subject to this agreement is reasonably proven to be productive of unitized substances or necessary for unit operations and that the object and purpose of this agreement is to formulate and put into effect a secondary recovery and gas storage project in order to effect the greatest economic recovery of unitized substances, prevent waste and conserve natural resources consistent with good engineering practices expected of a prudent operator. The parties hereto agree that the unit operator may, subject to the approval of a plan of operation by the Commissioner, inject gas produced from lands other than the unit area into the unitized formation through the following wells for secondary recovery and storage purposes:

Shell Oil Company State GRA Well No. 1 - SW $\frac{1}{4}$ NW $\frac{1}{4}$  Section 3  
Township 22 South, Range 34 East (Llano, Inc. operator)

Shell State GRB Well No. - NW $\frac{1}{4}$ SW $\frac{1}{4}$  Section 34, Township 21  
South, Range 34 East (Llano, Inc. operator)

South Wilson Deep Unit No. 1 well - NW $\frac{1}{4}$ SE $\frac{1}{4}$  Section 33,  
Township 21 South, Range 34 East (Llano, Inc. operator)

Llano Federal GR-4 No. 1 Morrow - SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$  Section 4,  
Township 22 South, Range 34 East (Llano, Inc. operator)

Unit operator shall furnish the Commissioner, between the first and twenty-fifth of each month, reports showing the amount of gas produced and injected into the unitized formation for the preceding month.

Unit operator shall have the right to rework or recondition the wells now located on the unit area or to drill additional wells to inject gas into or produce gas from the gas storage reservoir area to the extent that such work shall be approved by the Commissioner as necessary or incident to the rights granted to unit operator pursuant to this agreement. Unit operator shall conduct all operations hereunder in accordance with all applicable laws and regulations and shall comply with all the terms and conditions of the respective leases.

A plan of operation shall be filed with the Commissioner concurrently with the filing of this unit agreement for final approval. Said plan of operation and all revisions thereof shall be as complete and adequate as the Commissioner may determine to be necessary in connection with operations hereunder. Upon approval of this agreement and the aforementioned plan of operation by the Commissioner, said plan and all subsequently approved plans shall constitute the operating obligations of the unit operator under this agreement for the period specified in the plan. Thereafter, from time to time before the expiration of any existing plan, the unit operator shall submit for approval a plan for an additional specified period of operation. Reasonable diligence shall be exercised in complying with the obligations of the approved plan of operation. The unit operator shall furnish to the Commissioner, within 30 days from the expiration of each 6 month period, a report giving full factual information as to the manner in which the plan in effect for such period has been carried out.

If the unit operator should fail to comply with any approved plan of operation or supplement to or modification thereof, this

agreement may be terminated by the Commissioner; provided, however, the Commissioner shall give notice to the unit operator and the lessees of record in the manner prescribed by Section 7-11-14 N.M.S.A. 1953 of intention to cancel because of any alleged breach of said plan of operation and any decision entered therein shall be subject to appeal in the manner prescribed by Section 7-11-17 N.M.S.A. 1953; and provided, further, in any event unit operator shall be given a reasonable opportunity after a final determination within which to remedy said default, failing in which this agreement shall be terminated.

3. Section 10 of the unit agreement is amended as follows:

10. TRACT PARTICIPATION: For the purposes of this agreement "extraneous gas" shall mean the total amount of gas from other sources injected into the reservoir less the amount which has been withdrawn. Any gas produced in excess of the extraneous gas injected prior to or after the effective date hereof shall be considered as "indigenous gas". All such indigenous gas shall be apportioned to the tracts within the unit area in the proportions set forth on Exhibit "B" attached hereto, which is based on the percentage that the acreage covered by each tract bears to the total acreage within the unit area. Royalties shall be paid to the State of New Mexico at the rates provided in the respective leases on all indigenous gas allocated to such tracts.

4. Section 11 of the unit agreement shall be amended as follows:

11. GAS STORAGE -- STORAGE, INJECTION AND WITHDRAWAL FEES:

A. Gas Storage: It is contemplated that the extraneous gas which has been injected will be withdrawn from time to time. Unit operator shall be under no obligation to inject or withdraw any particular quantity of gas other than such as it in its sole discretion deems advisable. Unit operator shall install

and at all times operate and maintain metering equipment and other facilities approved by the Commissioner so that an accurate cumulative account can be kept of the quantity of gas, as well as the total number of British Thermal Units in the gas, injected into the unitized formation through the existing wells. Operator shall also keep an accurate cumulative account of the total number of British Thermal Units in all gas withdrawn from the unitized formation.

Operator shall also install, operate and maintain at all times the necessary separation equipment to separate the gas from the liquid hydrocarbons produced in connection with the withdrawal of gas from the respective wells, as well as all other related equipment which may be required to transfer all liquids so separated.

Operator shall cause monthly analyses by chromatograph or other mutually acceptable method of all gas injected into or withdrawn from the reservoir in order to compute the net change in British Thermal Unit content.

Operator shall pay royalties at the rates provided in the respective leases on 3/4 of all liquid hydrocarbons which are separated from the gas withdrawn and allocated to the respective tracts in accordance with the percentages of participation set forth on Exhibit "B"; provided, however, operator shall not be required to pay royalties on that portion of all liquid hydrocarbons which are separated from the first 318,519 MCF of gas withdrawn subsequent to the effective date of this amendment as payment for such liquid hydrocarbons has been included in the payment for the remaining primary gas underlying said Section 33 referred to in the preamble to this amendment. In addition, should the total cumulative British Thermal Units in the gas withdrawn exceed the total British Thermal Units in the gas injected, then operator shall pay royalties on said increase

in British Thermal Units at the prevailing market price in Lea County, New Mexico for gas of like quality. Payment for British Thermal Unit enrichment as set forth herein shall be made on an annual basis as determined by the cumulative chromatograph analyses.

B. Storage, Injection and Withdrawal Fees: In addition to the rental provided in the leases covering the respective tracts, for each year after the effective date of this amendment, unit operator shall pay an annual storage fee of \$1.00 per acre for the number of surface acres owned by the respective surface owners as shown on Exhibit "C" attached hereto. Said storage fee shall be paid in advance during the month of September of each year.

As to all gas injected or withdrawn subsequent to the effective date of this amendment, unit operator shall pay to the State of New Mexico an injection fee equal to  $47/64$  of \$.00625 per MCF and a withdrawal fee equal to  $47/64$  of \$.00625 per MCF on all gas injected or withdrawn from the reservoir through any wells located on the unit area or on Section 4, Township 22 South, Range 34 East during each calendar month; provided, however, no withdrawal fees shall be required on 6,727,987 MCF at 15.025 psia for gas injected prior to the effective date of this amendment if said gas is withdrawn prior to March 1, 1979.  $1/64$  of said injection and withdrawal fees on all of the gas shall be paid to Don E. Gridley and wife, Alice F. Gridley, John E. Bosserman and wife, Carol Jean Bosserman, and The Merchant Livestock Company in the proportions owned by said parties. All injection and withdrawal fees shall be paid during the month following the month in which injection or withdrawals are made.

5. Section 16 of the unit agreement is amended as follows:

16. EFFECTIVE DATE AND TERM: This amendment shall become effective as of September 1, 1976 upon approval by the Commissioner

and shall remain in effect so long as unitized substances are being produced from or stored within the unitized formation. The unit agreement may be terminated at any time by not less than seventy-five (75%) percent on an acreage basis of the owners of working interests signatory hereto with the approval of the Commissioner.

6. Section 22 of the unit agreement is amended as follows:

22. RE-NEGOTIATION OF INJECTION AND WITHDRAWAL FEES:

The injection and withdrawal fees provided for in Section 11 hereof shall be effective for a period of 5 years from the effective date of this amendment; provided, however, that during the 4th year of the first 5 year period and during the 4th year of each successive 5 year period this agreement is in force and effect said fees shall be subject to re-negotiation between the parties hereto so that said fees will be commensurate with fees being paid on similar projects, such re-negotiated rate to be in effect for the succeeding 5 year period. If the parties hereto are unable to agree to re-negotiate new fees 60 days prior to the expiration of the 4th year of any 5 year period, payment of the fees on the basis of prior rates shall continue and this agreement shall terminate upon expiration of not more than 3 years from the expiration of the preceding 5 year period. During said 3 year period the parties hereto may remove the metered and injected gas not previously withdrawn and equipment and facilities installed under this agreement, unless during such 3 year period the parties hereto agree upon a re-negotiated rate to be effective retroactively. Any gas or facilities not then removed by the termination date shall become the property of the State of New Mexico if it so elects.

7. COMMITMENT OF INTERESTS TO UNIT AND RATIFICATION OF OTHER UNIT PROVISIONS: By the execution of this amendment, the parties hereto commit to the unit agreement their respective interests of whatsoever kind, nature or description in and to the unitized forma-

tion underlying the unit area. Except as amended herein, all of the other terms and conditions of the original Unit Agreement for the Operation of the Grama Ridge-Morrow Unit Area shall remain in full force and effect and are ratified and confirmed by the parties or by those consenting hereto by separate instrument.

8. COUNTERPARTS: This amendment may be executed in any number of counterparts, no one of which needs to be executed by all parties, or may be ratified or consented to by separate instrument in writing specifically referring hereto, and shall be binding upon all those parties who have executed such a counterpart, ratification or consent hereto with the same force and effect as if all such parties had signed the same document and regardless of whether or not it is executed by all other parties owning or claiming an interest in the lands within the above described unit area.

IN WITNESS WHEREOF, the undersigned parties have caused this agreement to be executed as of the respective dates set opposite

their signatures.

ATTEST:

*[Signature]*  
Secretary-Treasurer  
Date: 12-16-76

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

*[Signature]* LIANO, INC.

By *[Signature]* President

Address: P. O. Box 1320  
Hobbs, New Mexico 88240

GULF OIL CORPORATION

By \_\_\_\_\_ President

Address: \_\_\_\_\_

TEXACO INC.

By \_\_\_\_\_ President

Address: \_\_\_\_\_

WILSON OIL COMPANY

By \_\_\_\_\_ President

Address: \_\_\_\_\_

tion underlying the unit area. Except as amended herein, all of the other terms and conditions of the original Unit Agreement for the Operation of the Grama Ridge-Morrow Unit Area shall remain in full force and effect and are ratified and confirmed by the parties or by those consenting hereto by separate instrument.

8. COUNTERPARTS: This amendment may be executed in any number of counterparts, no one of which needs to be executed by all parties, or may be ratified or consented to by separate instrument in writing specifically referring hereto, and shall be binding upon all those parties who have executed such a counterpart, ratification or consent hereto with the same force and effect as if all such parties had signed the same document and regardless of whether or not it is executed by all other parties owning or claiming an interest in the lands within the above described unit area.

IN WITNESS WHEREOF, the undersigned parties have caused this agreement to be executed as of the respective dates set opposite their signatures.

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

C. E. Sullivan  
Asst. Secretary  
Date: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

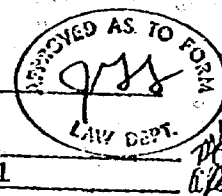
\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

LLANO, INC.

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_  
\_\_\_\_\_

GULF OIL CORPORATION

By R. E. Johnson  
Attorney-in-fact  
Address: P. O. Box 1150  
Midland, Texas 79701



TEXACO INC.

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_  
\_\_\_\_\_

WILSON OIL COMPANY

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_  
\_\_\_\_\_



tion underlying the unit area. Except as amended herein, all of the other terms and conditions of the original Unit Agreement for the Operation of the Grama Ridge-Morrow Unit Area shall remain in full force and effect and are ratified and confirmed by the parties or by those consenting hereto by separate instrument.

8. COUNTERPARTS: This amendment may be executed in any number of counterparts, no one of which needs to be executed by all parties, or may be ratified or consented to by separate instrument in writing specifically referring hereto, and shall be binding upon all those parties who have executed such a counterpart, ratification or consent hereto with the same force and effect as if all such parties had signed the same document and regardless of whether or not it is executed by all other parties owning or claiming an interest in the lands within the above described unit area.

IN WITNESS WHEREOF, the undersigned parties have caused this agreement to be executed as of the respective dates set opposite their signatures.

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

APPROVED:

Terms: OK  
Form: 51  
Date: NOVEMBER 5, 1976

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

LLANO, INC.

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_

GULF OIL CORPORATION

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_

TEXACO INC.

By A. F. Clarke  
Attorney-in-Fact  
Address: Box 3109  
Midland, Texas 79701

WILSON OIL COMPANY

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_

tion underlying the unit area. Except as amended herein, all of the other terms and conditions of the original Unit Agreement for the Operation of the Grama Ridge-Morrow Unit Area shall remain in full force and effect and are ratified and confirmed by the parties or by those consenting hereto by separate instrument.

8. COUNTERPARTS: This amendment may be executed in any number of counterparts, no one of which needs to be executed by all parties, or may be ratified or consented to by separate instrument in writing specifically referring hereto, and shall be binding upon all those parties who have executed such a counterpart, ratification or consent hereto with the same force and effect as if all such parties had signed the same document and regardless of whether or not it is executed by all other parties owning or claiming an interest in the lands within the above described unit area.

IN WITNESS WHEREOF, the undersigned parties have caused this agreement to be executed as of the respective dates set opposite their signatures.

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary  
Date: \_\_\_\_\_

ATTEST:

Francis Wilson  
Secretary  
Date: 29 Nov 76

LLANO, INC.

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_

GULF OIL CORPORATION

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_

TEXACO INC.

By \_\_\_\_\_  
President  
Address: \_\_\_\_\_

WILSON OIL COMPANY

By Francis Wilson  
President  
Address: P.O. Box 1297  
Santa Fe, New Mexico 87501

Date: December 2, 1976

FRANCES P. BOLTON, dba WYOMING OIL COMPANY  
Address: Frances P Bolton  
810 Hanna Building  
Cleveland, Ohio 44115  
NEW MEXICO ELECTRIC SERVICE COMPANY

ATTEST:

\_\_\_\_\_  
Secretary

By \_\_\_\_\_  
President

Address: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary

TUCO, INC.

By \_\_\_\_\_  
President

Address: \_\_\_\_\_

STATE OF NEW MEXICO )  
COUNTY OF LEA ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
President of Llano, Inc., a New Mexico corporation, on behalf of  
said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Gulf Oil Corporation, a Pennsylvania corpora-  
tion, on behalf of said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Texaco Inc. a Delaware corporation, on behalf  
of said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Date: \_\_\_\_\_

ATTEST:

Robert M. Wright  
Secretary

ATTEST:

\_\_\_\_\_  
Secretary

FRANCES P. BOLTON, dba WYOMING OIL  
COMPANY  
Address: \_\_\_\_\_

NEW MEXICO ELECTRIC SERVICE COMPANY

By [Signature]  
President

Address: P. O. Box 920  
Hobbs, New Mexico 88240

TUCO, INC.

By \_\_\_\_\_  
President

Address: \_\_\_\_\_

STATE OF NEW MEXICO )  
COUNTY OF LEA ) : ss

The foregoing instrument was acknowledged before me this 16  
day of December 1976 by Donald L. Daray  
President of Llano, Inc., a New Mexico corporation, on behalf of  
said corporation.

My Commission Expires:  
3-20-80

Anna L. Clark  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Gulf Oil Corporation, a Pennsylvania corpora-  
tion, on behalf of said corporation.

My Commission Expires:

\_\_\_\_\_  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Texaco Inc. a Delaware corporation, on behalf  
of said corporation.

My Commission Expires:

\_\_\_\_\_  
Notary Public

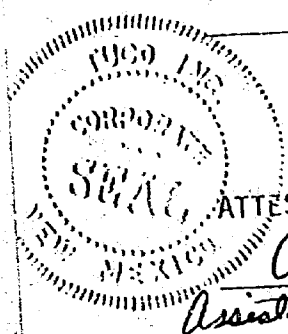
Date: \_\_\_\_\_

FRANCES P. BOLTON, dba WYOMING OIL  
COMPANY  
Address: \_\_\_\_\_

ATTEST:

NEW MEXICO ELECTRIC SERVICE COMPANY  
By \_\_\_\_\_  
President

Address: \_\_\_\_\_



ATTEST:  
Coyt Webb  
Assistant Secretary

TUCO, INC.

By Carroll O. Berman  
President

Address: P. O. Box 1261  
Amarillo, Texas 79170

STATE OF NEW MEXICO )  
COUNTY OF LEA ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
President of Llano, Inc., a New Mexico corporation, on behalf of  
said corporation.

My Commission Expires: \_\_\_\_\_ Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Gulf Oil Corporation, a Pennsylvania corpora-  
tion, on behalf of said corporation.

My Commission Expires: \_\_\_\_\_ Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Texaco Inc. a Delaware corporation, on behalf  
of said corporation.

My Commission Expires: \_\_\_\_\_ Notary Public

Date: \_\_\_\_\_

FRANCES P. BOLTON, dba WYOMING OIL  
COMPANY  
Address: \_\_\_\_\_

ATTEST:

NEW MEXICO ELECTRIC SERVICE COMPANY

\_\_\_\_\_  
Secretary

By \_\_\_\_\_  
President

Address: \_\_\_\_\_  
\_\_\_\_\_

ATTEST:

TUCO, INC.

\_\_\_\_\_  
Secretary

By \_\_\_\_\_  
President

Address: \_\_\_\_\_  
\_\_\_\_\_

STATE OF NEW MEXICO )  
                              : ss  
COUNTY OF LEA )

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
President of Llano, Inc., a New Mexico corporation, on behalf of  
said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

STATE OF Texas )  
                              : ss  
COUNTY OF MIDLAND )

The foregoing instrument was acknowledged before me this 16  
day of November 1976 by R. E. GALVIN  
~~Secretary-in-Fact~~ of Gulf Oil Corporation, a Pennsylvania corpora-  
tion, on behalf of said corporation.

My Commission Expires:  
6-1-77

Emily Jones  
Notary Public

STATE OF \_\_\_\_\_ )  
                              : ss  
COUNTY OF \_\_\_\_\_ )

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Texaco Inc. a Delaware corporation, on behalf  
of said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Date: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Secretary

ATTEST:

\_\_\_\_\_  
Secretary

STATE OF NEW MEXICO )  
COUNTY OF LEA ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
President of Llano, Inc., a New Mexico corporation, on behalf of  
said corporation.

My Commission Expires: \_\_\_\_\_

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Gulf Oil Corporation, a Pennsylvania corpora-  
tion, on behalf of said corporation.

My Commission Expires: \_\_\_\_\_

STATE OF TEXAS )  
COUNTY OF MIDLAND ) ss

The foregoing instrument was acknowledged before me this 5<sup>th</sup>  
day of November 1976 by G. F. CLARK  
Attorney-in-Fact of Texaco Inc. a Delaware corporation, on behalf  
of said corporation.

My Commission Expires: June 1, 1977

FRANCES P. BOLTON, dba WYOMING OIL  
COMPANY  
Address: \_\_\_\_\_

NEW MEXICO ELECTRIC SERVICE COMPANY

By \_\_\_\_\_  
President

Address: \_\_\_\_\_

TUCO, INC.

By \_\_\_\_\_  
President

Address: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

\_\_\_\_\_  
Notary Public

Martha Fincher Martha Fincher  
Notary Public in and for  
Midland County, Texas

STATE OF NEW MEXICO )  
COUNTY OF Santa Fe ) ss

The foregoing instrument was acknowledged before me this 29th  
day of November 1976 by PARKER WILSON  
President of Wilson Oil Company, a New Mexico corporation,  
on behalf of said corporation.

My Commission Expires:  
July 12, 1980

Ernestine Argente  
Notary Public  
NEW MEXICO

✓ STATE OF Ohio )  
COUNTY OF Cuyahoga ) ss

The foregoing instrument was acknowledged before me this 3rd  
day of December 1976 by Frances P. Bolton, dba Wyoming Oil Company,

My Commission Expires:  
May 8, 1978

Mary Jane Patrick  
Notary Public  
My commission expires May 8, 1978  
For Cuyahoga County, Ohio  
MARY JANE PATRICK, Notary Public

STATE OF NEW MEXICO )  
COUNTY OF LEA ) ss

The foregoing instrument was acknowledged before me this  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of New Mexico Electric Service Company, a New Mexico cor-  
poration, on behalf of said corporation.

My Commission Expires:

\_\_\_\_\_  
Notary Public

STATE OF NEW MEXICO )  
COUNTY OF \_\_\_\_\_ ) ss

The foregoing instrument was acknowledged before me this  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of TUCO, INC., a New Mexico corporation, on behalf of  
said corporation.

My Commission Expires:

\_\_\_\_\_  
Notary Public



STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of Wilson Oil Company, a \_\_\_\_\_ corporation,  
on behalf of said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by Frances P. Bolton, dba Wyoming Oil Company,

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

STATE OF NEW MEXICO )  
COUNTY OF LEA ) : ss

The foregoing instrument was acknowledged before me this 19th  
day of October 1976 by J. F Maddox, President  
of New Mexico Electric Service Company, a New Mexico cor-  
poration, on behalf of said corporation.

My Commission Expires:  
December 6, 1979

*Barbara Legg*  
\_\_\_\_\_  
Notary Public

STATE OF NEW MEXICO )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_  
day of \_\_\_\_\_ 1976 by \_\_\_\_\_  
of TUCO, Inc., a New Mexico corporation, on behalf of  
said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : SS

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_ 1976 by \_\_\_\_\_ of Wilson Oil Company, a \_\_\_\_\_ corporation, on behalf of said corporation.

My Commission Expires: \_\_\_\_\_  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : SS

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_ 1976 by Frances P. Bolton, dba Wyoming Oil Company,

My Commission Expires: \_\_\_\_\_  
Notary Public

STATE OF NEW MEXICO )  
COUNTY OF \_\_\_\_\_ ) : SS

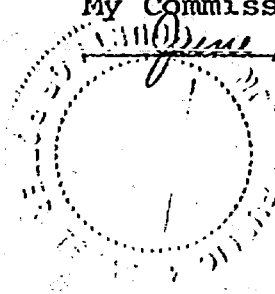
The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_ 1976 by \_\_\_\_\_ of New Mexico Electric Service Company, a New Mexico corporation, on behalf of said corporation.

My Commission Expires: \_\_\_\_\_  
Notary Public

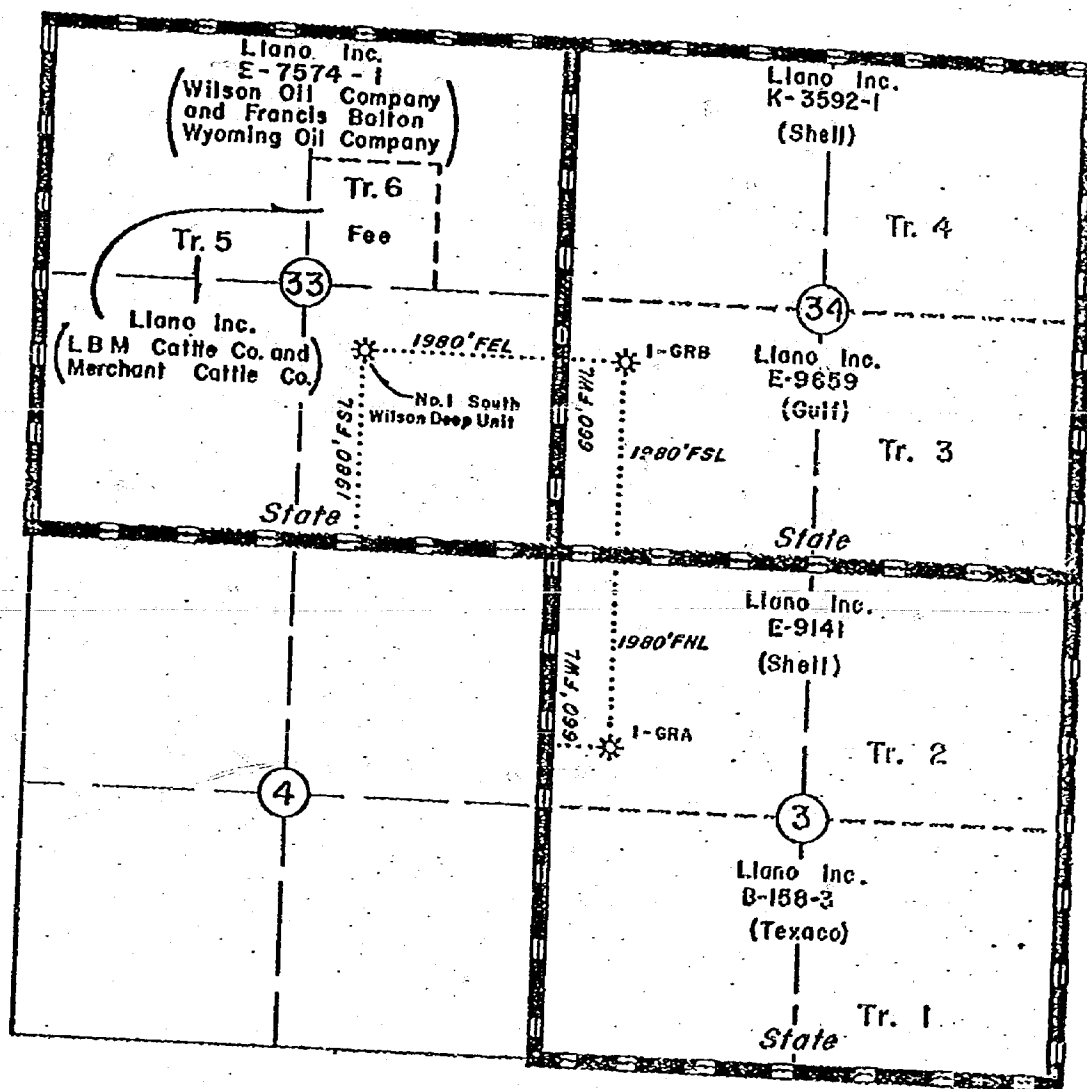
STATE OF <sup>Texas</sup> ~~NEW MEXICO~~ )  
COUNTY OF Potter ) : SS

The foregoing instrument was acknowledged before me this 8th day of December 1976 by Carroll A. Pearson, President of TUCO, Inc., a New Mexico corporation, on behalf of said corporation.

My Commission Expires: June 1, 1977  
Gulen Birtoul  
Notary Public



R 34 E



T21S

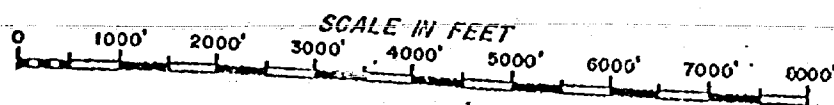
T22S

# EXHIBIT "A"

LLANO, INC.

GRAMA RIDGE MORROW UNIT  
Lea County, New Mexico

UNIT OWNERSHIP MAP



**EXHIBIT "B"**  
**GRAMA RIDGE-MORROW UNIT AGREEMENT**

Tract No.	Description	No. Surface Acres	Lease No.	Basic Royalty	Lessee of Record	Overriding Royalty	Working Int. Owner and Percentage	Percentage Tract Participation
1	S $\frac{1}{4}$ Sec. 3, T. 22 S., R. 34 E.	320.00	B-158-3	12 $\frac{1}{2}$ %	Texaco Inc.	None	*New Mexico Electric Ser- vice Co. 40% TUCO INC. 40% Llano, Inc. 20%	16,60475
2	N $\frac{1}{2}$ Sec. 3, T. 22 S., R. 34 E.	327.16	E-9141	12 $\frac{1}{2}$ %	Llano, Inc.	None	New Mexico Electric Ser- vice Co. 40% TUCO INC. 40% Llano, Inc. 20	16.97627
3	S $\frac{1}{4}$ Sec. 34, T. 21 S., R. 34 E.	320.00	E-9659	12 $\frac{1}{2}$ %	Gulf Oil Corp.	None	**New Mexico Electric Ser- vice Co. 40% TUCO INC. 40% Llano, Inc. 20%	16.60475
4	N $\frac{1}{2}$ Sec. 34, T. 21 S., R. 34 E.	320.00	K-3592-1	12 $\frac{1}{2}$ %	Llano, Inc.	None	New Mexico Electric Ser- vice Co. 40% TUCO INC. 40% Llano, Inc. 20%	16.60475

**EXHIBIT "B"**  
**GRAMA RIDGE-MORROW UNIT AGREEMENT**

Tract No.	Description	No. Surface Acres	Lease No.	Basic Royalty	Lessee of Record	Overriding Royalty	Working Int. Owner and Percentage	Percentage Tract Participation
5	S $\frac{1}{2}$ , NW $\frac{1}{4}$ , N $\frac{1}{2}$ NE $\frac{1}{4}$ , SE $\frac{1}{2}$ NE $\frac{1}{4}$ Sec. 33, T. 21 S., R. 34 E.	600.00	E-7574-1	12 $\frac{1}{2}$ %	Wilson Oil Co. and Frances P. Bolton, dba Wyoming Oil Co.	Amoco Production Co. - .0102041 Myles A. Colligan .0005102 Estelle L. Lake .0004081 F. W. Lake .0002041 Mary E. Lake .0002041 M. A. Machris .0032653 C. L. Milburn .0005102 Wilson Oil Co. .0081314 Frances P. Bolton dba Wyoming Oil Co. .0081314 Llano, Inc. .0280611	***New Mexico Electric Service Co. 40% TUCO INC. 40% Llano, Inc. 20%	31.13389
6	SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 33, T. 21 S., R. 34 E.	40.00		<p>The Merchant Livestock Company - 67.63% of 12<math>\frac{1}{2}</math>% Don E. Gridley and wife and John E. Bosserman and wife - 32.37% of 12<math>\frac{1}{2}</math>%</p> <p>Fee</p>	Wilson Oil Co. and Frances P. Bolton, dba Wyoming Oil Co.	Amoco Production Co. - .0102041. Myles A. Colligan .0005102 Estelle L. Lake .0004081 F. W. Lake .0002041 Mary E. Lake .0002041 M. A. Machris .0032653 C. L. Milburn .0005102	New Mexico Electric Service Co. 40% TUCO INC. 40% Llano, Inc. 20%	2.07559

**EXHIBIT "B"**  
**GRAMA RIDGE-MORROW UNIT AGREEMENT**

Tract No.	Description	No. Surface Acres	Lease No.	Basic Royalty	Lessee of Record	Overriding Royalty	Working Int. Owner and Percentage	Percentage Tract Participation
						Wilson Oil Co. .0081314 Frances P. Bolton dba Wyoming Oil Co. .0081314 Llano, Inc. .0280611		
Total		1,927.16						100.0000

\* Rights within vertical limits of the Morrow Sand formation between 12,720 and 13,257 feet.  
 \*\* From the surface to the top of the Silurian.  
 \*\*\* From 5,200 to 13,503 feet.

# EXHIBIT "C"

Description	Surface Ownership	Acreage	Rental
W½E½ Section 33, S½S½ Section 34, Township 21 South, Range 34 East	The Merchant Livestock Company	320.00	\$ 320.00
W½, E½E½ Section 33, N½, N½S½ Section 34, Township 21 South, Range 34 East	State of New Mexico	960.00	960.00
All Section 3, Township 22 South, Range 34 East	State of New Mexico	647.16	<u>647.16</u>
			\$1927.16

CONSENT AND RATIFICATION OF  
GRAMA RIDGE-MORROW UNIT AGREEMENT  
AND AMENDMENT THERETO  
LEA COUNTY, NEW MEXICO.

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, the undersigned, Don E. Gridley and wife, Alice F. Gridley, John E. Bosserman and wife, Carol Jean Bosserman, and The Merchant Livestock Company (hereinafter referred to as "parties hereto") are the owners of all the oil, gas and other minerals in and under and that may be produced from the SW $\frac{1}{4}$ NE $\frac{1}{4}$  Section 33, Township 21 South, Range 34 East, N.M.P.M. Lea County, New Mexico, subject to an oil and gas lease dated April 3, 1959 made by The Merchant Livestock Company to Wilson Oil Company, which lease was recorded in Book 175 at page 7 of the records in the office of the County Clerk of Lea County, and

WHEREAS, as of April 25, 1973 a unit agreement was made and entered into for the operation of the Grama Ridge-Morrow Unit Area Lea County, New Mexico covering all of Section 34, Township 21 South, Range 34 East and all of Section 3, Township 22 South, Range 34 East, which are lands of the State of New Mexico, by and between the owners of the oil and gas leases covering said lands, which unit agreement was approved by the Commissioner of Public Lands of the State of New Mexico on August 27, 1973, and

WHEREAS, said unit agreement covers only the Morrow formation as defined in said unit agreement, and

WHEREAS, the owners of the oil and gas leases covering the unitized formation covered by the above unit agreement and the owners of oil and gas leases covering Section 33, Township 21 South, Range 34 East as of September 1, 1976 entered into an amendment to said unit agreement so as to include within the unit area and make subject to all of the terms and conditions of said unit agreement all of



said Section 33 as to the unitized formation, and

WHEREAS, the parties hereto acknowledge receipt of a true and correct copy of said unit agreement and amendment thereto and are desirous of consenting thereto and ratifying the same.

NOW, THEREFORE, the parties hereto, for the purpose of committing all of their mineral interests in and to the SW $\frac{1}{4}$ NE $\frac{1}{4}$  Section 33, Township 21 South, Range 34 East and all rights in connection therewith to said unit agreement and amendment thereto insofar as the unitized formation is concerned, do hereby consent to and ratify said unit agreement and amendment thereto exactly the same as if each of the undersigned parties had executed the original agreements.

IN WITNESS WHEREOF, this consent and ratification is executed by the undersigned parties as of the dates indicated opposite their respective signatures.

Date: \_\_\_\_\_

Don E. Gridley

Date: \_\_\_\_\_

Alice F. Gridley

Date: \_\_\_\_\_

John E. Bosserman

Date: \_\_\_\_\_

Carol Jean Bosserman

ATTEST:

*Ruth P. Saunders*  
Secretary

THE MERCHANT LIVESTOCK COMPANY

By

*J. D. Merchant Jr.*  
President

Date: 11/15/76

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_ 1976 by Don E. Gridley and wife, Alice F. Gridley.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_ 1976 by John E. Bosserman and wife, Carol Jean Bosserman.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

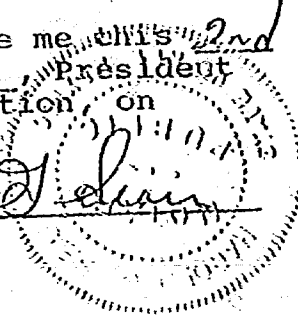
STATE OF New Mexico )  
COUNTY OF Eddy ) : ss

The foregoing instrument was acknowledged before me this 2nd day of November 1976 by J.D. Merchant, President of The Merchant Livestock Company, a New Mexico corporation, on behalf of said corporation.

My Commission Expires: \_\_\_\_\_

June 10, 1980

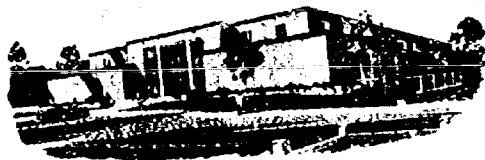
David D. Harris  
Notary Public





PHIL R. LUCERO  
COMMISSIONER

State of New Mexico



Commissioner of Public Lands

February 22, 1978

RECEIVED  
FEB 23 1978

Oil Conservation Commission

P. O. BOX 1148  
SANTA FE, NEW MEXICO 87501

Llano, Inc.  
P. O. Drawer 1320  
Hobbs, New Mexico 88240

Re: Grama Ridge Morrow Unit  
Lee County, New Mexico

ATTENTION: Mr. G. W. Edwards

Gentlemen:

We are in receipt of two copies of the Plan of Operation-  
Progress Report No. 9 for the Grama Ridge Morrow Unit, Lee County,  
New Mexico.

Such report has been accepted by this office. We note that  
you have changed the well names to include the word "Com". Since  
this area has now been unitized and there is no communitization  
agreements in effect, the word Com must be dropped, and we suggest  
that you use the word "Unit" in your well names.

The New Mexico Oil Conservation Commission also concurs that you  
can not use the word com in your well names at this time.

You are hereby advised to make this change effective February 1,  
1978.

Very truly yours,

PHIL R. LUCERO  
COMMISSIONER OF PUBLIC LANDS

BY:  
RAY D. GRAHAM, Director  
Oil and Gas Division

PRL/RDG/s  
cc:

OCC-Santa Fe, New Mexico ✓

**LLANO, INC.**

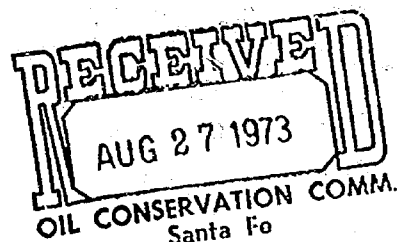
PHONE 393-2153

P. O. DRAWER 1320

HOBBS, NEW MEXICO 88240

D. L. GAREY, VICE PRESIDENT  
PLANNING AND DEVELOPMENT

4895  
August 22, 1973



Oil Conservation Commission  
P. O. Box 2088  
Santa Fe, New Mexico 87501

Attention: Mr. Pete Porter

Re: Grama Ridge Morrow  
Unit Agreement

Dear Mr. Porter:

Please find enclosed an original executed copy of the subject Agreement for your approval and files. We have also forwarded two original copies of the Agreement to the Commissioner of Public Lands.

You will note Llano, Inc. is now the lessee of record of the properties previously owned by Shell Oil Company.

Very truly yours,

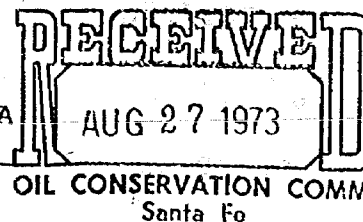
*Donald L. Garey*  
Donald L. Garey

DLG/zs

Enc: 1

cc: R. F. Montgomery

UNIT AGREEMENT  
FOR THE OPERATION OF THE  
GRAMA RIDGE MORROW UNIT AREA  
LEA COUNTY, NEW MEXICO



THIS AGREEMENT entered into as of the 25th day of April, 1973 by and between the parties subscribing, ratifying or consenting hereto, and herein referred to as the "parties hereto".

WITNESSETH:

WHEREAS, the parties hereto are the owners of working, royalty or other oil or gas interests in the unit area subject to this agreement; and

WHEREAS, the Commissioner of Public Lands of the State of New Mexico (hereinafter referred to as "Commissioner") is authorized by law to consent to and approve the operation of state lands under agreements made by lessees of state lands jointly or severally with other lessees where such agreements provide for the unit operation of part of or all of any oil or gas pool, field or area (Section 7-11-39, 7-11-40 N.M.S.A. 1953 Comp.); and

WHEREAS, the Commissioner of Public Lands of the State of New Mexico is authorized by law to amend with the approval of lessee, evidenced by lessee's execution of such agreement or otherwise, any oil and gas lease embracing state lands so that the length of the term of said lease may coincide with the term of such agreement for the unit operation of part or all of any oil or gas pool, field or area (Section 7-11-41 N.M.S.A. 1953 Comp.); and

WHEREAS, the Oil Conservation Commission of the State of New Mexico (hereinafter referred to as "Commission") is authorized by law to approve this agreement and the conservation provisions thereof (Art. 3, Chap. 65, Vol. 9, Part 2 N.M.S.A. 1953 Comp.); and

WHEREAS, the parties hereto hold sufficient interest in the Grama Ridge Morrow Unit Area covering the lands hereinafter described

to give reasonably effective control of operations therein; and

WHEREAS, it is the purpose of the parties hereto to conserve natural resources, prevent waste, store gas and secure other benefits obtainable through development and operation of the area subject to this agreement under the terms and conditions and limitations herein set forth.

NOW, THEREFORE, in consideration of the premises and the promises herein contained, the parties hereto commit to this agreement their respective interests in the below defined unit area, and agree severally among themselves as follows:

1. UNIT AREA: The following described land is hereby designated and recognized as constituting the unit area:

Township 21 South, Range 34 East, N.M.P.M.

Section 34 - All

Township 22 South, Range 34 East, N.M.P.M.

Section 3 - All

containing 1287.16 acres, more or less.

Exhibit "A" attached hereto is a map showing the unit area and the boundaries and identity of tracts and leases in said area to the extent known to the unit operator. Exhibit "B" attached hereto is a schedule showing to the extent known to the unit operator the acreage, percentage and kind of ownership of oil and gas interests in all lands in the unit area. However, nothing herein or in said schedule or map shall be construed as a representation by any party hereto as to the ownership of any interest other than such interest or interests as are shown on said map or schedule as owned by such party. Exhibits "A" and "B" shall be revised by the unit operator whenever changes in ownership in the unit area render such revisions necessary or when requested by the Commissioner.

All land committed to this agreement shall constitute land referred to herein as "unitized land" or "land subject to this agreement".

2. UNITIZED SUBSTANCES: All oil, gas, natural gasoline and associated fluid hydrocarbons in the unitized formation as hereinafter defined are unitized under the terms of this agreement and herein are called unitized substances.

3. UNITIZED FORMATION: That subsurface portion of the unit area commonly known as the Morrow sands which is the same zone as the top and bottom of which were encountered at log depths of 12,722 feet and 13,208 feet in the Shell Oil Company State GRA Well No. 1 as shown on the Schlumberger Sonic Log - Gamma Ray Log of said well dated July 5, 1965, which said well is located 1980 feet from the North line and 660 feet from the west line of Section 3, Township 22 South, Range 34 East, is unitized under this agreement and is hereinafter referred to as the "unitized formation".

4. UNIT OPERATOR: Llano, Inc. with offices at Hobbs, New Mexico (P.O. Drawer 1320) is hereby designated as unit operator and by signature hereto commits to this agreement all interest in unitized substances vested in it as set forth on Exhibit "B" and agrees and consents to accept the duties and obligations of unit operator for the operation of the Grama Ridge Morrow Unit Area. Whenever reference is made herein to the unit operator, such reference means the unit operator acting in that capacity and not as an owner of interests in unitized substances, and the term "working interest owner" when used herein shall include or refer to unit operator as the owner of a working interest when such interest is owned by it.

5. RESIGNATION OR REMOVAL OF UNIT OPERATOR: Unit operator shall have the right to resign at any time, but such resignation shall not become effective until a successor unit operator has been selected and approved in the manner provided for in Section 6 of this agreement. The resignation of the unit operator shall not release the unit operator from any liability or any default by it hereunder occurring prior to the effective date of its resignation.

Unit operator may, upon default or failure in the performance of its duties or obligations hereunder, be subject to removal by the same percentage vote of the owners of working interests determined in like manner as herein provided for the selection of a new unit operator. Such removal shall be effective upon notice thereof to the Commissioner.

The resignation or removal of the unit operator under this agreement shall not terminate his right, title or interest as the owner of a working interest or other interest in unitized substances, but upon the resignation or removal of unit operator becoming effective, such unit operator shall deliver possession of all equipment, materials and appurtenances used in conducting the unit operations and owned by the working interest owners to the new duly qualified successor unit operator, or to the owners thereof if no such new unit operator is elected, to be used for the purpose of conducting unit operations hereunder. Nothing herein shall be construed as authorizing removal of any material, equipment and appurtenances needed for the preservation of any wells.

6. SUCCESSOR UNIT OPERATOR: Whenever the unit operator shall resign as unit operator or shall be removed as hereinabove provided, the owners of the working interests according to their respective acreage interests in all unitized land shall by a majority vote select a successor unit operator; provided that, if a majority but less than seventy-five percent (75%) of the working interests qualified to vote is owned by one party to this agreement, a concurring vote of sufficient additional parties, so as to constitute in the aggregate not less than seventy-five percent (75%) of the total working interests, shall be required to select a new operator. Such selection shall not become effective until (a) a unit operator so selected shall accept in writing the duties and responsibilities of



unit operator, and (b) the selection shall have been approved by the Commissioner. If no successor unit operator is selected and qualified as herein provided, the Commissioner at his election may declare this unit agreement terminated.

7. ACCOUNTING PROVISIONS: The unit operator shall pay all costs and expenses incurred in conducting unit operations hereunder. In the event the ownership of the unitized formation should hereafter be divided or owned in whole or in part by parties other than unit operator, from and after such time unit operator shall pay in the first instance all costs and expenses incurred in conducting unit operations hereunder, and such costs and expenses and the working interest benefits accruing hereunder shall be apportioned among the owners of the unitized working interests in accordance with an operating agreement entered into by and between the unit operator and the owners of such interests, whether one or more, separately or collectively. Any agreement or agreements entered into between the working interest owners and the unit operator as provided in this section, whether one or more, are herein referred to as the "Operating Agreement". No such agreement shall be deemed either to modify any of the terms and conditions of this unit agreement or to relieve the unit operator of any right of obligation established under this unit agreement and in case of any inconsistencies or conflict between this unit agreement and the operating agreement, this unit agreement shall prevail.

8. RIGHTS AND OBLIGATIONS OF UNIT OPERATOR: Except as otherwise specifically provided herein, the exclusive right, privilege and duty of exercising any and all rights of the parties hereto which are necessary or convenient for producing, storing, allocating and distributing the unitized substances are hereby delegated to and shall be exercised by the unit operator as herein provided.

Acceptable evidence of title to said rights shall be deposited with said unit operator and, together with this agreement, shall constitute and define the rights, privileges and obligations of unit operator. Nothing herein, however, shall be construed to transfer title to any land or to any lease or operating agreement, it being understood that under this agreement the unit operator, in its capacity as unit operator, shall exercise the rights of possession and use vested in the parties hereto only for the purposes herein specified.

9. PURPOSE OF UNIT AND PLAN OF OPERATION: It is recognized and agreed by the parties hereto that the unitized formation as to all of the lands subject to this agreement is reasonably proven to be productive of unitized substances or necessary for unit operations and that the object and purpose of this agreement is to formulate and put into effect a secondary recovery and gas storage project in order to effect the greatest economic recovery of unitized substances, prevent waste and conserve natural resources consistent with good engineering practices expected of a prudent operator. The parties hereto agree that the unit operator may, subject to the approval of a plan of operation by the Commissioner, inject gas produced from lands other than the unit area into the unitized formation through the Shell Oil Company State GRA Well No. 1 located in the SW $\frac{1}{4}$ NW $\frac{1}{4}$  Section 3, Township 22 South, Range 34 East and the Shell State GRB Well No. 1 located in the NW $\frac{1}{4}$ SW $\frac{1}{4}$  Section 34, Township 21 South, Range 34 East for secondary recovery and storage purposes. Unit operator shall furnish the Commissioner, between the first and twentieth of each month, reports showing the amount of gas produced and injected into the unitized formation for the preceding month.

A plan of operation shall be filed with the Commissioner concurrently with the filing of this unit agreement for final approval. Said plan of operation and all revisions thereof shall be as complete

and adequate as the Commissioner may determine to be necessary in connection with operations hereunder. Upon approval of this agreement and the aforementioned plan of operation by the Commissioner, said plan and all subsequently approved plans shall constitute the operating obligations of the unit operator under this agreement for the period specified in the plan. Thereafter, from time to time before the expiration of any existing plan, the unit operator shall submit for approval a plan for an additional specified period of operation. Reasonable diligence shall be exercised in complying with the obligations of the approved plan of operation. The unit operator shall furnish to the Commissioner, within 30 days from the expiration of each 6 month period, a report giving full factual information as to the manner in which the plan in effect for such period has been carried out.

If the unit operator should fail to comply with any approved plan of operation or supplement to or modification thereof, this agreement may be terminated by the Commissioner; provided, however, the Commissioner shall give notice to the unit operator and the lessees of record in the manner prescribed by Section 7-11-14 N.M.S.A. 1953 of intention to cancel because of any alleged breach of said plan of operation and any decision entered therein shall be subject to appeal in the manner prescribed by Section 7-11-17 N.M.S.A. 1953; and provided further in any event unit operator shall be given a reasonable opportunity after a final determination within which to remedy said default, failing in which this agreement shall be terminated.

10. TRACT PARTICIPATION: Exhibit "B" attached hereto shows the percentage of participation of each of the tracts embraced by leasehold interests which are committed to this agreement. These participation factors have been obtained by dividing the number of acres contained in each tract by the total number of acres contained in the unit area.

The unitized substances produced from the unit area shall be allocated to the respective tracts as hereinafter set forth in accordance with said percentages of participation and such unitized substances shall be deemed to have been produced from the respective tracts to which allocated.

11. ALLOCATION OF PRODUCTION:

A. PHASE I: It is recognized that there is still some primary gas and liquid hydrocarbons left in the unitized formation underlying the unit area which would otherwise be produced in the normal producing life of the existing wells before they reach their economic limit upon which the state would be entitled to royalty. It is contemplated that gas produced from lands outside the unit area will be injected into the unitized formation for a considerable length of time before any appreciable amounts of gas are withdrawn. The primary production which would normally have been produced from May 1, 1975 to its economic limit has been determined by B.H.P/Z method based upon prior production, and Exhibit "C" attached hereto shows the royalty gas to which the state is entitled. In order that the State of New Mexico will continue to receive royalties on the same basis as if the existing wells had continued normal production until they reached their economic limits, the amount of gas shown for the respective months on Exhibit "C" shall be allocated to the tracts in accordance with the percentages set forth on Exhibit "B" and unit operator shall pay to the state royalties on the gas allocated to the respective tracts on the basis provided in the leases covering said tracts exactly the same as if the gas had actually been produced therefrom. Such payments based upon the gas for each of the months shown on Exhibit "C" shall be considered as full payment to the state for all remaining primary gas reserves. The period from May 1, 1973 through the months shown on Exhibit "C" shall constitute Phase I.

B. PHASE II: It is contemplated that after the unitized formation has been reasonably repressured by the injection of gas produced from lands outside the unit area, there will be withdrawals from time to time. Unit operator shall install and at all times operate and maintain metering equipment and other facilities approved by the Commissioner so that an accurate cumulative account can be kept of the quantity of gas as well as the total number of British Thermal Units in the gas injected into the unitized formation through the existing wells. Operator shall also keep an accurate cumulative account of the total number of British Thermal Units in all gas withdrawn from the unitized formation.

Operator shall also install, operate and maintain at all times the necessary separation equipment to separate the gas from the liquid hydrocarbons produced in connection with the withdrawal of gas from the respective wells, as well as all other related equipment which may be required to transfer all liquids so separated.

Operator shall cause monthly analyses by chromatograph or other mutually acceptable method of all the gas injected into or withdrawn from the reservoir in order to compute the net change in British Thermal Unit content.

Operator shall pay royalties to the state at the rates provided in the respective leases on all liquid hydrocarbons which are separated from the gas withdrawn and allocated to the respective tracts in accordance with the percentages of participation set forth on Exhibit "B" regardless of the time said gas is withdrawn. In addition, should the total cumulative British Thermal Units in the gas withdrawn exceed the total British Thermal Units in the gas

injected plus the pre-determined number of British Thermal Units in the remaining primary gas reserves and for which the state has been or will be paid during Phase I, then operator shall pay royalties on said increase in British Thermal Units at the prevailing market price in Lea County, New Mexico as set by the Federal Power Commission for gas of like quality. Payment for British Thermal Unit enrichment as set forth herein shall be made on a monthly basis as the result of the chromatograph analyses.

In addition to the rental and royalty provided in the leases covering the respective tracts beginning with the first of the month following the end of Phase I as shown on Exhibit "C" unit operator shall pay an annual storage fee or rental of \$1.00 per acre plus 1/2¢ per thousand cubic feet of gas withdrawn from the reservoir, which shall be allocated to the respective leasehold interests on the basis of the percentage of participation set forth on Exhibit "B". Said storage fee or additional rental of \$1.00 per acre shall be paid during the month of February of each year and the 1/2¢ per thousand cubic feet for gas withdrawn shall be based on the monthly withdrawals, payments to be made in the month following the month in which withdrawals are made.

All gas produced from the lands outside the unit area and injected into the unitized formation, as well as all primary gas if, as and when produced, except for the payments to be made to the state in accordance with Phase I, may be withdrawn from the unitized formation from time to time royalty free except as to any enhancement in value through an increase in British Thermal Units. Notwithstanding the above, royalty shall be paid on all liquid hydrocarbons separated from gas withdrawn.

12. LEASES AND CONTRACTS CONFORMED AND EXTENDED. The terms, conditions and provisions of all leases, subleases, operating agreements and other contracts relating to the exploration, drilling,

development or operation for oil or gas of the lands committed to this agreement shall, as of the effective date hereof, be and the same are hereby expressly modified and amended insofar as they apply to lands within the unitized area to the extent necessary to make the same conform to the provisions hereof and so that the respective terms of said leases and agreements will be extended insofar as necessary to coincide with the term of this agreement and the approval of this agreement by the Commissioner and the respective lessees shall be effective to conform the provisions and extend the term of each such lease as to lands within the unitized area to the provisions and term of this agreement; but otherwise to remain in full force and effect. Each lease committed to this agreement, insofar as it applies to lands within the unitized area, shall continue in force beyond the term provided therein so long as this agreement remains in effect. Termination of this agreement shall not affect any lease which pursuant to the terms thereof or any applicable laws would continue in full force and effect thereafter. The continued operation or production of a well or wells for unitized substances on the unit area or for gas storage purposes shall be construed and considered as the continued operation or production on each of the leasehold interests committed to this agreement and operations or production or gas storage pursuant to this agreement shall be deemed to be operations upon and production from each leasehold interest committed hereto and there shall be no obligation on the part of the unit operator or any of the owners of the respective leasehold interests committed hereto to drill offsets to wells as between the leasehold interests committed to this agreement.

Any lease embracing lands of the State of New Mexico having only a portion of its lands committed hereto shall be segregated as to the portion committed and the portion not committed and the terms of such leases shall apply separately as to such segregated portions

commencing as of the effective date hereof. Notwithstanding any of the provisions of this agreement to the contrary, any lease embracing lands of the State of New Mexico having only a portion of its lands committed hereto shall continue in full force and effect beyond the term provided therein as to all lands embraced in such lease if oil and gas, or either of them, are capable of being produced from or gas is being stored within some part of the unitized formation covered by the leases committed to this agreement at the expiration of the secondary term thereof.

13. CONSERVATION: Operations hereunder and production of unitized substances shall be conducted to provide for the most economical and efficient recovery and storage of said substances without waste, as defined by or pursuant to state laws or regulations.

14. DRAINAGE: In the event a well or wells producing oil or gas in paying quantities should be brought in on land adjacent to the unit area draining unitized substances from the lands embraced therein, unit operator shall drill such offset well or wells as a reasonably prudent operator would drill under the same or similar circumstances.

15. COVENANTS RUN WITH LAND: The covenants herein shall be construed to be covenants running with the land with respect to the interests of the parties hereto and their successors in interest until this agreement terminates, and any grant, transfer or conveyance of interest in land or leases subject hereto shall be and hereby is conditioned upon the assumption of all privileges and obligations hereunder by the grantee, transferee or other successor in interest. No assignment or transfer of any working, royalty or other interest subject hereto shall be binding upon unit operator until the first day of the calendar month after the unit operator is furnished with the original, photostatic or certified copy of the instrument of transfer.



16. EFFECTIVE DATE AND TERM: This agreement shall become effective as of April 25, 1973 upon approval by the Commissioner and shall remain in effect so long as unitized substances are being produced from or stored within the unitized formation. This agreement may be terminated at any time by not less than seventy-five per cent (75%) on an acreage basis of the owners of working interests signatory hereto with the approval of the Commissioner.

17. RATE OF PRODUCTION: All production and the disposal thereof shall be in conformity with allocations, allotments and quotas made or fixed by the Commission and in conformity with all applicable laws and lawful regulations.

18. APPEARANCES: Unit operator shall, after notice to other parties affected, have the right to appear for and on behalf of any and all interests affected hereby before the Commissioner of Public Lands and the New Mexico Oil Conservation Commission, and to appeal from orders issued under the regulations of the Commissioner or Commission or to apply for relief from any of said regulations or in any proceedings on its own behalf relative to operations pending before the Commissioner or Commission; provided, however, that any other interested party shall also have the right at his own expense to appear and to participate in any such proceeding.

19. NOTICES: All notices, demands or statements required hereunder to be given or rendered to the parties hereto shall be deemed fully given if given in writing and sent by postpaid certified mail, addressed to such party or parties at their respective addresses set forth in connection with the signatures hereto or to the ratification or consent hereof or to such other address as any such party may have furnished in writing to party sending the notice, demand or statement.

20. UNAVOIDABLE DELAY: All obligations under this agreement requiring the unit operator to produce unitized substances from or

store gas within the unitized formation covered by this agreement shall be suspended while, but only so long as, the unit operator, despite the exercise of due care and diligence, is prevented from complying with such obligations, in whole or in part, by strikes, war, acts of God, federal, state or municipal law or agencies, unavoidable accidents, uncontrollable delays in transportation, inability to obtain necessary materials in open market, or other matters beyond the reasonable control of the unit operator, whether similar to matters herein enumerated or not.

21. LOSS OF TITLE: In the event title to any tract of unitized land or substantial interest therein shall fail and the true owner cannot be induced to join the unit agreement so that such tract is not committed to this agreement or the operation thereof hereunder becomes impracticable as a result thereof, such tract may be eliminated from the unitized area, and the interest of the parties readjusted as a result of such tract being eliminated from the unitized area. In the event of a dispute as to the title to any royalty, working or other interest subject hereto, the unit operator may withhold payment or delivery of the allocated portion of the unitized substances involved on account thereof without liability for interest until the dispute is finally settled, provided that no payment of funds due the State of New Mexico shall be withheld. Unit operator as such is relieved from any responsibility for any defect or failure of any title hereunder.

22. RE-NEGOTIATION OF STORAGE OR RENTAL FEE: The gas storage fee paid on gas withdrawn under Section 11B shall be valid for a period of three (3) years from the effective date of this agreement. During the final year of the first three (3) year period that this agreement is in force the fee set out in Section 11B shall be re-negotiated between the parties hereto, each such re-negotiated rate to be in effect for the succeeding five (5) year period. If the parties hereto are unable to agree to re-negotiated new fees sixty (60) days prior to the

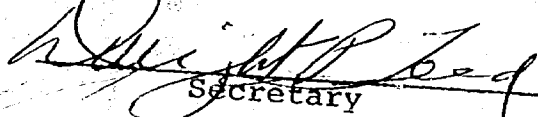
expiration of the first three (3) year period and at least sixty (60) days prior to the first day of any such succeeding five (5) year period, payment of the fees on the basis of prior rates shall continue and this agreement shall terminate upon expiration of not more than two (2) years from said first day (during which time the parties hereto may remove the metered and injected gas not previously withdrawn and equipment and facilities installed under this agreement) unless during such two (2) year period the parties hereto agree upon a re-negotiated rate to be effective retroactively to said first day. Any gas or facilities not then removed by the termination date shall become the property of the State of New Mexico if it so elects.

23. HOLD HARMLESS CLAUSE: Notwithstanding any of the provisions contained herein, unit operator shall save, hold and protect the Commissioner of Public Lands and the State of New Mexico harmless from all claims and liabilities of whatsoever kind, nature or description arising from or growing out of operations carried on by unit operator pursuant to this agreement.

24. COUNTERPARTS: This agreement may be executed in any number of counterparts, no one of which needs to be executed by all parties, or may be ratified or consented to by separate instrument in writing specifically referring hereto, and shall be binding upon all those parties who have executed such a counterpart, ratification or consent hereto with the same force and effect as if all such parties had signed the same document and regardless of whether or not it is executed by all other parties owning or claiming an interest in the lands within the above described unit area.

IN WITNESS WHEREOF, the undersigned parties have caused this agreement to be executed as of the respective dates set forth opposite their signatures.

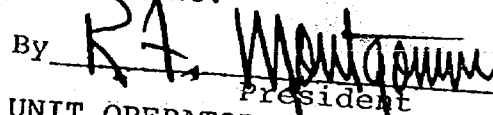
ATTEST:

  
Secretary

Date: June 7, 1973

LLANO, INC.

By

  
President

UNIT OPERATOR AND WORKING INTEREST OWNER

Address: P. O. Box 1320

Hobbs, New Mexico 88240

LESSEES OF RECORD

ATTEST:

Smith Reed  
Secretary

Date: 8/22/73

SHELL-OIL COMPANY LLANO, INC.

By R. F. Montgomery  
President

Address: P. O. Box 1320  
Hobbs, New Mexico 88240

ATTEST:

m B mowley  
Asst. Secretary  
Date: 7-20-73

GULF OIL CORPORATION

By W. B. Hopkins  
Attorney-in-Fact

Address: P. O. Box 1150  
Midland, TX 79701

ATTEST:

Secretary  
Date: \_\_\_\_\_

TEXACO INC.

By SEE PAGE 16-A  
President

Address: \_\_\_\_\_

STATE OF NEW MEXICO )  
COUNTY OF LEA ) : SS

The foregoing instrument was acknowledged before me this 7th day of June 1973 by R. F. Montgomery President of Llano, Inc., a New Mexico corporation, on behalf of said corporation.

My Commission Expires:  
October 30, 1976

STATE OF NEW MEXICO )  
COUNTY OF LEA ) : SS

Larry L Greig  
Notary Public

The foregoing instrument was acknowledged before me this 22 day of August 1973 by R. F. Montgomery President of Shell-Oil Company, a Delaware corporation, on behalf of said corporation. Llano, Inc. New Mexico

My Commission Expires:  
Oct 30, 1976

STATE OF TEXAS )  
COUNTY OF MIDLAND ) : SS

Larry L Greig  
Notary Public

The foregoing instrument was acknowledged before me this 20 day of July 1973 by W. B. Hopkins Attorney-in-Fact of Gulf Oil Corporation, a Pennsylvania corporation, on behalf of said corporation.

My Commission Expires:  
6-1-75

Emily Jones  
Notary Public

CONSENT AND RATIFICATION  
GRAMA RIDGE MORROW UNIT AGREEMENT  
EMBRACING LANDS IN LEA COUNTY, NEW MEXICO

The undersigned hereby acknowledges receipt of a copy of the Unit Agreement for the Development and Operation of the Grama Ridge Morrow Unit Area embracing lands situated in Lea County, New Mexico, which is dated the 25th day of April, 1973, and further acknowledges that the undersigned is familiar with the terms and conditions thereof. As to unitized substances in the unitized formation defined in said Unit Agreement, the undersigned owns no interest whatsoever. However, the undersigned does own the official record title to an oil and gas lease from the State of New Mexico as lessor, which lease is more particularly described in said Unit Agreement. Said lease is subject to certain operating rights and working interest owned by another. The undersigned understands that the owner of said operating rights and working interest desires to commit the same to said Unit Agreement. Pursuant to policies and practices of the State Land Office for the State of New Mexico, the Commissioner of Public Lands for the State of New Mexico requires consent and joinder of the official record title holders or lessees of record of State of New Mexico oil and gas leases before the Commissioner will approve the above Unit Agreement. In its capacity as owner of the official record title, or as lessee of record, to a State of New Mexico oil and gas lease, and in that capacity only, and as an accommodation to said owner of operating rights and working interest under said lease, the undersigned desires to consent, ratify and join in the execution of said Unit Agreement. By these presents the undersigned does hereby consent to said Unit Agreement and ratifies all of the terms and provisions thereof exactly the same as if the undersigned had executed the original of said Unit Agreement, or a counterpart thereof, in the undersigned's capacity as official record title holder or lessee of record of a State of New Mexico oil and gas lease.

IN WITNESS WHEREOF, this instrument is executed by the undersigned as of the date set forth opposite the signature.

Date: July 18, 1973

TEXACO INC.

By: [Signature]

ATTORNEY-IN-FACT

APPROVED AS TO

Terms [Signature]  
Form [Signature]

STATE OF TEXAS )  
COUNTY OF MIDLAND ) ss.

The foregoing instrument was acknowledged before me this 18th day of July, 1973, by [Signature] of TEXACO INC., a Delaware corporation, on behalf of said corporation.

[Signature]  
Notary Public

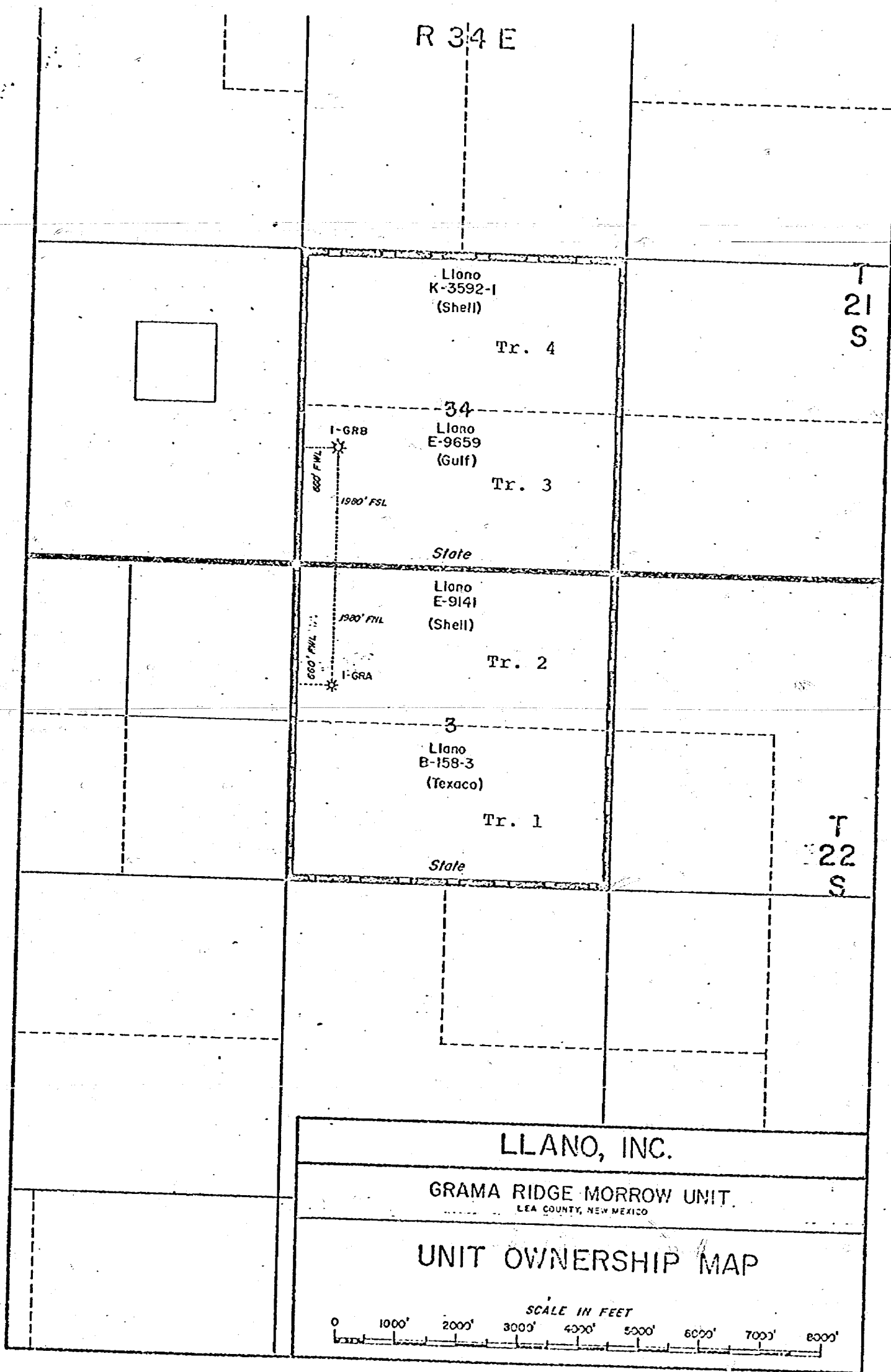
My Commission Expires:  
6-1-75

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) : ss

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of January, 1973 by \_\_\_\_\_ of Texaco Inc., a \_\_\_\_\_ corporation, on behalf of said corporation.

My Commission Expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public



**EXHIBIT "B"**  
**GRAMA RIDGE MORROW UNIT AGREEMENT**

Tract No.	Description	No. Surface Acres	Lease No.	Basic Royalty	Lessee of Record	Overriding Royalty or Prod. Pymt.	Working Int. Owner and Percentage	Percentage Tract Participation
1	S½ Sec. 3, T. 22 S., R. 34 E.	320.00	B-158-3	12½%	Taxaco Inc.	None	Llano, Inc. 100%	24.861
2	N½ Sec. 3, T. 22 S., R. 34 E.	327.16	E-9141	12½%	Shell Oil Company	None	Llano, Inc. 100%	25.417
3	S½ Sec. 34, T. 21 S., R. 34 E.	320.00	E-9659	12½%	Gulf Oil Corporation	None	Llano, Inc. 100%	24.861
4	N½ Sec. 34, T. 21 S., R. 34 E.	320.00	K-3592-1	12½%	Shell Oil Company	None	Llano, Inc. 100%	24.861
Total		1287.16						100.000



EXHIBIT "C"

Composite Royalty Production - BHP/Z Method - Grama Ridge Morrow Unit Area, Lea County, New Mexico

<u>1973</u>		<u>1974</u>		<u>1975</u>		<u>1976</u>		<u>1977</u>	
<u>Equivalent Gas Production MCF</u>		<u>Equivalent Gas Production MCF</u>		<u>Equivalent Gas Production MCF</u>		<u>Equivalent Gas Production MCF</u>		<u>Equivalent Gas Production MCF</u>	
<u>Month</u>		<u>Month</u>		<u>Month</u>		<u>Month</u>		<u>Month</u>	
May	1,860	Jan.	1,060	Jan.	810	Jan.	610	Jan.	460
June	1,770	Feb.	1,040	Feb.	790	Feb.	600	Feb.	450
July	1,660	Mar.	1,010	Mar.	775	Mar.	590	Mar.	445
Aug.	1,590	Apr.	990	Apr.	750	Apr.	575	Apr.	430
Sept.	1,510	May	960	May	740	May	550	May	425
Oct.	1,450	June	950	June	710	June	540	June	410
Nov.	1,380	July	925	July	700	July	525	July	400
Dec.	1,090	Aug.	900	Aug.	690	Aug.	510	Aug.	395
		Sept.	890	Sept.	675	Sept.	500	Sept.	375
		Oct.	860	Oct.	650	Oct.	495	Oct.	370
		Nov.	840	Nov.	640	Nov.	490	Nov.	360
		Dec.	825	Dec.	625	Dec.	475	Dec.	
<b>Total</b>	<b>12,310</b>	<b>Total</b>	<b>11,250</b>	<b>Total</b>	<b>8,555</b>	<b>Total</b>	<b>6,460</b>	<b>Total</b>	<b>4,910</b>
<b>Cum.</b>	<b>12,310</b>	<b>Cum.</b>	<b>23,560</b>	<b>Cum.</b>	<b>32,115</b>	<b>Cum.</b>	<b>38,575</b>	<b>Cum.</b>	<b>43,485</b>

<u>1978</u>		<u>1979</u>	
<u>Equivalent Gas Production MCF</u>		<u>Equivalent Gas Production MCF</u>	
<u>Month</u>		<u>Month</u>	
Jan.	350	Jan.	270
Feb.	345	Feb.	270
Mar.	340		
Apr.	330		
May	325		
June	310		
July	305		
Aug.	300		
Sept.	295		
Oct.	290		
Nov.	280		
Dec.	275		
<b>Total</b>	<b>3,745</b>	<b>Total</b>	<b>540</b>
<b>Cum.</b>	<b>47,230</b>	<b>Cum.</b>	<b>47,770</b>

Unit Name GRAMA RIDGE MORROW UNIT (SECONDARY RECOVERY AND GAS STORAGE)  
Operator Llano, Inc.  
County Lea

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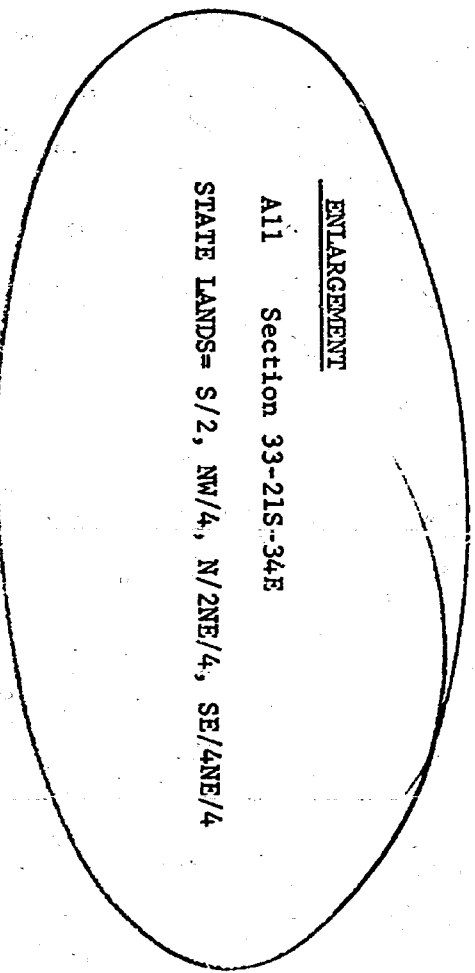
4895 &

DATE	OCC CASE NO.	4896	EFFECTIVE	TOTAL	STATE	FEDERAL	INDIAN-FEE	SEGREGATION	TERM
APPROVED	OCC ORDER NO.	R-4473 &	DATE	ACREAGE				CLAUSE	
Commissioner	1-29-73 &	R-4491	4-25-73	1,287.16	1,287.16	-0-	-0-	Yes	5 yrs.
8-27-73	3-16-73								

UNIT AREA

TOWNSHIP 22 SOUTH, RANGE 34 EAST NMPM  
Section 3: All

TOWNSHIP 21 South, Range 34 EAST NMPM  
Section 34: All  
Section 33: All (ENLARGEMENT)



Unit Name GRAMA RIDGE MORROW UNIT (Secondary Recovery and Gas Storage)  
 Operator Llano, Inc.  
 County Lea

STATE TRACT NO.	LEASE NO.	INSTI-TUTION	SEC.	TWP.	RGE.	SUBSECTION	RATIFIED		LESSEE
							DATE	ACRES	
1	B-158-3	C.S.	3	22S	34E	S/2	7-18-73	320.00	Texaco Inc.
2	E-9141	C.S.	3	22S	34E	N/2	6-7-73	327.16	Llano, Inc.
3	E-9659	C.S.	34	21S	34E	S/2	7-20-73	320.00	Gulf Oil Corporat
4	K-3592-2	C.S.	34	21S	34E	N/2	6-7-73	320.00	Llano, Inc.
5	E-7574-1	C.S.	33	21S	34E	S/2, NW/4, N/2NE/4, SE/4NE/4 (ENLARGEMENT)	11-29-76	600.00	Wilson Oil Compar Frances P. Bolton Wyoming Oil Comp

Clarence

Klano Inc

with Grama Ridge  
Morrow

1280 acres State Lease &

secondary recovery & inject gas  
inj gas into gas storage

Grama Ridge - Morrow  
34 SW 3 NE