STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT 1 OIL CONSERVATION DIVISION STATE LAND OFFICE BLDG. 2 SANTA FE, NEW MEXICO 3 9 April 1986 4 COMMISSION HEARING 5 6 IN THE MATTER OF: 7 Application of Southland Royalty CASE 8 Company for special pool rules, S802 Lea County, New Mexico. 9 10 11 12 BEFORE; Richard L. Stamets, Chairman 13 Ed Kelley, Commissioner 14 15 TRANSCRIPT OF HEARING 16 17 APPEARANCES 18 For the Oil Conservation Jeff Taylor 19 Division: Legal Counsel to the Division Oil Conservation Division 20 State Land Office Bldg. Santa Fe, New Mexico 87501 21 22 For the Applicant: Peter N. Ives Attorney at Law 23 CAMPBELL & BLACK P. A. P. O. Box 2208 24 Santa Fe, New Mexico 87501 25 For Conoco, Inc.: W. Thomas Kellahin Attorney at Law KELLAHIN & KELLAHIN P. C. Box 2265 Santa Fe, New Mexico 87501

INDEX STATEMENT BY MR. IVES TREY SHEPHERD III Direct Examination by Mr. Ives RANDY HERR Direct Examination by Mr. Ives Cross Examination by Mr. Stamets Cross Examination by Mr. Kellahin Recross Examination by Mr. Stamets Questions by Mr. Lyon JOHN STARK Direct Examination by Mr. Ives Cross Examination by Mr. Stamets Questions by Mr. Lyon Redirect Examination by Mr. Ives Cross Examination by Mr. Kellahin GENE CARLSON Direct Examination by Mr. Ives

EXHIBITS SRC Exhibit One, Map SRC Exhibit Two, Cross Section SRC Exhibit Three, Water Analysis SRC Exhibit Four, Data SRC Exhibit Five, Calculations STATEMENT OF DECISION BY MR. STAMETS

4 1 2 MR. STAMETS: Call next Case 3 8802. 4 MR. TAYLOR: The application of 5 Southland Royalty Company for special pool rules, Lea Coun-6 ty, New Mexico. 7 MR. STAMETS: Call for appear-8 ances. 9 MR. IVES: Peter Ives, with the 10 firm of Campbell and Black, representing Southland Royalty 11 Company. 12 MR. STAMETS: Other appear-13 ances? 14 MR. **KELLAHIN:** Mr. Chairman, 15 I'm Tom Kellahin from Santa Fe, New Mexico, appearing on be-16 half of Conoco, Inc. 17 MR. STAMETS: Mr. Ives. 18 MR. IVES: May it please the 19 Commission, we are here today before the Commission seeking 20 temporary special pool rules for the South Corbin Wolfcamp 21 Pool. 22 Our testimony which we will 23 present today will show that 80-acre spacing is currently 24 justified from a geologic and engineering standpoint for the 25 pool; that without the granting of 80-acre spacing economic

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5 1 waste will occur and development of the pool will be hin-2 dered or curtailed and we believe that an expedited order is 3 neede in this matter to prevent economic waste due to a 4 drilling obligation of Southland Royalty Company, which they 5 face on May 3rd, 1986. 6 I have four witnesses today 7 from Southland Royalty Company to present testimony and ex-8 hibits and I would call my first witness. 9 MR. TAYLOR: We have to swear 10 your witnesses first. 11 Tom, do you have any witnesses? 12 MR. KELLAHIN: No, sir. 13 14 (Witnesses sworn.) 15 16 MR. IVES: Call first as my 17 witness, Mr. Trey Shepherd. 18 19 TREY SHEPHERD, III 20 being called as a witness and being duly sworn upon his 21 oath, testified as follows, to-wit: 22 23 DIRECT EXAMINATION 24 BY MR. IVES: 25 Mr. Shepherd, would you please state your 0

6 1 name and residence for the record. 2 Α My name is Trey Shepherd and I live at. 3 5201 Brazos, Midland, Texas. 4 Q And what is your current occupation and 5 by whom are you currently employed? 6 Α I am a landman for Meridian Oil, Incor-7 porated. 8 I would like to review with you your edu-0 cational background beginning with college. 9 Please tell us what degrees, beginning with college, you have received. 10 11 Α I went to the University of Texas at Austin and received a Bachelor of Business Administration in 12 petroleum land management in 1979. 13 14 0 And have you received any advanced de-15 grees since then? 16 Α No, I have not. 17 Q Are you a member of any professional as-18 sociations or societies? 19 I'm a member of the American Association Α 20 of Petroleum Landmen and the Permian Basin Landmen's Asso-21 ciation. 22 I would also like to review your work ex-0 perience for the Commission beginning with your work assign-23 ments after college. 24 25 Α In 1979 I went to work for Atlantic Rich-

7 1 field Company in Tulsa, Oklahoma, as a staff landman. 2 In 1980 I was transferred to Tyler, 3 Texas as a Senior Landman and I worked there until the early 4 part of 1983 and was transferred to Lafayette, Louisiana, as 5 a Provence (sic) Landman, and in the middle of the summer of 6 1983 I went to work for Southland Royalty Company in Midland 7 and have been with them since that date. 8 0 Are you familiar with the wells in the 9 area which is the subject of this application? 10 Α Yes, I am. 11 0 And are you familiar with the application 12 at issue in this matter? 13 Α Yes. 14 MR. IVES: I would tender Mr. 15 Shepherd as an expert witness in the area of -- as a land-16 man. 17 MR. STAMETS: He is considered 18 qualified. 19 Would somebody clear the record 20 in the relationship between Meridian and Southland? 21 MR. Certainly. IVES: We were 22 going to cover that. 23 MR. STAMETS: Fine. 24 Q Mr. Shepherd, if I could ask you to state 25 for the Commission, just what is the relationship between

8 1 Meridian Oil, Incorporated, and Southland Royalty company? 2 А Meridian Oil. Incorporated, acquired 3 Southland Royalty Company in the fourth quarter of last. 4 year. They now act as agent for Southland Royalty Company. 5 For purposes of this proceeding, we will Q 6 refer to Southland Royalty Company, as they were the initial 7 applicant before the Commission, simply for ease and con-8 venience. 9 Mr. Shepherd, could you please briefly 10 state for the Commission what is sought in this application? 11 А We are seeking temporary pool rules of 12 80-acres for the South Corbin Wolfcamp Field. 13 0 And when you say temporary pool rules, 14 what period of time are you speaking of? 15 Α Approximately 18 months. 16 0 And why are you seeking these temporary 17 pool rules? 18 To gain information to determine whether Α 19 this request for 80-acre spacing is justified or whether the 20 wells should actually be drilled on 40 acres. 21 Q I would like to please refer to what's 22 been marked as Exhibit One for identification and explain to 23 the Commissioners what it is and what it shows. 24 Α This is a map of the South Corbin Wolf-25 camp Field. The field is shaded in the gray color. Over

9 1 that, portions of that, are Southland's acreage shaded in 2 green. The farmouts which we have acquired are shaded in 3 pink. 4 This contains the wells in the field, 5 their names, operators, their completion dates, production 6 history, perforated intervals, et cetera. 7 0 Could you please relate to the Commission 8 generally the history of development in the South Corbin 9 Wolfcamp Field? 10 A Not a great deal of activity in the field 11 itself; there've been only nine wells drilled in approxi-12 mately the last 19 years. Two of those were drilled in 13 1967, one other well in 1968. There was then approximately 14 an ll-year period before any additional drilling was done, 15 and the most recent activity has been by Southland Royalty 16 Company in Section 17. 17 And what was the date of the first well 0 18 drilled in the pool? 19 Α 1967. 20 0 What has the effective spacing in the 21 area been? 22 Α The effective spacing is 80 acres. 23 0 And I would like to ask what drilling ob-24 ligation Southland Royalty Company has at the present time 25 in the South Corbin Wolfcamp Field?

1 Α We have two farm-ins in the southwest 2 quarter of Section 17. Our first farm-in is from J. Μ. 3 Huber Corporation. It covers the east half of the southwest 4 quarter and the southwest quarter of the southwest quarter. 5 Our next obligation date under that farm-in is May the 3rd 6 of this year. 7 also have a farm-in from Armstrong We 8 Energy Corporation in the northwest quarter of the southwest 9 quarter and with a May 15th obligation date. 10 And does Southland Royalty Company seek 0 11 and need an expedited order in this matter? 12 Α sir, we do, if we are to meet this Yes, 13 drilling obligation. We need an order by May the 3rd. 14 0 What are Southland Royalty Company's de-15 velopment plans in the South Corbin Wolfcamp? 16 Α We plan to drill our next well in Unit K 17 Section 17 and depending on the performance of that well of 18 and the two existing wells that we have drilled, two recent 19 wells we have drilled, rather, we plan additional wells in 20 Unit C of Section 17 and Unit J of Section 18. 21 0 Was Exhibit One prepared by Southland 22 Royalty Company? 23 Α Yes, it was. 24 Q And do you have personal knowledge of the 25 information which is set forth on Exhibit One?

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1 1 A Yes, I do. 2 Is the information on Exhibit One 0 accu-3 rate and correct? 4 Α Yes. 5 MR. IVES: I would atthis 6 point in time offer Exhibit One into evidence. 7 MR. STAMETS: Is the witness 8 referring to the information relative the acreage in the 9 pool, (not clearly understood) depths, well locations, or is 10 he also referring to the production data, depth, and so on? 11 You mean insofar as what I have prepared? А 12 MR. STAMETS: In your prepara-13 tion and your knowledge of Exhibit Number One? 14 I have discussed this information with Ą 15 the engineers that will testify later and I myself have pre-16 pared the information in regard to the acreage within the 17 pool and Southland's acreage and the farm-in acreage that we 18 hold. 19 MR. STAMETS: Mr. Ives, I think 20 would prefer to wait till all of the data on Exhibit 1 One 21 has been discussed before we --22 That's fine. MR. IVES: 23 Q Mr. Shepherd, is it your opinion that 24 granting the application will be in the best interest of 25 preventing waste in the south part of the Wolfcamp Pool?

12 1 Yes, it is. A 2 MR. IVES: Those are all + he 3 questions I have of this first witness. 4 MR. STAMETS: Any questions of 5 the witness? 6 He may be excused. 7 MR. IVES: I'm going to call 8 our second witness, Mr. Randy Herr. 9 10 RANDY HERR, 11 being called as a witness and being duly sworn upon his 12 oath, testified as follows, to-wit: 13 14 DIRECT EXAMINATION 15 BY MR. IVES: 16 Q Would you please state your name and 17 place of residence, Mr. Herr? 18 Α My name is Randy Herr and I live in Mid-19 land, Texas. 20 And what is your current occupation 0 and 21 by whom are you currently employed? 22 А I'm a petroleum geologist for Meridian 23 Oil, Incorporated. 24 0 I would like to review with you your edu-25 cational background beginning with college and degrees, ad

vanced degrees which you have received.

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A I received my Bachelor of Science in
geology from Texas A & M in 1970; then received a Master of
Science in geology from the University of Utah in 1979.

5 Ω And are you a member of any professional
6 associations or societies?

7 A A member of the Association -- American
8 Association of Petroleum Geologists, Society of Economic
9 Paleontologists and Mineralogists, the West Texas Geological
10 Society and the Permian Basin Section of the Society of
11 Economic Paleontologists and Mineralogists.

12 Q Mr. Herr, I'd like to now review with you 13 your work experience since college, if you could cover each 14 job you've had, your position, and general responsibilities. 15 A In 1979 I joined Union Oil Company of

16 California where I was a development geologist with that 17 company. I worked development projects throughout the Per-18 mian Basin area.

In 1981, and to the present, I am a petroleum geologist with Southland Royalty Company where I have
recommended exploration and development projects in southeast New Mexico, the Central Basin Platform, the Midland
Basin, and the Northern Valverde Basin.

24 Q Mr. Herr, are you familiar with the wells
25 in the area of -- that are the subject of this application?

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14 1 A Yes, I am. 2 0 Are you familiar with the application at 3 issue in this matter? 4 Α Yes, I am. 5 MR. IVES: I would tender Mr. 6 Herr as an expert in geology, petroleum geology, before the 7 Commission and for purposes of this proceeding. 8 MR. STAMETS: The witness is 9 considered qualified. 10 Q Mr. Herr, directing your attention to 11 what has been marked for identification as Exhibit Two, 12 could you please explain to the Commissioners what it is and 13 what it shows? 14 Α This is a north/south Okay. strati-15 graphic cross section that goes through the South Corbin 16 Wolfcamp Field. There is an index map on the lefthand side 17 of the map showing the locations for the wells involved in 18 the cross section. 19 This stratigraphic cross section is hung 20 with the datum on the top of the Third Bone Spring Sand, 21 that's the very top dark line. 22 The next heavy line located below that is 23 the top of the Wolfcamp. 24 The next heavy line located below that is 25 the top of the Strawn; similarly below that is the Atoka and

15 1 Morrow sections. 2 The Wolfcamp has been split into differ-3 ent, several different horizons. 4 The uppermost horizon is called the Upper 5 Wolfcamp dolomite facies. This is a nonproductive facies in 6 the area. 7 Similarly, below this is the Upper Wolf-8 camp cherty limestone facies. It also is not productive in 9 this area. 10 producing area in the South Corbin The 11 Field is located in the Middle Wolfcamp zone. In particular 12 the main pay in the area is called the South Corbin Wolfcamp 13 pay and on the cross section it is shown in the yellow hori-14 zon. 15 Now the Wolfcamp in this area pays from a 16 limestone detrital, which is characterized by a very clean 17 gamma ray character on the log. If you will look at the 18 cross section in the producing wells, you will notice that 19 very clean gamma ray character. 20 Our Huber 17 Federal No. 1, which would 21 be the fourth well from the left, is perforated and produc-22 ing from one of these very clean gamma ray portions of the 23 log. 24 Our West Corbin 5, located just to the 25 left of that well, which would be the third well on the

1 cross section, is perforated in the lower portion of the 2 Middle Wolfcamp but we have evidence to suggest that that 3 production is actually coming from the zone that's at appro-4 ximately 10,800, which is the correlative zone that produces 5 in the Huber 17 Federal No. 1.

Q Mr. Herr, you've indicated that you believe that, I believe the word is channeling, may be occurring in the West Corbin No. 5 Well from the primary pay zone
which is marked in yellow on Exhibit Two and coming into the
perforations in the West Corbin 5. Why exactly is that?

11 А We have several reasons. First, as you 12 I've stated that the pay in this area is associated recall. 13 with a very clean gamma ray character on these logs and if 14 you will look at the perforated interval in the West Corbin 15 No. 5, there is no reservoir development within that portion 16 of the Woflcamp.

Secondly, we have run a production survey
within that well and all of the production in that well is
coming from the top perforated -- perforation in that well,
and that perforation is opposite a zone which has 1 percent
porosity.

Also we have a water analysis on both the Corbin 5 and the Huber 17 and both those water analyses are very similar in content, suggesting to us that the Corbin 5 has channeled down from the main -- well, from the South Corbin Wolfcamp pay.

2 And finally, we -- on the logs there is 3 an interval located beneath the yellow horizon, which is а 4 washout zone where we feel that there's a good chance that 5 we've had a bad cement across that zone. 6 0 Mr. Herr, let me hand you what has been 7 marked for identification as Exhibit Three and ask you to 8 explain what it is and what it shows. 9 А Okay, this is the water analysis which I 10 referred to on the West Corbin 5 and the Huber 17 No. 1. 11 If you'll look on the lefthand column at 12 the column -- or the row called chlorides, chlorides are the 13 most common indicators we use for -- in comparing the waters 14 in the formation. 15 If you'll look at those numbers, the Cor-16 bin 5 and Huber 17 have very similar chloride contents and 17 -- but radically different chloride contents with the Corbin 18 No. 1, which is the second well on the left on the cross 19 section. 20 So we feel that the production in the 21 Corbin 5 is actually going down from the main pay which we 22 think is at 10,800 into that top perforation in the well. 23 0 And why do you feel that the chlorides 24 are a good indicator of a relationship in this instance? 25 Well, chlorides are the most common con-А

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18 1 stituent and the most easily measured constituent to charac-2 terize formation water. 3 Were Exhibits Two and Three prepared Q by 4 you or compiled under your direction and supervision? 5 Α Yes. 6 MR. IVES: At this time --7 0 Do they accurately and correctly set 8 forth the information contained therein and as you have tes-9 tified here today? 10 Α Yes. 11 MR. IVES: I would offer Exhi-12 bits Two and Three into evidence at this time. 13 MR. exhibits STAMETS: These 14 will be admitted. 15 Mr. Herr, is it your opinion as a petro-Q 16 leum geologist to a reasonable probability that the Huber 17 17 and the Corbin 5 both are geologically related in that they 18 appear to be producing from the same primary pay zone? 19 Α Yes. 20 0 Is it your opinion as a petroleum geolo-21 gist to a reasonable probability that granting this applica-22 tion will be in the best interest of conservation and pre-23 vention of waste, and the protection of correlative rights? 24 A Yes. 25 MR. have no further IVES: Ι

19 1 questions of this witness. 2 3 CROSS EXAMINATION 4 BY MR. STAMETS: 5 Q Mr. Herr, was the purpose of this exhibit 6 show that there's basically a single pay in the to field 7 that is continuous between wells? 8 A Yes, that was the intent. 9 Q Looking at the third well I see a set of 10 perforations below the main pay interval. Are those still 11 open? 12 The upper perforations are. A They have --13 we have squeezed the perforations from 11,261 to 333. 14 0 Were those tested? 15 А Yes, they were tested. 16 Q What did they produce? 17 We tested a half a barrel of oil and А 19 18 barrels of load water in 10 hours. 19 Q Okay. Are there any other pay intervals 20 in the Wolfcamp in this area that are producing or have pro-21 duced significant quantities of oil? 22 Α The West Corbin No. 1, which is the 23 second well to the left, produces from a Wolfcamp limestone 24 detrital pay which is in the lower part of the Middle Wolf-25 camp.

20 1 And there are a few other wells in the 2 area which produce from a slightly different interval but 3 the majority of the wells produce from that pay interval 4 which we have identified as the South Corbin Wolfcamp pay. 5 Q Do you have any idea -- were -- were you 6 in 1985 or whenever this third well was perforated around 7 over that extensive interval? 8 Α I was, yes, I was with Southland at the 9 time. 10 Q Do you know why that interval was perfor-11 ated? 12 Α No, I do not, but we have an engineer 13 with us today that could answer that question for you. 14 All right. Do you know if Southland has 0 15 any plans to repair that well? 16 Α We, at the moment we do have a workover 17 procedure in on that West Corbin No. 5 to go in and attempt 18 to squeeze that pay and reperforate the well. 19 MR. STAMETS: Any other 20 questions of this witness? 21 MR. KELLAHIN: Yes, sir. 22 MR. STAMETS: Mr. Kellahin. 23 24 25

21 1 CROSS EXAMINATION 2 BY MR. KELLAHIN: 3 0 Mr. Herr, I'm using a stratigraphic cross 4 section that's not colored as yours is. Perhaps you could 5 help me, sir. 6 What is the proposed vertical limit for 7 the pool? 8 In which particular well or --A 9 Q You can use any of them as a type well to 10 show me the vertical limits. 11 Α Okay. Then I would go to the Huber 17 12 Federal 1 and it's that cleanest portion of the No. gamma 13 ray curve and occurs from approximately 10,870 to 11,010. 14 MR. STAMETS: I'm not clear on 15 that now. Would you be proposing a Wolfcamp pool for less 16 than the entire Wolfcamp interval or would -- are you just 17 indicating what the main pay is? 18 Α That is the interval that I think is 19 where the -- the pay is located. 20 0 I'm asking you something else. I didn't 21 make myself clear. 22 In terms of identifying for you or any 23 other operator that proposes to drill in the pool we need to 24 have a type log from which we can take the uppermost portion 25 of the pool and the lower portion. Certainly there will be

۱ some distance in there that may produce but in order to have 2 an order that tells us what the pool limits are vertically, 3 which of the logs would you select and what would the inter-4 val be? 5 Α Well. I would select, then, the interval 6 the cross section that we have labeled the Middle Wolfon 7 camp zone, and it's shown as an arrow with the label "Middle 8 Wolfcamp" located between the last two wells on the cross 9 section on the right hand side. 10 Q All right, it would be that portion of 11 the Wolfcamp? 12 Α Yes. 13 When we're looking for the continuity, as 0 14 a geologist, of the pay interval from well to well, are you 15 satisfied as a geologist that you will find that pay inter-16 val reasonably continuous across the area that you've map-17 ped? 18 Α The pay which I -- or the interval which 19 I call the South Corbin Wolfcamp pay, I think it is reason-20 ably continuous across that area. 21 0 Does the thickness of that interval in-22 crease and decrease as you move from well to well? 23 Α The overall interval changes somewhat. 24 The main change that occurs within the well is the actual 25 thickness of the limestone detrital.

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23 1 Q Does the qualify of the reservoir change 2 dramatically from well to well as we move across the pool? 3 A I don't think it necessarily is that the 4 quality of the reservoir changes as much as, say, maybe the 5 thickness. 6 0 As a geologist, then, are you satisfied 7 that the area to which these special rules are to be applied 8 is one that constitutes a separate and distinct reservoir in 9 the interval that you propose to be the new pool? 10 Α I'm sorry, I don't understand that ques-11 tion. 12 You have mapped us an area in your 0 stra-13 tigraphic cross section from northwest to southeast. Within 14 that area do you find a separate and distinct reservoir in 15 this Wolfcamp interval that is both separated vertically and 16 horizontally from other pools? 17 A Yes. 18 0 Where is the closest pool that produces 19 from this interval other than the one we're talking about 20 How far away is the next pool like this? now? 21 A I believe the closest one that I'm fam-22 iliar with would be the Scharb Wolfcamp Field. 23 0 And approximately how far away is that? 24 It would be located one township away, Α 25 six to eight miles, approximately.

24 1 Q In terms of establishing an initial hori-2 zontal boundary for the pool, does one of your exhibits show 3 us what the horizontal boundary is for the pool? 4 That interval which I've marked the Mid-А 5 dle Wolfcamp. 6 Yes, sir, and horizontally, 0 then, on a 7 land plat is that what's depicted on Exhibit Number One in 8 some fashion? 9 I'm not sure of that. Would you repeat Α 10 that, please? 11 0 Yes, sir. You're preparing the land plat 12 and the well locations in reference to your geology and I 13 want to find out from you as a geologist whether or not the 14 wells that you propose to include in the pool are all in the 15 same pool. 16 Α Yes. 17 Q As a geologist, do you think it would be 18 appropriate to initially space this pool on less than 80 19 acres? 20 Α Not at the moment until we have addi-21 tional information. 22 Q With the current present information 23 available to you, are you satisfied that geology shows you 24 that this pay interval is reasonable continuous? 25 A Yes.

25 1 Q It is not so discontinuous that you would 2 leave reservoir untested if you should drill the wells 80 3 acres apart. 4 Α With the information we have now, no, Ι 5 don't think so. 6 0 At this point with the current state of 7 information available to you, would you believe that wells 8 drilled on 40-acre spacing now would result in the drilling 9 of unnecessary wells? 10 A I believe in certain portions of this 11 pool it definitely would or could result in waste. 12 Q Will spacing on 80 acres lead to a more 13 efficient and quicker development of this pool? 14 Α I think so, yes. 15 MR. KELLAHIN: Nothing further. 16 17 **RECROSS EXAMINATION** 18 BY MR. STAMETS: 19 0 Mr. Herr, if you discovered a producing 20 interval in the Upper Wolfcamp, would you propose to dually 21 complete that interval with the Middle Wolfcamp? 22 Α If it was mechanically feasible, but to 23 date all that upper horizon, which I've labeled the Upper 24 Wolfcamp dolomite facies, we've encountered numerous shows 25 within that interval but all formation tests that I'm aware

26 1 of have recovered salt water. 2 Q I'm at a loss as to why you don't want to 3 include the entire Wolfcamp interval in these pool rules. 4 MR. Sir, could you re-IVES: 5 peat the question? 6 MR. STAMETS: Well, it's not 7 exactly a question. I was just saying I'm at a loss as to 8 why you don't want to include the entire Wolfcamp interval 9 within these pool rules. 10 Α That would not bother me. 11 MR. IVES: We do propose to de-12 dicate the entire Wolfcamp Pool to 80-acre spacing. 13 STAMETS: MR. Okay. I did not 14 understand that because --15 MR. IVES: On а temporary 16 basis. 17 MR. STAMETS: -- of the re-18 sponse to Mr. Kellahin's questions. 19 MR. CARR: Mr. Stamets, one 20 thing to try and avoid any confusion. This is an existing 21 pool at the present time. The initial well was drilled in 22 1967 and the shaded area on Exhibit One does outline what is 23 the existing pool boundary and it includes the Wolfcamp in-24 terval. 25 MR. Well, STAMETS: I under-

27 1 stood that Mr. Herr, in response to Mr. Kellahin's question, 2 wanted the horizontal -- or vertical limits of the pool to 3 be the Middle Wolfcamp as identified on the two righthand 4 logs on Exhibit Number Three -- no, Exhibit Two. 5 А I would say that I misunderstood the 6 question. 7 All right, thank you. Q 8 If I may, I believe MR. IVES: 9 this point may be clarified. I believe the line which Mr. 10 Herr was referring to on the Exhibit Two comes between the 11 second and third wells from the righthand side of the page 12 as opposd to the line between the first and second. 13 Q Is that correct, Mr. Herr? 14 Α Yes. 15 MR. STAMETS: Are there other 16 questions of this witness? 17 MR. LYON: May I ask a few 18 questions? 19 MR. STAMETS: Mr. Lyon. 20 21 QUESTIONS BY MR. LYON: 22 Q Mr. Herr, referring to your cross section 23 -- I'm V. T. Lyon, Chief Engineer for the Division. 24 You have some discontinuous (not clearly 25 understood) shown on a few of these wells. For instance,

1 the second well from the left, the West Corbin No. 1, you 2 have an interval which is at approximately 11,200 to 11,300 3 feet. It is shown -- is outlined by an irregular polygon 4 there and labeled Wolfcamp pay, and apparently, as I inter-5 pret this, that is not considered to be in connection with 6 any other wells shown on the cross section. 7 Α At the moment we do not think it connects 8 with any other wells. 9 Q But that is part of the Wolfcamp, is that 10 correct? 11 Α Yes. 12 And is part of this particular field 0 or 13 pool that we've been referring to. 14 Α Yes, right. 15 0 And the perforations on the third well 16 from the left are shown below the yellow interval but you 17 maintain that that well is producing from the yellow 18 interval, is that correct? 19 That's correct. Α 20 0 Then in the fourth well, just in the 21 perforations that straddle 11,200, those perforations have 22 been squeezed, is that what that symbol means? 23 Α Yes. 24 Q And it's actually producing from the top 25 of the yellow zone shown at -- straddling 10,900 feet? А Yes, opposite that label No. 2 there.

28

29 1 You also show on six, the sixth well from 0 2 the left, the upper interval there, that shows perforations 3 and is labeled Wolfcamp pay, which is above the yellow 4 interval, is that the pay zone in that well? 5 A Yes. 6 And in your last well on the right there 0 7 are two sets of perforations. One of them is in the yellow 8 and the other one is not in the yellow. 9 What is the situation on this well? 10 Α The lower perforations, the well was 11 worked over subsequently, and the upper perforations are the 12 producing perforations in that well. 13 If I understand your exhibit correctly, Q 14 and correct me if I'm wrong, you do indicate a zone with ap-15 parent continuous pay represented by the yellow --16 Yes, that's correct. Α 17 -- but that there are other 0 intervals 18 which are found from one location to another in the Wolf-19 camp, is that correct, that are not continuous? 20 Well, as I've stated, that the interval Α 21 which we marked the South Corbin Wolfcamp pay is the inter-22 val which produces in most or a majority of the wells in 23 that field. There are a few of the stringers that produce 24 in other portions of the Wolfcamp. 25 MR. LYON: I believe that's all

30 ۱ the questions I have. 2 MR. STAMETS: Any other ques-3 tions of Mr. Herr? 4 He may be excused. 5 MR. IVES: I would now like to 6 call Mr. John Stark for or on behalf of Southland Royalty 7 Company. 8 9 JOHN STARK, 10 being called as a witness and being duly sworn upon his 11 oath, testified as follows, to-wit: 12 13 DIRECT EXAMINATION 14 BY MR. IVES: 15 Q Mr. Stark, would you please state your 16 name and residence? 17 А My name is John Stark. I live in Mid-18 land, Texas. 19 0 What is your occupation and by whom are 20 you employed? 21 А Operations engineer, with Southland Roy-22 alty Company. 23 Q Stark, have you previously testified Mr. 24 before this Commission as a petroleum engineer and had your 25 credentials accepted as a matter of record?

31 1 А Yes, I have. 2 Are you familiar with the wells in Q the 3 area which are the subject of this application? 4 А Yes, I am. 5 Q Are you familiar with the application as 6 issued in this matter? 7 Α Yes, I am. 8 MR. IVES: I would tender Mr. 9 Stark as an expert petroleum engineer. 10 MR. STAMETS: He is considered 11 qualified. 12 Mr. Stark, I'd like you first to refer to Q 13 has been marked as Exhibit One and review the developwhat 14 ment of the pool referenced on Exhibit One and the data pre-15 sent on each well in the pool, if you would. 16 А Yes, sir. I prepared this map and the 17 shaded area is the pool outline, currently the South Corbin 18 Wolfcamp Field. 19 The well locations shown are all the 20 wells that have been tested and are -- and have been com-21 pleted in the Wolfcamp interval, and beside each well is 22 well data that I have gathered and in the lower left ----23 righthand corner of the map it explains this information. 24 It gives the operator name, the well name, the location of 25 the well, completion date, total depth, perforations, ini-

32 1 tial potential, the current production rate, cumulative to 2 the lastest available. 3 Was Exhibit One prepared by you? Q 4 А Yes, sir, it was. 5 0 And does it accurately and correctly set 6 forth the information contained therein and as you have just 7 testified at the hearing today? 8 Α Yes. 9 MR. I would offer Exhi-IVES: 10 bit One into evidence before the Commission. 11 MR. STAMETS: Exhibit One will 12 be admitted. 13 Q Mr. Stark, asking you to refer to what 14 has been marked as Exhibit Four for identification, could 15 you please explain to the Commission what it is and what it 16 shows? 17 This exhibit shows the volumetric A Yes. 18 calculations I've made on the Huber 17 Federal No. 1, the 19 well that we -- the most recent well drilled in the field by 20 Southland, and it's located in Section 17 in the Unit letter 21 M of that section. 22 This -- the information given, the first 23 one. I've used the estimated ultimate recovery of the well 24 of 100,000 barrels of oil. This was derived from decline 25 curve analysis of this well and wells in the area.

33 1 The next -- next item is H net. That 2 stands for the thickness of the net pay. I'm giving it 28 3 feet according to open hole log evaluation. 4 Also of porosity, I'm showing 6 percent 5 as the average porosity of this net pay. 6 B sub O I (sic) stands for formation 7 volume factor in initial conditions. 8 The next one is water saturation, SW, of 9 this net pay interval. 10 RF is the recovery factor, which I as-11 sumed 25 percent, and then A stands for the acreage of acre 12 drainage around this well and using the data I've just said 13 we calculated 73 acres of drainage. 14 0 Have you done or performed any other cal-15 culations to substantiate the information on Exhibit Four? 16 Α Yes, sir, we have pressure data from the 17 Huber 17 No. 1. 18 The first pressure point we had was in 19 December '85. After the well had produced 600 barrels of 20 oil it gave initial pressure of 4000 pounds bottom hole 21 pressure. 22 The second pressure data in this well was 23 February of '86 after the well had produced approximately 24 4600 barrels. The pressure was 3,600. 25 From this pressure data and the recovery

34 1 data I then performed a material balance evaluation in 2 which I estimated original oil in place of approximately 3 400,000 barrels of oil. Using my 25 percent recovery factor, as 5 explained previously, I come up with a recoverable oil 6 around this well of 100,000 barrels, which substantiates the 7 100,000 barrels of coverable oil that I used in my volumet-8 ric calculations. 9 0 Was Exhibit Number Four prepared by you? 10 Α Yes, it was. 11 Q And does it accurately and correctly set 12 forth the information contained therein and as you have tes-13 tified to here today? 14 A Yes. 15 MR. IVES: I would offer Exhi-16 bit Four into evidence before the Commission. 17 MR. STAMETS: Exhibit Four will 18 be admitted. 19 Mr. Stark, is it your opinion as a petro-Q 20 leum engineer to a reasonable probability that 80-acre spac-21 ing will efficiently and econmically drain the South Corbin 22 Wolfcamp Pool? 23 Α Yes, sir. 24 Q Is it your opinion as a petroleum en-25 gineer to a reasonable probability that granting this appli-

35 1 cation would be in the best interest of conservation, the 2 prevention of waste, and the protection of correlative 3 rights? 4 Α Yes, I do. 5 0 And is it your opinion as a petroleum en-6 gineer to a reasonable probability that granting this appli-7 cation will avoid drilling of unnecessary wells? 8 Α Yes. 9 Q And is that opinion based on the fact 10 that your volumetric calculations suggest that, for in-11 stance, the Huber 17 will drill -- will drain effectively 73 12 acres? 13 Α Yes, sir, with the data we have now. 14 0 Assuming that 80-acre spacing was granted 15 on a temporary basis, what information will you develop from 16 any additional wells you've drilled in relation to the spac-17 ing issue here today? 18 Α We would gather further performance and 19 pressure data from the existing and wells to be drilled and 20 from that data we would be able to do, as -- as explained, 21 do further volumetric and material balance calculations to 22 more accurately determine the drainage of acreage around 23 each well. 24 0 And would that information, could that 25 information then be used to justify either 80-acre spacing

36 1 on a permanent basis or suggest reversion to 40-acre spac-2 inq? 3 А Yes, sir, it would. 4 MR. IVES: Those are all the 5 questions I have of this witness. 6 7 CROSS EXAMINATION 8 BY MR. STAMETS: 9 0 Is there any pressure data available for 10 any of the wells in this pool? 11 А Wells besides the Huber 17? 12 Q Yes. 13 Α Okay, yes, sir, we have pressure 14 information in the West Corbin Unit Number Five that -- that 15 data was gathered in September of '85 after the well hađ 16 produced approximately 700 barrels of oil and it had a 17 pressure of 4300 pounds initially, which is --18 Q Is that bottom hole pressure? 19 Α Yes, this is bottom hole pressure. The 20 -- as I might go ahead and say, this pressure is 21 approximately 300 pounds higher than the initial pressure 22 found in the Huber 17-1, and due to the completion in the 23 West Corbin 5, we now suspect channeling possibly occurring. 24 I do not include this pressure data in the material balance 25 because of the -- we weren't sure of the completion and the
1 zone it could possibly be coming from.

Q There's no pressure data available for
West Corbin Unit No. 1, the Corbin Federal No. 1, any of
these other wells in this pool?

5 A Yes, sir, we have one pressure where we
6 have pressure information on the West Corbin Unit No. 1. It
7 was gathered in October of '85. This was from equipment
8 that is at the surface and we estimate bottom hole pressure
9 and we -- it estimated approximately 1000 pounds bottom hole
10 pressure.

11 Q As I recall looking at Exhibit Number 12 Two, that's a different interval, producing interval from 13 the No. 5, is that correct?

Yes, sir. We believe so.

15 Q Is there any pressure data available for
16 either of the wells in Section 20?

17 A No, sir. The data I've just said is all
18 -- is all the pressure data I'm aware of.

19 Q Did you make a search of the records to
20 determine if there was data available?

21 A Yes, sir, I looked through scout ticket 22 information and called other operators and this -- this is 23 all I found. 24 MD converse. here side of the second states are side of the second states and the second states are side of the secon

MR. STAMETS: Any other ques-

tions of this witness?

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38 1 MR. LYON: I've got a few gues-2 tions. 3 MR. STAMETS: Mr. Lyon. 4 5 QUESTIONS BY MR. LYON: 6 Mr. Stark, referring to Exhibit Four, why Q 7 did you choose Huber 17 for this calculation, Huber 17 No. 8 1? 9 Α we choose this well, we -- we had Okay, 10 a -- we didn't suspect any problem with completion as the 11 West Corbin 5 had encountered; any questions and suspicions 12 that possibly channeling is going on. We also had bond logs 13 and other logs that, you know, help us to determine that 14 there was no channeling, you know, no cement channels behind 15 pipe, so we felt confident the interval was completed as 16 shown on the perforations. 17 We also had more pressure data that we, 18 bottom hole pressure data, better quality, in this well that 19 I could then compare my original oil in place calculations 20 for material balance with my volumetrics and to see how they 21 fit together. 22 0 Well, what is the basis for your esti-23 mated recovery of 100,000 barrels? 24 Α That was based on looking at the perfor-25 mance of the wells in the area; the Wolfcamp interval, the

39 1 that were completed in the Wolfcamp in this wells entire 2 area. I tried to look at the decline curve analysis on as 3 many wells as I possibly could, including the West Corbin 5 4 and wells in the southern portion of the pool area. 5 I just -- some showed much higher And 6 than that, some showed much less, but this average -- this 7 number is an average that I obtained. 8 Q What's the cumulative production from 9 this well? 10 Α From the Huber 17-1? 11 Yes. Q 12 It's approximately 4000 barrels of oil Α 13 and 600 water. 14 Q All right. Now, your -- your net pay you 15 picked from your logs? 16 Yes, sir. A 17 0 Your porosity you picked from your logs. 18 Α Yes, sir. 19 0 What's -- what is the basis for your vol-20 umetric -- your reservoir volume factor? 21 Α The -- of the oil, the formation volume 22 factor? 23 Q Yes. 24 Α I was using correlations using the grav-25 ity of oil we obtained and measured; bottom hole pressure

40 1 and temperatures, and correlation charts to come up with a 2 formation volume factor initial. 3 So you had to (not clearly understood.) 0 4 Α You mean the PVT information? 5 Right. Q 6 Α No, sir, we have not done that. 7 0 You say there are -- are -- referring 8 back to Exhibit One, there are nine wells producing in this 9 field, is that right? 10 Yes, sir, I believe that's correct. А 11 Q Have any of those -- have any of those 12 wells recovered 100,000 barrels? 13 Α No. sir, but that includes the West 14 Corbin No. 5, I included, and, as seen, that well in its 15 short life has recovered nearly 64,000 barrels of oil al-16 ready and it's still flowing top allowable rates of 365 oil 17 a day. 18 Q Right. 19 Α Due to the proximity to that well I hađ 20 to weight somewhat my averaging of the -- close of that, 21 such a good performing well. 22 Also, there are some Wolfcamp wells out-23 side the pool area that I also had looked at, but, you know, 24 just to compare some other performance. 25 Q Some of these wells have produced for

 Λ 1 nigh on to twenty years, isn't that right? 2 А Yes, sir, the first well was completed in 3 July of '67. 4 Apparently they were not of the Q same 5 quality as those more recent wells there to the northwest. 6 Well, that's -- that's exactly what we're Α 7 trying to understand, is the difference -- what is making 8 this area so different in its performance. 9 0 It's almost as if it were a separate 10 field. 11 Α That's what we'd like to determine with 12 future data. 13 MR. LYON: I think that's all 14 the questions I have. 15 MR. STAMETS: Any other ques-16 Fions of Mr. Stark? 17 MR. IVES: I have a couple of 18 additional questions. 19 20 REDIRECT EXAMINATION 21 BY MR. IVES: 22 Q Mr. Stark, isn't your testimony here to-23 day that the pressure data you have across these number of 24 wells is not determinative of the issues in this applica-25 tion?

42 1 Well, at this point -- well, no, sir, not Α 2 -- we'd like to get more information. 3 In other words you do need more and addi-Q 4 tional information in order to come to -- obtain what you 5 will feel comfortable with in terms of figures showing pos-6 sible relationships across the Wolfcamp Pool? 7 Α Yes, sir, that's definitely true. We on-8 ly have two really pressure data that we feel competent of 9 and it's -- we just need much more to make a more accurate 10 estimate. 11 0 And were those two pressure points that 12 you're referring to taken from the Huber 17 Well? 13 A Yes. sir. 14 0 And is it your feeling that the volumet-15 ric calculation performed and which is set forth on Exhibit 16 Four provides you the best indication of drainage in the 17 pool at the present time? 18 Α At the present time, that's the best es-19 timate. 20 MR. IVES: I have no additional 21 questions. 22 MR. STAMETS: Any other ques-23 tions of the witness? 24 MR. KELLAHIN: Just a couple, 25 Mr. Chairman.

43 1 CROSS EXAMINATION 2 BY MR. KELLAHIN: 3 Mr. Stark, are you satisfied that the re-0 4 servoir parameters that you have used for the volumetric 5 calculation are reasonably typical for other wells from 6 which you have similar information? 7 Yes, sir. We feel that that 100,000 re-Α 8 coverable oil, as I was mentioning before, is, we feel like, 9 a reasonable number including all the poorer wells to the 10 south in this pool. 11 0 I meant the actual parameters that go in-12 to the calculations. 13 Yes, sir, that's --Α 14 The water saturation, all the rest of the 0 15 numbers that you have used and seen in this well and in this 16 log, are they generally typical of these others or is there 17 a range of difference here? 18 А Yes, sir, I feel like these are typical 19 of the wells I've looked at. 20 What is the original bottom hole pressure Q 21 of the Wolfcamp Pool? 22 Α I'm not -- again, the older -- I've 23 looked in the histories of -- these wells are nearly twenty 24 years old and I could not find any good quality data at all, 25 and that's why we went to the effort ot start gathering data

1 in these wells. 2 Do you see any significant difference in Q 3 the way the wells were completed and stimulated for produc-4 might account for the fact that some wells tion that have 5 produced significantly less than other wells? 6 Α sir, I have seen -- they're all com-No, 7 pleted similarly. 8 0 Have you done other volumetric calcula-9 tions, other than this one for the Huber No. 17 Federal L? 10 No, sir, I haven't. А 11 0 And this is the one you used because it 12 is the only well that you had what you thought was reliable 13 information? 14 Yes, sir. Α 15 0 Do you have any information from wells 16 that are adjacent to each other from which to draw any kind 17 of pressure information or conclusions about communication? 18 Ά No, sir, I don't, and as I believe noted 19 earlier, the rest of the field is really spaced at 80 acre 20 and greater, so, no, I don't. 21 I was looking at it in Sections 0 18 and 22 17. There are at least two wells there that are 40 acres 23 I -- is there anly information available to apart and you 24 from either of those wells that you could draw any compari-25 or studies about the abilities of wells to drain or sons

45 ١ communicate that close together? 2 Α Well, again, we don't have that good a 3 reliable pressure information in either well and I would not 4 like to at this point without more data, to make a judgment 5 either way on those two wells. 6 Q Thank you. 7 MR. STAMETS: Any other ques-8 tions of Mr. Stark? 9 He may be excused. 10 MR. IVES: I'd like to call Mr. 11 Gene Carlson to testify in behalf of Southland Royalty Com-12 pany at this time. 13 14 GENE CARLSON, 15 being called as a witness and being duly sworn upon his 16 oath, testified as follows, to-wit: 17 18 DIRECT EXAMINATION 19 BY MR. IVES: 20 0 Mr. Carlson, would you please state your 21 name and residence? 22 Α My name is Gene Carlson. I live in Mid-23 land, Texas. 24 Q And what is your occupation and by whom 25 are you currently employed?

46 1 Α I am Regional Reservoir Engineer for Mer-2 idian Oil Company -- or Incorporated, excuse me, in Midland. 3 Q And if you could please summarize your 4 educational background for the Commission beginning with 5 college and covering any advanced degrees you have received. 6 Α I received a BS degree in mechanical en-7 gineering from Texas A & M University in December, 1974. 8 0 Are you a member of any professional as-9 sociations or societies? 10 Yes, sir. I'm a member of the Society of Α 11 Petroleum Engineers of the American Institute of Mining En-12 gineering. 13 Are you -- let me ask you now to 0 sum-14 marize your work experience since your graduation from co1-15 lege, covering what company you were with, when you were 16 with them, and what position? 17 Α I was originally with Exxon Company USA 18 in Midland from 1975 until mid-1977, whereupon I went to 19 work for Southland Royalty Company, also in Midland. I wor-20 ked there until late 1979. 21 I was with Texas Oil and Gas in Dallas 22 and Denver until mid-1981, whereupon I returned to Southland 23 Midland and stayed until I was transferred to Ft. in Worth 24 in 1982 and I recently returned to Midland as the Regional 25 Reservoir Engineer for the newly merged organization, Meri-

47 1 dian Oil, Incorporated. 2 Carlson, are you familiar with the Q Mr. 3 wells in the area which is the subject of this application? 4 Yes, I am. А 5 Q Are you familiar with the application at 6 issue in this matter? 7 Yes, I am. Α 8 MR. IVES: I would offer Mr. 9 Carlson as an expert in the area of petroleum engineering. 10 MR. STAMETS: He is considered 11 qualified. 12 Mr. Carlson, let me ask you please to re-0 13 fer to what has been marked for identification as Exhibit 14 Number Five and explain to the Commissioners what it is and 15 what it shows and please, if you would, detail out any acro-16 nyms or other abbreviations which are set forth on the exhi-17 bit, and it might be helpful to go column by column. 18 All right. First of all, I'd like to ex-Α 19 in concept what we've done here is we've built plain upon 20 previous testimony which established that a reasonable re-21 covery, for example, the Huber 17-1, which is also coinci-22 dentally offset to most of the obligation problems that we 23 have right now. 24 17-1 is estimated to have The Huber an 25 ultimate recovery of about 100,000 barrels if it were allowed to drain what is estimated to be its 73 acres it will
drain ultimately.

What we did here is we compared the economics of leaving one well on 80-acre spacing, that is, the Huber 17-1, for example, which would recover an ultimate 100,000 barrels of oil recovered.

7 The second case that we would have is 8 going to the 40-acre development density, in which case the 9 full 80 acres would be drained and hence increase the re-10 covery from the two combined wells to about 110,000 barrels, 11 or increase the recovery an additional 7 percent, or 7 ac-12 res.

The economics that we've summarized here show on the left column discussing the -- what -- or labeling the items that are under each of the four cases of economics that I'll delineate later.

17 The oil in thousands of stock tank bar18 rels of oil is expressed in gross and net for a working in19 terest of 100 percent and a net interest of 87-1/2.

20 The gas reserves volumes are the -- ex21 pressed in million cubic feet of -- million standard cubic
22 feet of gas that is also expressed in gross and net, is in23 dicated in parentheses.

24 With the working interest investment
25 based on 100 percent working interest for a typical well in

١ this area is \$874,000 by our best estimate. It would take 2 -- the payout in years is after Federal income tax payout 3 for an investment for the four cases that was run, and the 4 ROR is the effective rate of return by discounted cash flow 5 analysis that says what the effective interest rate that you 6 get for your investment by doing this business opportunity. 7 The PI is the profit to investment ratio 8 at 15 percent discount, also by the discounted cash flow 9 method, and is the ratio of the -- what the last item is, 10 which is the net present value at 15 percent discounted com-11 pared against the investment of \$874,000 in the first exam-12 ple. 13 We used for all these economic calcula-14 an oil price of \$20.00 a barrel and a gas price of tions 15 \$1.50 per MCF. Of course, we'll remind you later in the 16 presentation that oil is now running about \$13.00 a barrel. 17 Initial producing rate that we used for 18 each of these on a -- for a typical well would be 50 barrels 19 of oil per day initial production rate. The gas/oil ratio 20 employed was 2000 standard cubic feet of gas per barrel of 21 oil and again the working interest used was 100 percent and 22 the net revenue interest, 87-1/2 percent. 23 The first case of economics that was pre-24 pared shows what we believe to be the economics of the Huber 25 17-1 retroactive to its time zero or date of drilling.

50 1 If you recover 100,000 barrels from this 2 well. as established in previous testimony, you would also 3 recover 200,000,000 cubic feet of gas gross and you would 4 spend \$874,000 to get that. 5 It would take 1.7 years to payout after 6 Federal income tax and you would achieve what I would con-7 sider to be an acceptable after Federal income tax rate of 8 return of about 40 percent. 9 The profit to investment ratio is .26. 10 which is well within most people's guidelines and the net 11 present value that you would achieve over your investment 12 discounted at 15 percent is \$229,000. 13 What we see here is in general terms а 14 very good acceptable economic proposition. 15 The next three cases of economics that 16 are delineated show the other scenarios of how you can look 17 at it from very many different viewpoints. I call your at-18 tention to the farthest right case of economics, which shows 19 what we would have to do to drill the second well, or what 20 would result if we drilled the second well on that 80-acre 21 tract with 40-acre spacing and that second well would, as 22 it's indicated, increase the recovery in oil, 100,000 bar-23 rels to almost 110,000 barrels, reflecting 80-acre drainage 24 versus 73. 25 The qas associated with that would be

219,000,000 cubic feet of gas and working interest investment, as you can see, would double the single well case, and
for the two well case here you see that the payout in years
would be almost four years.

The rate of return experienced for us on the overall project basis would be about 4-7 percent, which you could greatly exceed by buying a Treasury bond at this time; just to show how you would compare that in your mind versus, you know, that is the main economic parameter we're looking at here and that's your rate of return.

The profit to investment ratio is negative because the rate of return is less than the discount rate of 15 percent employed in the PI calculations and, of course, the net present value to -- to us at 15 percent discount is negative for this case for the combined economics of the two wells.

17 Now let's look at it again and let's say 18 that Southland -- or Meridian and Southland were not allowed 19 to maintain the 80-acre spacing and we also made the busi-20 ness decision which by the economic parameters showed in the 21 right cases we probably would not seek the opportunity to 22 drill a 40-acre well, we would then have the production es-23 timated to June 1st, 1986, without two wells in the reser-24 voir, as indicated in the note at the bottom.

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So our current well would recover more

1 than half of the 110,000 barrels stated for the two well 2 case. We would recover from the Huber 17-1 because it would 3 have a head start on the second well, would recover about 4 59,000 barrels and about 118,000,000 cubic feet of gas. 5 Again our working interest investment, 6 looking back from time zero, \$874,000. 7 Our payout on the well would change from 8 1.7 years to 3.5 years, and again our rate of return, AFIT, 9 would drop well below acceptable rates of return, which 10 would have to be -- most people use more than 50 percent, 11 and as you can see, the rate of return for the case of us 12 having the Huber 1 Well compete with someone else's new 13 well, as we use in the vernacular, would be 7.4 percent rate 14 of return. 15 The profit to investment again is nega-16 tive because the return is less than the stated discount, 17 and net present value to us of the Huber well, Huber 17-1, 18 is negative also, \$70,000. 19 We want to also point out the economics 20 of the new well, in that if you despaced this based on the 21 information we have in to date, the new well on 40-acre 22 spacing would achieve less recovery than the Huber 17-1, or 23 51,000 barrels, approximately, 101,000,000 cubic feet of 24 gas. They would have to spend \$874,000 to do it and j.t 25 would take 4.1 years for it to pay out. The rate of return

53 1 would be 2 percent AFIT. The profit to investment ratio 2 would also be negative and the net present value would be 3 minus \$116,000. 4 What we would want to point out with this 5 is that if you do engineering analysis with the available 6 information as we have done, that this is not an economical 7 prospect on 40-acre drainage. 8 you have full development on 40-acre If 9 drainage and wells competing, no one is going to be able to 10 make money out here based on current information that we 11 have. 12 to draw the conclusion, then, if you so, 13 drilled the thing on 40-acre spacing and everybody does 14 their homework, you're not going to get as many wells dril-15 led as if you would allow us to drill them on 80-acre spac-16 ing. 17 0 Mr. Carlson, assuming that the South Cor-18 bin Wolfcamp were developed on 40-acre spacing, is it your 19 opinion as a petroleum engineer to a reasonable probability 20 that such wells would be uneconomical and result in economic 21 waste? 22 Α Based on data at hand today, I believe 23 that be true. 24 0 Was Exhibit Five prepared by you? 25 Α Yes, sir.

54 1 Q And does it accurately and correctly set forth the information contained therein and as you have tes-2 tified to here today? 3 Α Yes, sir. 4 MR. IVES: I would offer Exhi-5 6 bit Five into evidence. 7 MR. STAMETS: Exhibit Five will be admitted. 8 9 Are there questions of Mr. Carlson? 10 11 MR. IVES: Ι have one last. general question. 12 MR. STAMETS: All right. 13 Q Mr. Carlson, is it your opinion as a pet-14 roleum engineer to a reasonable probability that granting 15 this applicatio is in the best interest of conservation, the 16 prevention of economic waste, and the protection of correla-17 18 tive rights? 19 Α Yes, sir, I believe that to be true. 20 MR. IVES: No further questions. 21 22 MR. STAMETS: Any other guestions of Mr. Carlson? 23 24 He may be excused. 25 Mr. Ives, do you have anything

55 1 further you wish to offer in this case? 2 Does anyone have a closing 3 statement? 4 MR. IVES: We have nothing fur-5 ther to offer, Mr. Commissioner. 6 MR. STAMETS: Tom, do you have 7 any --8 MR. KELLAHIN: Nothing, sir. 9 MR. LYON: May I inquire, is 10 there anything in the record which shows that there is 80-11 acres of common lease which is available to each of these 12 wells indicated? 13 MR. IVES: I'm not aware of 14 anything in the record. 15 MR. LYON: What I'm concerned 16 about is --17 18 (Thereupon a discussion was had off the record.) 19 20 MR. STAMETS: Gentlemen, the 21 Commission has decided that we will approve the application 22 for a temporary period of 18 months. Let's see, today j.s 23 the 9th of April, and unless there is some reason to make 24 the effective data some other date we would propose to make 25 that effective May the 1st, and the basis for this would be

56 ۱ the economic data that there is not a great deal of engine-2 ering data to demonstrate that the wells can, indeed, drain 3 80 acres, but there is sufficient economic data to indicate 4 at this time the pool cannot be economically developed on 5 less than the 80-acres, and we would ask that we be provided 6 with a draft order which would set out those findings and --7 and an order with provisions that we have discussed there, 8 including coming back in for demonstration at the end of 18 9 months for a demonstration and 80 acres is indeed the cor-10 rect spacing for this pool. 11 being the decision of the That 12 Commission, we would sign that order as soon as it becomes 13 available. 14 If there is nothing further, 15 this hearing will be recessed until 9:00 o'clock tothen. 16 morrow morning. 17 18 (Hearing concluded.) 19 20 21 22 23 24 25

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2	CERTIFICATE
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4	I, SALLY W. BOYD, C.S.R., DO
5	HEREBY CERTIFY the foregoing Transcript of Hearing before
6	the Oil Conservation Division (Commission) was reported by
7	me; that the said transcript is a full, true, and correct
8	record of the hearing, prepared by me to the best of my
9	ability.
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12	Salleyles. Boyd CSR
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STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT 1 OIL CONSERVATION DIVISION STATE LAND OFFICE BLDG. 2 SANTA FE, NEW MEXICO 3 9 April 1986 4 COMMISSION HEARING 5 6 IN THE MATTER OF: 7 Application of Southland Royalty CASE 8 Company for special pool rules, 8802 Lea County, New Mexico. 9 10 11 12 BEFORE; Richard L. Stamets, Chairman 13 Ed Kelley, Commissioner 14 15 TRANSCRIPT OF HEARING 16 17 APPEARANCES 18 For the Oil Conservation Jeff Taylor 19 Division: Legal Counsel to the Division Oil Conservation Division 20 State Land Office Bldg. Santa Fe, New Mexico 87501 21 22 For the Applicant: Peter N. Ives Attorney at Law 23 CAMPBELL & BLACK P. A. P. O. Box 2208 24 Santa Fe, New Mexico 87501 25 For Conoco, Inc.: W. Thomas Kellahin Attorney at Law KELLAHIN & KELLAHIN P. O. Box 2265 Santa Fe, New Mexico 87501

INDEX STATEMENT BY MR. IVES TREY SHEPHERD III Direct Examination by Mr. Ives RANDY HERR Direct Examination by Mr. Ives Cross Examination by Mr. Stamets Cross Examination by Mr. Kellahin Recross Examination by Mr. Stamets Questions by Mr. Lyon JOHN STARK Direct Examination by Mr. Ives Cross Examination by Mr. Stamets Questions by Mr. Lyon Redirect Examination by Mr. Ives Cross Examination by Mr. Kellahin GENE CARLSON Direct Examination by Mr. Ives

EXHIBITS SRC Exhibit One, Map SRC Exhibit Two, Cross Section б SRC Exhibit Three, Water Analysis SRC Exhibit Four, Data SRC Exhibit Five, Calculations STATEMENT OF DECISION BY MR. STAMETS

4 1 2 MR. STAMETS: Call next Case 3 8802. 4 MR. TAYLOR: The application of 5 Southland Royalty Company for special pool rules, Lea Coun-6 ty, New Mexico. 7 MR. STAMETS: Call for appear-8 ances. 9 MR. IVES: Peter Ives, with the 10 firm of Campbell and Black, representing Southland Royalty 11 Company. 12 MR. STAMETS: Other appear-13 ances? 14 MR. KELLAHIN: Chairman, Mr. 15 I'm Tom Kellahin from Santa Fe, New Mexico, appearing on be-16 half of Conoco, Inc. 17 MR. STAMETS: Mr. Ives. 18 MR. May it please the IVES: 19 Commission, we are here today before the Commission seeking 20 temporary special pool rules for the South Corbin Wolfcamp 21 Pool. 22 testimony which we will Our 23 present today will show that 80-acre spacing is currently 24 justified from a geologic and engineering standpoint for the 25 pool; that without the granting of 80-acre spacing economic

1 waste will occur and development of the pool will be hin-2 dered or curtailed and we believe that an expedited order is 3 neede in this matter to prevent economic waste due to a 4 drilling obligation of Southland Royalty Company, which they 5 face on May 3rd, 1986. 6 I have four witnesses today 7 from Southland Royalty Company to present testimony and ex-8 hibits and I would call my first witness. 9 MR. TAYLOR: We have to swear 10 your witnesses first. 11 Tom, do you have any witnesses? 12 MR. KELLAHIN: No, sir. 13 14 (Witnesses sworn.) 15 16 MR. IVES: Call as my first 17 witness, Mr. Trey Shepherd. 18 19 TREY SHEPHERD, III 20 being called as a witness and being duly sworn upon his 21 oath, testified as follows, to-wit: 22 23 DIRECT EXAMINATION 24 BY MR. IVES: 25 Mr. Shepherd, would you please state your Q

6 1 name and residence for the record. 2 Α My name is Trey Shepherd and I live at. 3 5201 Brazos, Midland, Texas. 4 Q And what is your current occupation and 5 by whom are you currently employed? 6 Α I am a landman for Meridian Oil, Incor-7 porated. 8 I would like to review with you your edu-0 9 cational background beginning with college. Please tell us what degrees, beginning with college, you have received. 10 11 Α I went to the University of Texas at. Austin and received a Bachelor of Business Administration in 12 13 petroleum land management in 1979. 14 0 And have you received any advanced de-15 grees since then? 16 Α No, I have not. 17 Q Are you a member of any professional as-18 sociations or societies? 19 Α I'm a member of the American Association 20 of Petroleum Landmen and the Permian Basin Landmen's Asso-21 ciation. 22 0 I would also like to review your work ex-23 perience for the Commission beginning with your work assign-24 ments after college. 25 Α In 1979 I went to work for Atlantic Rich-

7 1 field Company in Tulsa, Oklahoma, as a staff landman. 2 In 1980 I was transferred to Tyler, 3 Texas as a Senior Landman and I worked there until the early 4 part of 1983 and was transferred to Lafayette, Louisiana, as 5 a Provence (sic) Landman, and in the middle of the summer of 6 1983 I went to work for Southland Royalty Company in Midland 7 and have been with them since that date. 8 Q Are you familiar with the wells in the 9 area which is the subject of this application? 10 Α Yes, I am. 11 And are you familiar with the application 0 12 at issue in this matter? 13 Α Yes. 14 MR. IVES: I would tender Mr. 15 Shepherd as an expert witness in the area of -- as a land-16 man. 17 He is considered MR. STAMETS: 18 qualified. 19 Would somebody clear the record 20 in the relationship between Meridian and Southland? 21 MR. IVES: Certainly. We were 22 going to cover that. 23 MR. STAMETS: Fine. 24 Mr. Shepherd, if I could ask you to state Q 25 for the Commission, just what is the relationship between

8 1 Meridian Oil, Incorporated, and Southland Royalty company? 2 Meridian Oil, Incorporated, acquired Α 3 Southland Royalty Company in the fourth quarter of last4 They now act as agent for Southland Royalty Company. year. 5 For purposes of this proceeding, we will Q 6 refer to Southland Royalty Company, as they were the initial 7 applicant before the Commission, simply for ease and con-8 venience. 9 Mr. Shepherd, could you please briefly 10 state for the Commission what is sought in this application? 11 Α We are seeking temporary pool rules of 12 80-acres for the South Corbin Wolfcamp Field. 13 Q And when you say temporary pool rules, 14 what period of time are you speaking of? 15 Approximately 18 months. Α 16 Q And why are you seeking these temporary 17 pool rules? 18 Α To gain information to determine whether 19 this request for 80-acre spacing is justified or whether the 20 wells should actually be drilled on 40 acres. 21 I would like to please refer to what's 0 22 been marked as Exhibit One for identification and explain to 23 the Commissioners what it is and what it shows. 24 This is a map of the South Corbin Α Wolf-25 Field. The field is shaded in the gray color. camp Over that, portions of that, are Southland's acreage shaded in
green. The farmouts which we have acquired are shaded in
pink.

This contains the wells in the field,
their names, operators, their completion dates, production
history, perforated intervals, et cetera.

7 Q Could you please relate to the Commission
8 generally the history of development in the South Corbin
9 Wolfcamp Field?

10 A Not a great deal of activity in the field
11 itself; there've been only nine wells drilled in approxi12 mately the last 19 years. Two of those were drilled in
13 1967, one other well in 1968. There was then approximately
14 an 11-year period before any additional drilling was done,
15 and the most recent activity has been by Southland Royalty
16 Company in Section 17.

17 Q And what was the date of the first well
18 drilled in the pool?

A 1967.

19

20QWhat has the effective spacing in the21area been?

A The effective spacing is 80 acres.
Q And I would like to ask what drilling obligation Southland Royalty Company has at the present time
in the South Corbin Wolfcamp Field?

1 We have two farm-ins in the southwest Α 2 Section 17. Our first farm-in is from J. Μ. quarter of 3 Huber Corporation. It covers the east half of the southwest 4 quarter and the southwest quarter of the southwest quarter. 5 Our next obligation date under that farm-in is May the 3rd 6 of this year. 7 We also have a farm-in from Armstrong 8 Energy Corporation in the northwest quarter of the southwest 9 quarter and with a May 15th obligation date. 10 And does Southland Royalty Company seek 0 11 and need an expedited order in this matter? 12 sir, we do, if we are to meet this Α Yes, 13 drilling obligation. We need an order by May the 3rd. 14 What are Southland Royalty Company's de-0 15 velopment plans in the South Corbin Wolfcamp? 16 We plan to drill our next well in Unit K Α 17 Section 17 and depending on the performance of that well of 18 and the two existing wells that we have drilled, two recent 19 wells we have drilled, rather, we plan additional wells in 20 Unit C of Section 17 and Unit J of Section 18. 21 Exhibit One prepared by Southland Was 0 22 Royalty Company? 23 Yes, it was. Α 24 And do you have personal knowledge of the Q 25 information which is set forth on Exhibit One?

11 1 Α Yes, I do. 2 Is the information on Exhibit One 0 accu-3 rate and correct? 4 Α Yes. 5 MR. IVES: would at Ι this 6 point in time offer Exhibit One into evidence. 7 MR. STAMETS: Is the witness 8 referring to the information relative the acreage in the 9 pool, (not clearly understood)depths, well locations, or is 10 he also referring to the production data, depth, and so on? 11 Α You mean insofar as what I have prepared? 12 MR. STAMETS: In your prepara-13 tion and your knowledge of Exhibit Number One? 14 Α I have discussed this information with 15 the engineers that will testify later and I myself have pre-16 pared the information in regard to the acreage within the 17 pool and Southland's acreage and the farm-in acreage that we 18 hold. 19 MR. STAMETS: Mr. Ives, I think 20 would prefer to wait till all of the data on Exhibit Ι One 21 has been discussed before we --22 MR. IVES: That's fine. 23 0 Mr. Shepherd, is it your opinion that 24 granting the application will be in the best interest of 25 preventing waste in the south part of the Wolfcamp Pool?

12 1 Α Yes, it is. 2 MR. IVES: Those are all the 3 questions I have of this first witness. 4 MR. STAMETS: Any questions of 5 the witness? 6 He may be excused. 7 MR. I'm going to call IVES: 8 our second witness, Mr. Randy Herr. 9 10 RANDY HERR, 11 being called as a witness and being duly sworn upon his 12 oath, testified as follows, to-wit: 13 14 DIRECT EXAMINATION 15 BY MR. IVES: 16 Would you please state your Q name and 17 place of residence, Mr. Herr? 18 My name is Randy Herr and I live in Mid-Α 19 land, Texas. 20 And what is your current occupation 0 and 21 by whom are you currently employed? 22 Α I'm a petroleum geologist for Meridian 23 Oil, Incorporated. 24 0 I would like to review with you your edu-25 cational background beginning with college and degrees, ad

1 vanced degrees which you have received.

A I received my Bachelor of Science in
geology from Texas A & M in 1970; then received a Master of
Science in geology from the University of Utah in 1979.

5 Q And are you a member of any professional
6 associations or societies?

7 A A member of the Association -- American
8 Association of Petroleum Geologists, Society of Economic
9 Paleontologists and Mineralogists, the West Texas Geological
10 Society and the Permian Basin Section of the Society of
11 Economic Paleontologists and Mineralogists.

12 Q Mr. Herr, I'd like to now review with you 13 your work experience since college, if you could cover each 14 job you've had, your position, and general responsibilities. 15 A In 1979 I joined Union Oil Company of 16 California where I was a development geologist with that

17 company. I worked development projects throughout the Per18 mian Basin area.

In 1981, and to the present, I am a petroleum geologist with Southland Royalty Company where I have
recommended exploration and development projects in southeast New Mexico, the Central Basin Platform, the Midland
Basin, and the Northern Valverde Basin.

24 Q Mr. Herr, are you familiar with the wells
25 in the area of -- that are the subject of this application?

14 1 Α Yes, I am. 2 0 Are you familiar with the application at 3 issue in this matter? 4 Yes, I am. Α 5 MR. IVES: I would tender Mr. 6 Herr as an expert in geology, petroleum geology, before the 7 Commission and for purposes of this proceeding. 8 MR. STAMETS: The witness is 9 considered qualified. 10 directing your attention Mr. Herr, 0 to 11 what has been marked for identification as Exhibit Two, 12 could you please explain to the Commissioners what it is and 13 what it shows? 14 Okay. This is a north/south strati-Α 15 graphic cross section that goes through the South Corbin 16 Wolfcamp Field. There is an index map on the lefthand side 17 of the map showing the locations for the wells involved in 18 the cross section. 19 stratigraphic cross section is hung This 20 the datum on the top of the Third Bone Spring with Sand, 21 that's the very top dark line. 22 The next heavy line located below that is 23 the top of the Wolfcamp. 24 The next heavy line located below that is 25 the top of the Strawn; similarly below that is the Atoka and

15 1 Morrow sections. 2 The Wolfcamp has been split into differ-3 ent, several different horizons. 4 The uppermost horizon is called the Upper 5 Wolfcamp dolomite facies. This is a nonproductive facies in 6 the area. 7 Similarly, below this is the Upper Wolf-8 camp cherty limestone facies. It also is not productive in 9 this area. 10 producing area in the South Corbin The 11 Field is located in the Middle Wolfcamp zone. In particular 12 the main pay in the area is called the South Corbin Wolfcamp 13 pay and on the cross section it is shown in the yellow hori-14 zon. 15 Now the Wolfcamp in this area pays from a 16 limestone detrital, which is characterized by a very clean 17 gamma ray character on the log. If you will look at the 18 cross section in the producing wells, you will notice that 19 very clean gamma ray character. 20 Our Huber 17 Federal No. 1, which would 21 be the fourth well from the left, is perforated and produc-22 ing from one of these very clean gamma ray portions of the 23 log. 24 West Corbin 5, located just to Our the 25 left of that well, which would be the third well on the
1 cross section, is perforated in the lower portion of the
2 Middle Wolfcamp but we have evidence to suggest that that
3 production is actually coming from the zone that's at appro4 ximately 10,800, which is the correlative zone that produces
5 in the Huber 17 Federal No. 1.

Q Mr. Herr, you've indicated that you believe that, I believe the word is channeling, may be occurring in the West Corbin No. 5 Well from the primary pay zone
which is marked in yellow on Exhibit Two and coming into the
perforations in the West Corbin 5. Why exactly is that?

11 Α We have several reasons. First, as you 12 recall. I've stated that the pay in this area is associated 13 with a very clean gamma ray character on these logs and if 14 you will look at the perforated interval in the West Corbin 15 No. 5, there is no reservoir development within that portion 16 of the Woflcamp.

Secondly, we have run a production survey
within that well and all of the production in that well is
coming from the top perforated -- perforation in that well,
and that perforation is opposite a zone which has 1 percent
porosity.

Also we have a water analysis on both the
Corbin 5 and the Huber 17 and both those water analyses are
very similar in content, suggesting to us that the Corbin 5
has channeled down from the main -- well, from the South

Corbin Wolfcamp pay.

2 And finally, we -- on the logs there is 3 an interval located beneath the yellow horizon, which is а 4 washout zone where we feel that there's a good chance that 5 we've had a bad cement across that zone. 6 Herr, let me hand you what has been 0 Mr. 7 for identification as Exhibit Three and ask you marked to 8 explain what it is and what it shows. 9 Α Okay, this is the water analysis which I 10 referred to on the West Corbin 5 and the Huber 17 No. 1. 11 If you'll look on the lefthand column at. 12 the column -- or the row called chlorides, chlorides are the 13 most common indicators we use for -- in comparing the waters 14 in the formation. 15 If you'll look at those numbers, the Cor-16 bin 5 and Huber 17 have very similar chloride contents and 17 -- but radically different chloride contents with the Corbin 18 No. 1, which is the second well on the left on the cross 19 section. 20 feel that the production So we in the 21 Corbin 5 is actually going down from the main pay which we 22 think is at 10,800 into that top perforation in the well. 23 Q And why do you feel that the chlorides 24 are a good indicator of a relationship in this instance? 25 Α Well, chlorides are the most common con-

18 1 stituent and the most easily measured constituent to charac-2 terize formation water. 3 Were Exhibits Two and Three prepared by 0 4 you or compiled under your direction and supervision? 5 Α Yes. 6 MR. IVES: At this time --7 Do they accurately and correctly Q set. 8 forth the information contained therein and as you have tes-9 tified here today? 10 Α Yes. 11 MR. IVES: I would offer Exhi-12 bits Two and Three into evidence at this time. 13 MR. These exhibits STAMETS: 14 will be admitted. 15 Q Mr. Herr, is it your opinion as a petro-16 leum geologist to a reasonable probability that the Huber 17 17 and the Corbin 5 both are geologically related in that they 18 appear to be producing from the same primary pay zone? 19 A Yes. 20 Is it your opinion as a petroleum geolo-Q 21 gist to a reasonable probability that granting this applica-22 tion will be in the best interest of conservation and pre-23 vention of waste, and the protection of correlative rights? 24 Α Yes. 25 MR. IVES: I have no further

19 1 questions of this witness. 2 3 CROSS EXAMINATION 4 BY MR. STAMETS: 5 Q Mr. Herr, was the purpose of this exhibit 6 show that there's basically a single pay in the to field 7 that is continuous between wells? 8 Α Yes, that was the intent. 9 Q Looking at the third well I see a set of 10 perforations below the main pay interval. Are those still 11 open? 12 Α The upper perforations are. They have --13 we have squeezed the perforations from 11,261 to 333. 14 Were those tested? 0 15 Α Yes, they were tested. 16 0 What did they produce? 17 Α We tested a half a barrel of oil and 19 18 barrels of load water in 10 hours. 19 0 Okay. Are there any other pay intervals 20 in the Wolfcamp in this area that are producing or have pro-21 duced significant quantities of oil? 22 Α The West Corbin No. 1, which is the 23 second well to the left, produces from a Wolfcamp limestone 24 detrital pay which is in the lower part of the Middle Wolf-25 camp.

20 ۱ And there are a few other wells in the 2 area which produce from a slightly different interval but the majority of the wells produce from that pay 3 interval 4 which we have identified as the South Corbin Wolfcamp pay. 5 Do you have any idea -- were -- were you Q 6 1985 or whenever this third well was perforated around in 7 over that extensive interval? 8 Α I was, yes, I was with Southland at the 9 time. 10 Q Do you know why that interval was perfor-11 ated? 12 A No, I do not, but we have an engineer 13 with us today that could answer that question for you. 14 Q All right. Do you know if Southland has 15 any plans to repair that well? 16 Α We, at the moment we do have a workover 17 procedure in on that West Corbin No. 5 to go in and attempt 18 to squeeze that pay and reperforate the well. 19 MR. STAMETS: Any other 20 questions of this witness? 21 MR. KELLAHIN: Yes, sir. 22 MR. STAMETS: Mr. Kellahin. 23 24 25

21 1 CROSS EXAMINATION 2 BY MR. KELLAHIN: 3 Mr. Herr, I'm using a stratigraphic cross 0 4 section that's not colored as yours is. Perhaps you could 5 help me, sir. 6 is the proposed vertical limit What for 7 the pool? 8 In which particular well or --Α 9 You can use any of them as a type well to 0 10 show me the vertical limits. 11 Then I would go to the Huber Α Okay. 17 12 Federal No. 1 and it's that cleanest portion of the gamma 13 ray curve and occurs from approximately 10,870 to 11,010. 14 MR. STAMETS: I'm not clear on 15 that now. Would you be proposing a Wolfcamp pool for less 16 than the entire Wolfcamp interval or would -- are you just 17 indicating what the main pay is? 18 That is the interval that I think Α is 19 where the -- the pay is located. 20 I'm asking you something else. I didn't Q 21 make myself clear. 22 terms of identifying for you or In any 23 other operator that proposes to drill in the pool we need to 24 have a type log from which we can take the uppermost portion 25 of the pool and the lower portion. Certainly there will be

some distance in there that may produce but in order to have an order that tells us what the pool limits are vertically, which of the logs would you select and what would the interval be?

A Well, I would select, then, the interval
on the cross section that we have labeled the Middle Wolfcamp zone, and it's shown as an arrow with the label "Middle
Wolfcamp" located between the last two wells on the cross
section on the right hand side.

10 Q All right, it would be that portion of 11 the Wolfcamp?

A Yes.

12

13 Q When we're looking for the continuity, as 14 a geologist, of the pay interval from well to well, are you 15 satisfied as a geologist that you will find that pay inter-16 val reasonably continuous across the area that you've map-17 ped?

18 A The pay which I -- or the interval which
19 I call the South Corbin Wolfcamp pay, I think it is reason20 ably continuous across that area.

21 Q Does the thickness of that interval in22 crease and decrease as you move from well to well?

23 A The overall interval changes somewhat.
24 The main change that occurs within the well is the actual
25 thickness of the limestone detrital.

1 Does the qualify of the reservoir change Q 2 dramatically from well to well as we move across the pool? 3 Α I don't think it necessarily is that the 4 quality of the reservoir changes as much as, say, maybe the 5 thickness. 6 As a geologist, then, are you satisfied 0 7 that the area to which these special rules are to be applied 8 is one that constitutes a separate and distinct reservoir in 9 the interval that you propose to be the new pool? 10 I'm sorry, I don't understand that ques-Α 11 tion. 12 Q You have mapped us an area in your stra-13 tigraphic cross section from northwest to southeast. Within 14 that area do you find a separate and distinct reservoir in 15 this Wolfcamp interval that is both separated vertically and 16 horizontally from other pools? 17 Α Yes. 18 0 Where is the closest pool that produces 19 interval other than the one we're talking about from this 20 How far away is the next pool like this? now? 21 I believe the closest one that I'm fam-Α 22 iliar with would be the Scharb Wolfcamp Field. 23 And approximately how far away is that? Q 24 It would be located one township away, Α 25 six to eight miles, approximately.

24 1 In terms of establishing an initial hori-0 2 zontal boundary for the pool, does one of your exhibits show 3 us what the horizontal boundary is for the pool? 4 A That interval which I've marked the Mid-5 dle Wolfcamp. 6 Yes, sir, and horizontally, then, on a Q 7 land plat is that what's depicted on Exhibit Number One in 8 some fashion? 9 Α I'm not sure of that. Would you repeat 10 that, please? 11 0 Yes, sir. You're preparing the land plat 12 and the well locations in reference to your geology and I 13 want to find out from you as a geologist whether or not the 14 wells that you propose to include in the pool are all in the 15 same pool. 16 Α Yes. 17 As a geologist, do you think it would be Q 18 initially space this pool on less than appropriate to 80 19 acres? 20 Α at the moment until we have Not. addi-21 tional information. 22 0 With the current present information 23 available to you, are you satisfied that geology shows you 24 that this pay interval is reasonable continuous? 25 A Yes.

25 1 It is not so discontinuous that you would 0 2 leave reservoir untested if you should drill the wells 80 3 acres apart. Α With the information we have now, no. Ι 5 don't think so. 6 Q At this point with the current state of 7 information available to you, would you believe that wells 8 drilled on 40-acre spacing now would result in the drilling 9 of unnecessary wells? 10 Α I believe in certain portions of this 11 pool it definitely would or could result in waste. 12 Q Will spacing on 80 acres lead to a more 13 efficient and quicker development of this pool? 14 Α I think so, yes. 15 MR. KELLAHIN: Nothing further. 16 17 **RECROSS EXAMINATION** 18 BY MR. STAMETS: 19 Q Mr. Herr, if you discovered a producing 20 interval in the Upper Wolfcamp, would you propose to dually 21 complete that interval with the Middle Wolfcamp? 22 Α If it was mechanically feasible, but to 23 date all that upper horizon, which I've labeled the Upper 24 Wolfcamp dolomite facies, we've encountered numerous shows 25 within that interval but all formation tests that I'm aware

26 1 of have recovered salt water. 2 0 I'm at a loss as to why you don't want to 3 include the entire Wolfcamp interval in these pool rules. 4 MR. IVES: Sir, could you re-5 peat the question? 6 MR. STAMETS: Well, it's not 7 exactly a question. I was just saying I'm at a loss as to 8 why you don't want to include the entire Wolfcamp interval 9 within these pool rules. 10 Α That would not bother me. 11 MR. IVES: We do propose to de-12 dicate the entire Wolfcamp Pool to 80-acre spacing. 13 MR. Okay. I did not STAMETS: 14 understand that because --15 MR. IVES: On temporary а 16 basis. 17 MR. STAMETS: -- of the re-18 sponse to Mr. Kellahin's questions. 19 MR. CARR: Mr. Stamets, one 20 try and avoid any confusion. This is an existing thing to 21 pool at the present time. The initial well was drilled in 22 1967 and the shaded area on Exhibit One does outline what is 23 the existing pool boundary and it includes the Wolfcamp in-24 terval. 25 I under-MR. STAMETS: Well,

27 1 stood that Mr. Herr, in response to Mr. Kellahin's question, 2 wanted the horizontal -- or vertical limits of the pool to 3 be the Middle Wolfcamp as identified on the two righthand 4 logs on Exhibit Number Three -- no, Exhibit Two. 5 Α I would say that I misunderstood the 6 question. 7 Q All right, thank you. 8 If I may, I believe MR. IVES: 9 this point may be clarified. I believe the line which Mr. 10 Herr was referring to on the Exhibit Two comes between the 11 second and third wells from the righthand side of the page 12 as opposd to the line between the first and second. 13 Q Is that correct, Mr. Herr? 14 Α Yes. 15 MR. STAMETS: Are there other 16 questions of this witness? 17 MR. LYON: May I ask few a 18 questions? 19 MR. STAMETS: Mr. Lyon. 20 21 QUESTIONS BY MR. LYON: 22 Mr. Herr, referring to your cross section 0 23 -- I'm V. T. Lyon, Chief Engineer for the Division. 24 You have some discontinuous (not clearly 25 understood) shown on a few of these wells. For instance,

28 1 the second well from the left, the West Corbin No. 1, you 2 have an interval which is at approximately 11,200 to 11,300 3 feet. It is shown -- is outlined by an irregular polygon there and labeled Wolfcamp pay, and apparently, as I inter-5 pret this, that is not considered to be in connection with 6 any other wells shown on the cross section. 7 Α At the moment we do not think it connects 8 with any other wells. 9 But that is part of the Wolfcamp, is that 0 10 correct? 11 Α Yes. 12 0 And is part of this particular field or 13 pool that we've been referring to. 14 Yes, right. Α 15 And the perforations on the third well 0 16 from the left are shown below the yellow interval but you 17 maintain that that well is producing from the yellow 18 interval, is that correct? 19 Α That's correct. 20 Q Then in the fourth well, just in the 21 perforations that straddle 11,200, those perforations have 22 been squeezed, is that what that symbol means? 23 Α Yes. 24 Q And it's actually producing from the top 25 of the yellow zone shown at -- straddling 10,900 feet? Yes, opposite that label No. 2 there. Α

29 1 Q You also show on six, the sixth well from 2 the left, the upper interval there, that shows perforations 3 and is labeled Wolfcamp pay, which is above the yellow 4 interval, is that the pay zone in that well? 5 Α Yes. 6 Q And in your last well on the right there 7 are two sets of perforations. One of them is in the yellow 8 and the other one is not in the yellow. 9 What is the situation on this well? 10 Α The lower perforations, the well was 11 worked over subsequently, and the upper perforations are the 12 producing perforations in that well. 13 If I understand your exhibit correctly, 0 14 and correct me if I'm wrong, you do indicate a zone with ap-15 parent continuous pay represented by the yellow --16 Α Yes, that's correct. 17 0 -- but that there are other intervals 18 which are found from one location to another in the Wolf-19 camp, is that correct, that are not continuous? 20 Well, as I've stated, that the interval Α 21 which we marked the South Corbin Wolfcamp pay is the inter-22 val which produces in most or a majority of the wells in 23 that field. There are a few of the stringers that produce 24 in other portions of the Wolfcamp. 25 MR. LYON: I believe that's all

30 1 the questions I have. 2 STAMETS: Any other ques-MR. 3 tions of Mr. Herr? 4 He may be excused. 5 IVES: I would now like to MR. 6 John Stark for or on behalf of Southland Royalty call Mr. 7 Company. 8 9 JOHN STARK, 10 a witness and being duly sworn upon his being called as 11 oath, testified as follows, to-wit: 12 13 DIRECT EXAMINATION 14 BY MR. IVES: 15 Stark, would you please state your Mr. Q 16 name and residence? 17 My name is John Stark. I live in Mid-Α 18 land, Texas. 19 What is your occupation and by whom are Q 20 you employed? 21 Operations engineer, with Southland Roy-Α 22 alty Company. 23 Mr. Stark, have you previously testified 0 24 before this Commission as a petroleum engineer and had your 25 credentials accepted as a matter of record?

31 1 Α Yes, I have. 2 Q Are you familiar with the wells in the 3 area which are the subject of this application? 4 A Yes, I am. 5 0 Are you familiar with the application as 6 issued in this matter? 7 Α Yes, I am. 8 MR. IVES: I would tender Mr. 9 Stark as an expert petroleum engineer. 10 MR. STAMETS: He is considered 11 qualified. 12 0 Mr. Stark, I'd like you first to refer to 13 what has been marked as Exhibit One and review the develop-14 ment of the pool referenced on Exhibit One and the data pre-15 sent on each well in the pool, if you would. 16 Α Yes. I prepared this map and sir. the 17 shaded area is the pool outline, currently the South Corbin 18 Wolfcamp Field. 19 The well locations shown are all the 20 wells that have been tested and are -- and have been com-21 pleted in the Wolfcamp interval, and beside each well is 22 well data that I have gathered and in the lower left ----23 righthand corner of the map it explains this information. 24 It gives the operator name, the well name, the location of 25 the well, completion date, total depth, perforations, ini-

32 1 tial potential, the current production rate, cumulative to 2 the lastest available. 3 0 Was Exhibit One prepared by you? 4 Yes, sir, it was. Α 5 Q And does it accurately and correctly set 6 forth the information contained therein and as you have just 7 testified at the hearing today? 8 Α Yes. 9 I would offer Exhi-MR. IVES: 10 bit One into evidence before the Commission. 11 MR. STAMETS: Exhibit One will 12 be admitted. 13 Mr. Stark, asking you to refer to what Ο 14 has been marked as Exhibit Four for identification, could 15 you please explain to the Commission what it is and what it 16 shows? 17 Α Yes. This exhibit shows the volumetric 18 calculations I've made on the Huber 17 Federal No. 1, the 19 well that we -- the most recent well drilled in the field by 20 Southland, and it's located in Section 17 in the Unit letter 21 M of that section. 22 This -- the information given, the first 23 one, I've used the estimated ultimate recovery of the well 24 of 100,000 barrels of oil. This was derived from decline 25 curve analysis of this well and wells in the area.

33 1 The next -- next item is H net. That 2 stands for the thickness of the net pay. I'm giving it 28 3 feet according to open hole log evaluation. 4 Also of porosity, I'm showing 6 percent 5 as the average porosity of this net pay. 6 B sub O I (sic) stands for formation 7 volume factor in initial conditions. 8 The next one is water saturation, SW, of 9 this net pay interval. 10 RF is the recovery factor, which I as-11 sumed 25 percent, and then A stands for the acreage of acre 12 drainage around this well and using the data I've just said 13 we calculated 73 acres of drainage. 14 Have you done or performed any other cal-0 15 culations to substantiate the information on Exhibit Four? 16 Α sir, we have pressure data from the Yes, 17 Huber 17 No. 1. 18 The first pressure point we had was in 19 December '85. After the well had produced 600 barrels of 20 oil it gave initial pressure of 4000 pounds bottom hole 21 pressure. 22 The second pressure data in this well was 23 February of '86 after the well had produced approximately 24 4600 barrels. The pressure was 3,600. 25 From this pressure data and the recovery

34 1 data I then performed a material balance evaluation in 2 which I estimated original oil in place of approximately 3 400,000 barrels of oil. 4 Using my 25 percent recovery factor, as 5 explained previously, I come up with a recoverable oil 6 around this well of 100,000 barrels, which substantiates the 7 100,000 barrels of coverable oil that I used in my volumet-8 ric calculations. 9 Was Exhibit Number Four prepared by you? Q 10 Α Yes, it was. 11 And does it accurately and correctly set 0 12 forth the information contained therein and as you have tes-13 tified to here today? 14 Α Yes. 15 MR. IVES: I would offer Exhi-16 bit Four into evidence before the Commission. 17 MR. STAMETS: Exhibit Four will 18 be admitted. 19 Mr. Stark, is it your opinion as a petro-0 20 leum engineer to a reasonable probability that 80-acre spac-21 ing will efficiently and econmically drain the South Corbin 22 Wolfcamp Pool? 23 Α Yes, sir. 24 0 it your opinion as a petroleum en-Is 25 gineer to a reasonable probability that granting this appli-

35 1 cation would be in the best interest of conservation, the 2 prevention of waste, and the protection of correlative 3 rights? Yes, I do. Α 5 And is it your opinion as a petroleum en-Q 6 gineer to a reasonable probability that granting this appli-7 cation will avoid drilling of unnecessary wells? 8 Α Yes. 9 Q And is that opinion based on the fact 10 volumetric calculations suggest that, that your for in-11 stance, the Huber 17 will drill -- will drain effectively 73 12 acres? 13 Yes, sir, with the data we have now. Α 14 0 Assuming that 80-acre spacing was granted 15 on a temporary basis, what information will you develop from 16 any additional wells you've drilled in relation to the spac-17 ing issue here today? 18 We would gather further performance Α and 19 pressure data from the existing and wells to be drilled and 20 from that data we would be able to do, as -- as explained, 21 do further volumetric and material balance calculations to 22 more accurately determine the drainage of acreage around 23 each well. 24 And would that information, could that 0 25 information then be used to justify either 80-acre spacing

36 1 on a permanent basis or suggest reversion to 40-acre spac-2 ing? 3 Yes, sir, it would. Α 4 MR. IVES: Those are all the 5 questions I have of this witness. 6 7 CROSS EXAMINATION 8 BY MR. STAMETS: 9 Is there any pressure data available 0 for 10 any of the wells in this pool? 11 Α Wells besides the Huber 17? 12 Yes. 0 13 Α Okay, yes, sir, we have pressure 14 information in the West Corbin Unit Number Five that -- that 15 data was gathered in September of '85 after the well had 16 produced approximately 700 barrels of oil and it had a 17 pressure of 4300 pounds initially, which is --18 Is that bottom hole pressure? 0 19 Α Yes, this is bottom hole pressure. The 20 I might go ahead and say, -- as this pressure is 21 approximately 300 pounds higher than the initial pressure 22 found in the Huber 17-1, and due to the completion in the 23 West Corbin 5, we now suspect channeling possibly occurring. 24 I do not include this pressure data in the material balance 25 because of the -- we weren't sure of the completion and the

I zone it could possibly be coming from.

Q There's no pressure data available for
West Corbin Unit No. 1, the Corbin Federal No. 1, any of
these other wells in this pool?

A Yes, sir, we have one pressure where we
have pressure information on the West Corbin Unit No. 1. It
was gathered in October of '85. This was from equipment
that is at the surface and we estimate bottom hole pressure
and we -- it estimated approximately 1000 pounds bottom hole
pressure.

Q As I recall looking at Exhibit Number
Two, that's a different interval, producing interval from
the No. 5, is that correct?

A Yes, sir. We believe so.

15 Q Is there any pressure data available for
16 either of the wells in Section 20?

17 A No, sir. The data I've just said is all
18 -- is all the pressure data I'm aware of.

19 Q Did you make a search of the records to
20 determine if there was data available?

A Yes, sir, I looked through scout ticket
information and called other operators and this -- this is
all I found.

MR. STAMETS: Any other ques-

25 tions of this witness?

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38 1 MR. LYON: I've got a few gues-2 tions. 3 MR. STAMETS: Mr. Lyon. 4 5 QUESTIONS BY MR. LYON: 6 Mr. Stark, referring to Exhibit Four, why Q 7 did you choose Huber 17 for this calculation, Huber 17 No. 8 1? 9 Α we choose this well, we -- we had Okay, 10 -- we didn't suspect any problem with completion as the а 11 West Corbin 5 had encountered; any questions and suspicions 12 that possibly channeling is going on. We also had bond logs 13 and other logs that, you know, help us to determine that 14 there was no channeling, you know, no cement channels behind 15 pipe, so we felt confident the interval was completed as 16 shown on the perforations. 17 We also had more pressure data that we, 18 bottom hole pressure data, better quality, in this well that 19 I could then compare my original oil in place calculations 20 for material balance with my volumetrics and to see how they 21 fit together. 22 0 Well, what is the basis for your esti-23 mated recovery of 100,000 barrels? 24 Α That was based on looking at the perfor-25 mance of the wells in the area; the Wolfcamp interval, the

1 wells that were completed in the Wolfcamp in this entire 2 I tried to look at the decline curve analysis on as area. 3 many wells as I possibly could, including the West Corbin 5 4 and wells in the southern portion of the pool area. 5 And I just -- some showed much higher 6 some showed much less, but this average -- this than that, 7 number is an average that I obtained. 8 What's the cumulative production from Q 9 this well? 10 From the Huber 17-1? Α 11 0 Yes. 12 It's approximately 4000 barrels of oil Α 13 and 600 water. 14 All right. Now, your -- your net pay you 0 15 picked from your logs? 16 Α Yes, sir. 17 Your porosity you picked from your logs. Q 18 Yes, sir. Α 19 What's -- what is the basis for your vol-0 20 umetric -- your reservoir volume factor? 21 The -- of the oil, the formation volume Å 22 factor? 23 Q Yes. 24 Α I was using correlations using the grav-25 ity of oil we obtained and measured; bottom hole pressure

40 1 and temperatures, and correlation charts to come up with a 2 formation volume factor initial. 3 So you had to (not clearly understood.) Q 4 You mean the PVT information? Α 5 Right. Q 6 No, sir, we have not done that. Α 7 You say there are -- are -- referring 0 8 back to Exhibit One, there are nine wells producing in this 9 field, is that right? 10 Yes, sir, I believe that's correct. Α 11 Q Have any of those -- have any of those 12 wells recovered 100,000 barrels? 13 Α No, sir, but that includes the West 14 Corbin No. 5, I included, and, as seen, that well in its 15 short life has recovered nearly 64,000 barrels of oil a1-16 ready and it's still flowing top allowable rates of 365 oil 17 a day. 18 Right. 0 19 Α Due to the proximity to that well I had 20 to weight somewhat my averaging of the -- close of that, 21 such a good performing well. 22 Also, there are some Wolfcamp wells out-23 side the pool area that I also had looked at, but, you know, 24 just to compare some other performance. 25 0 Some of these wells have produced for

41 1 nigh on to twenty years, isn't that right? 2 Yes, sir, the first well was completed in Α 3 July of '67. 4 0 Apparently they were not of the same 5 quality as those more recent wells there to the northwest. 6 Α Well, that's -- that's exactly what we're 7 trying to understand, is the difference -- what is making 8 this area so different in its performance. 9 It's almost as if it were a separate Q 10 field. 11 Α That's what we'd like to determine with 12 future data. 13 LYON: I think that's all MR. 14 the questions I have. 15 MR. STAMETS: Any other ques-16 tions of Mr. Stark? 17 I have a couple of MR. IVES: 18 additional questions. 19 20 REDIRECT EXAMINATION 21 BY MR. IVES: 22 Mr. Stark, isn't your testimony here to-0 23 day that the pressure data you have across these number of 24 wells is not determinative of the issues in this applica-25 tion?

42 1 Well, at this point -- well, no, sir, not Α 2 -- we'd like to get more information. 3 In other words you do need more and addi-Q 4 information in order to come to -- obtain what tional you 5 will feel comfortable with in terms of figures showing pos-6 sible relationships across the Wolfcamp Pool? 7 Α Yes, sir, that's definitely true. We on-8 ly have two really pressure data that we feel competent of 9 and it's -- we just need much more to make a more accurate 10 estimate. 11 0 And were those two pressure points that 12 you're referring to taken from the Huber 17 Well? 13 Α Yes, sir. 14 And is it your feeling that the volumet-Q 15 ric calculation performed and which is set forth on Exhibit 16 Four provides you the best indication of drainage in the 17 pool at the present time? 18 Α At the present time, that's the best es-19 timate. 20 MR. IVES: I have no additional 21 questions. 22 MR. STAMETS: Any other ques-23 tions of the witness? 24 MR. KELLAHIN: Just a couple, 25 Mr. Chairman.

43 1 CROSS EXAMINATION 2 BY MR. KELLAHIN: 3 Mr. Stark, are you satisfied that the re-Q 4 servoir parameters that you have used for the volumetric 5 calculation are reasonably typical for other wells from 6 which you have similar information? 7 Α Yes, sir. We feel that that 100,000 re-8 coverable oil, as I was mentioning before, is, we feel like, 9 a reasonable number including all the poorer wells to the 10 south in this pool. 11 Q I meant the actual parameters that go in-12 to the calculations. 13 Yes, sir, that's --Α 14 0 The water saturation, all the rest of the 15 numbers that you have used and seen in this well and in this 16 log, are they generally typical of these others or is there 17 a range of difference here? 18 Α sir, I feel like these are typical Yes, 19 of the wells I've looked at. 20 Q What is the original bottom hole pressure 21 of the Wolfcamp Pool? 22 Α I'm not -- again, the older -- I've 23 looked in the histories of -- these wells are nearly twenty 24 years old and I could not find any good quality data at all, 25 and that's why we went to the effort ot start gathering data

44 1 in these wells. 2 Do you see any significant difference in Q 3 the way the wells were completed and stimulated for produc-4 tion that might account for the fact that some wells have 5 produced significantly less than other wells? 6 No, sir, I have seen -- they're all com-Α 7 pleted similarly. 8 Have you done other volumetric calcula-Q 9 tions, other than this one for the Huber No. 17 Federal L? 10 No, sir, I haven't. Α 11 And this is the one you used because it 0 12 is the only well that you had what you thought was reliable 13 information? 14 Yes, sir. Α 15 Do you have any information from wells 0 16 that are adjacent to each other from which to draw any kind 17 of pressure information or conclusions about communication? 18 No, sir, I don't, and as I believe noted Α 19 earlier, the rest of the field is really spaced at 80 acre 20 and greater, so, no, I don't. 21 I was looking at it in Sections 18 and 0 22 There are at least two wells there that are 40 acres 17. 23 apart and I -- is there anly information available to you 24 from either of those wells that you could draw any compari-25 sons or studies about the abilities of wells to drain or

45 1 communicate that close together? 2 Well, Α again, we don't have that good a 3 reliable pressure information in either well and I would not 4 like to at this point without more data, to make a judgment 5 either way on those two wells. 6 0 Thank you. 7 Any other ques-MR. STAMETS: 8 tions of Mr. Stark? 9 He may be excused. 10 MR. IVES: I'd like to call Mr. 11 Gene Carlson to testify in behalf of Southland Royalty Com-12 pany at this time. 13 14 GENE CARLSON, 15 being called as a witness and being duly sworn upon his 16 oath, testified as follows, to-wit: 17 18 DIRECT EXAMINATION 19 BY MR. IVES: 20 0 Mr. Carlson, would you please state your 21 name and residence? 22 Α My name is Gene Carlson. I live in Mid-23 land, Texas. 24 Q And what is your occupation and by whom 25 are you currently employed?

1 I am Regional Reservoir Engineer for Mer-Α 2 idian Oil Company -- or Incorporated, excuse me, in Midland. 3 And if you could please summarize your Q 4 educational background for the Commission beginning with 5 college and covering any advanced degrees you have received. 6 Α I received a BS degree in mechanical en-7 gineering from Texas A & M University in December, 1974. 8 0 Are you a member of any professional as-9 sociations or societies? 10 Α I'm a member of the Society of Yes, sir. 11 Petroleum Engineers of the American Institute of Mining En-12 gineering. 13 Q Are you -- let me ask you now to sum-14 marize your work experience since your graduation from col-15 lege, covering what company you were with, when you were 16 with them, and what position? 17 Α I was originally with Exxon Company USA 18 in Midland from 1975 until mid-1977, whereupon I went to 19 work for Southland Royalty Company, also in Midland. I wor-20 ked there until late 1979. 21 I was with Texas Oil and Gas in Dallas 22 and Denver until mid-1981, whereupon I returned to Southland 23 Midland and stayed until I was transferred to Ft. Worth in 24 in 1982 and I recently returned to Midland as the Regional 25 Reservoir Engineer for the newly merged organization, Meri-

47 1 dian Oil, Incorporated. 2 0 Mr. Carlson, are you familiar with the 3 wells in the area which is the subject of this application? 4 Α Yes, I am. 5 0 Are you familiar with the application at 6 issue in this matter? 7 Yes, I am. Α 8 MR. IVES: I would offer Mr. 9 Carlson as an expert in the area of petroleum engineering. 10 MR. STAMETS: He is considered 11 qualified. 12 Mr. Carlson, let me ask you please to re-0 13 fer to what has been marked for identification as Exhibit 14 Number Five and explain to the Commissioners what it is and 15 what it shows and please, if you would, detail out any acro-16 nyms or other abbreviations which are set forth on the exhi-17 bit, and it might be helpful to go column by column. 18 All right. First of all, I'd like to ex-Α 19 in concept what we've done here is we've built upon plain 20 previous testimony which established that a reasonable re-21 covery, for example, the Huber 17-1, which is also coinci-22 dentally offset to most of the obligation problems that we 23 have right now. 24 17-1 is estimated to have The Huber an 25 ultimate recovery of about 100,000 barrels if it were al-

1 lowed to drain what is estimated to be its 73 acres it will 2 drain ultimately. 3 What we did here is we compared the eco-4 nomics of leaving one well on 80-acre spacing, that is, the 5 Huber 17-1, for example, which would recover an ultimate 6 100,000 barrels of oil recovered. 7 The second case that we would have is 8 going to the 40-acre development density, in which case the 9 full 80 acres would be drained and hence increase the re-10 covery from the two combined wells to about 110,000 barrels, 11 or increase the recovery an additional 7 percent, or 7 ac-12 res. 13 The economics that we've summarized here 14 show on the left column discussing the -- what -- or lab-15 eling the items that are under each of the four cases of 16 economics that I'll delineate later. 17 The oil in thousands of stock tank bar-18 rels of oil is expressed in gross and net for a working in-19 terest of 100 percent and a net interest of 87-1/2. 20 The gas reserves volumes are the -- ex-21 pressed in million cubic feet of -- million standard cubic 22 feet of gas that is also expressed in gross and net, is in-23 dicated in parentheses. 24 With the working interest investment 25 based on 100 percent working interest for a typical well in

1 this area is \$874,000 by our best estimate. It would take 2 -- the payout in years is after Federal income tax payout 3 for an investment for the four cases that was run, and the 4 ROR is the effective rate of return by discounted cash flow 5 analysis that says what the effective interest rate that you 6 get for your investment by doing this business opportunity. 7 The PI is the profit to investment ratio 8 15 percent discount, also by the discounted cash flow at 9 is the ratio of the -- what the last item method, and is, 10 which is the net present value at 15 percent discounted com-11 pared against the investment of \$874,000 in the first exam-12 ple. 13 We used for all these economic calcula-14 oil price of \$20.00 a barrel and a gas price of tions an 15 Of course, we'll remind you later in \$1.50 per MCF. the 16 presentation that oil is now running about \$13.00 a barrel. 17 Initial producing rate that we used for 18 each of these on a -- for a typical well would be 50 barrels 19 The gas/oil ratio of oil per day initial production rate. 20 employed was 2000 standard cubic feet of gas per barrel of 21 oil and again the working interest used was 100 percent. and 22 the net revenue interest, 87-1/2 percent. 23 The first case of economics that was pre-24 pared shows what we believe to be the economics of the Huber 25 17-1 retroactive to its time zero or date of drilling.

50 1 If you recover 100,000 barrels from this 2 well, as established in previous testimony, you would also 3 recover 200,000,000 cubic feet of gas gross and you would 4 spend \$874,000 to get that. 5 It would take 1.7 years to payout after 6 Federal income tax and you would achieve what I would con-7 sider to be an acceptable after Federal income tax rate of 8 return of about 40 percent. 9 The profit to investment ratio is .26. 10 which is well within most people's guidelines and the net 11 present value that you would achieve over your investment 12 discounted at 15 percent is \$229,000. 13 What we see here is in general terms a 14 very good acceptable economic proposition. 15 The next three cases of economics that 16 are delineated show the other scenarios of how you can look 17 at it from very many different viewpoints. I call your at-18 tention to the farthest right case of economics, which shows 19 what we would have to do to drill the second well, or what 20 would result if we drilled the second well on that 80-acre 21 tract with 40-acre spacing and that second well would, as 22 it's indicated, increase the recovery in oil, 100,000 bar-23 rels to almost 110,000 barrels, reflecting 80-acre drainage 24 versus 73. 25

The gas associated with that would be

1 219,000,000 cubic feet of gas and working interest invest2 ment, as you can see, would double the single well case, and
3 for the two well case here you see that the payout in years
4 would be almost four years.

The rate of return experienced for us on the overall project basis would be about 4-7 percent, which you could greatly exceed by buying a Treasury bond at this time; just to show how you would compare that in your mind versus, you know, that is the main economic parameter we're looking at here and that's your rate of return.

The profit to investment ratio is negative because the rate of return is less than the discount rate of 15 percent employed in the PI calculations and, of course, the net present value to -- to us at 15 percent discount is negative for this case for the combined economics of the two wells.

17 Now let's look at it again and let's say 18 that Southland -- or Meridian and Southland were not allowed 19 to maintain the 80-acre spacing and we also made the busi-20 ness decision which by the economic parameters showed in the 21 right cases we probably would not seek the opportunity to 22 drill a 40-acre well, we would then have the production es-23 timated to June 1st, 1986, without two wells in the reser-24 voir, as indicated in the note at the bottom.

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So our current well would recover more
1 than half of the 110,000 barrels stated for the two well 2 case. We would recover from the Huber 17-1 because it would 3 have a head start on the second well, would recover about 4 59,000 barrels and about 118,000,000 cubic feet of gas. 5 Again our working interest investment, 6 looking back from time zero, \$874,000. 7 Our payout on the well would change from 8 1.7 years to 3.5 years, and again our rate of return, AFIT, 9 would drop well below acceptable rates of return, which 10 would have to be -- most people use more than 50 percent, 11 and as you can see, the rate of return for the case of us 12 having the Huber 1 Well compete with someone else's new 13 well, as we use in the vernacular, would be 7.4 percent rate 14 of return. 15 The profit to investment again is nega-16 tive because the return is less than the stated discount, 17 and net present value to us of the Huber well, Huber 17-1, 18 is negative also, \$70,000. 19 We want to also point out the economics 20 the new well, in that if you despaced this based on the of 21 information we have in to date, the new well on 40-acre 22 spacing would achieve less recovery than the Huber 17-1, or 23 51,000 barrels, approximately, 101,000,000 cubic feet of 24 They would have to spend \$874,000 to do it and qas. it 25 would take 4.1 years for it to pay out. The rate of return

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53 1 would be 2 percent AFIT. The profit to investment ratio 2 would also be negative and the net present value would be 3 minus \$116,000. 4 What we would want to point out with this 5 is that if you do engineering analysis with the available 6 information as we have done, that this is not an economical 7 prospect on 40-acre drainage. 8 If you have full development on 40-acre 9 drainage and wells competing, no one is going to be able to 10 make money out here based on current information that we 11 have. 12 So, to draw the conclusion, then, if you 13 drilled the thing on 40-acre spacing and everybody does 14 their homework, you're not going to get as many wells dril-15 led as if you would allow us to drill them on 80-acre spac-16 ing. 17 Mr. Carlson, assuming that the South Cor-0 18 bin Wolfcamp were developed on 40-acre spacing, is it your 19 opinion as a petroleum engineer to a reasonable probability 20 that such wells would be uneconomical and result in economic 21 waste? 22 Α Based on data at hand today, I believe 23 that be true. 24 Was Exhibit Five prepared by you? Q 25 Yes, sir. Α

54 And does it accurately and correctly set Q 1 forth the information contained therein and as you have tes-2 3 tified to here today? Α Yes, sir. 4 IVES: I would offer Exhi-MR. 5 bit Five into evidence. 6 MR. STAMETS: Exhibit Five will 7 be admitted. 8 there questions of 9 Are Mr. Carlson? 10 IVES: I have one MR. last 11 general question. 12 MR. STAMETS: All right. 13 Q Mr. Carlson, is it your opinion as a pet-14 roleum engineer to a reasonable probability that granting 15 this applicatio is in the best interest of conservation, the 16 17 prevention of economic waste, and the protection of correlative rights? 18 Α Yes, sir, I believe that to be true. 19 further ques-MR. IVES: No 20 tions. 21 STAMETS: Any other ques-22 MR. tions of Mr. Carlson? 23 24 He may be excused. Mr. Ives, do you have anything 25

55 1 further you wish to offer in this case? 2 Does anyone have a closing 3 statement? 4 We have nothing fur-MR. IVES: 5 ther to offer, Mr. Commissioner. 6 MR. STAMETS: Tom, do you have 7 any --8 MR. KELLAHIN: Nothing, sir. 9 MR. LYON: May I inquire, is 10 there anything in the record which shows that there is 80-11 acres of common lease which is available to each of these 12 wells indicated? 13 I'm not aware of MR. IVES: 14 anything in the record. 15 MR. LYON: What I'm concerned 16 about is --17 18 (Thereupon a discussion was had off the record.) 19 20 MR. STAMETS: Gentlemen, the 21 Commission has decided that we will approve the application 22 for a temporary period of 18 months. Let's see, today is 23 the 9th of April, and unless there is some reason to make 24 the effective data some other date we would propose to make 25 that effective May the 1st, and the basis for this would be

56 1 the economic data that there is not a great deal of engine-2 ering data to demonstrate that the wells can, indeed, drain 3 80 acres, but there is sufficient economic data to indicate 4 at this time the pool cannot be economically developed on 5 less than the 80-acres, and we would ask that we be provided 6 with a draft order which would set out those findings and --7 and an order with provisions that we have discussed there, 8 including coming back in for demonstration at the end of 18 9 months for a demonstration and 80 acres is indeed the cor-10 rect spacing for this pool. 11 That. being the decision of the 12 Commission, we would sign that order as soon as it becomes 13 available. 14 If there is nothing further, 15 then, this hearing will be recessed until 9:00 o'clock to-16 morrow morning. 17 18 (Hearing concluded.) 19 20 21 22 23 24 25

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