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BEFORE THE OIL AND GAS CONSERVATION COMMISSION

OF THE STATE OF COLORADO

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 :  
 IN THE MATTER OF THE PROMULGATION :  
 OF FIELD RULES TO GOVERN THE :  
 SPACING AND DENSITY OF OIL AND :  
 GAS WELLS IN THE ADENA FIELD, :  
 MORGAN COUNTY, COLORADO. :  
 :  
 Carmack and Crawford, applicants. :  
 :  
 -----X

26-11  
CAUSE NO. 26.

Room 704, State Capitol Annex,  
Denver, Colorado,  
Tuesday, August 10, 1954.

Met, pursuant to notice, at 10 a. m.

BEFORE:

MR. H. C. BRETSCHNEIDER,  
MR. F. M. VAN TUYL,  
MR. WARWICK DOWNING,  
Commissioners.

WILBUR ROCCHIO, Attorney,  
D. V. ROGERS, Petroleum Engineer,  
A.J. JERSIN, Deputy Director,  
ANNABEL HOGSETT, Assistant Secretary.

APPEARANCES:

TED P. STOCKMAR, 1210 First National Bank Building,  
Denver, Colorado, appearing for Carmack and Crawford,  
applicants.

PATRICK M. WESTFELDT, 520 Equitable Building, and  
GEORGE H. FENTRESS, 310 Silver States Building, Denver, both  
appearing for Lion Oil Company.

## APPEARANCES (Continued):

R. J. GENGLER, 828 Equitable Building, Denver,  
Colorado, appearing for W. H. Gaddis and F. W. Baumgartner.

D. M. MURPHREE, C. A. Johnson Building, Denver,  
Colorado, appearing for S. D. Johnson.

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I N D E X

<u>WITNESSES</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>
John F. Tolleson	3	12	25	
George H. Fentress	30	41	47	48

E X H I B I T S

	<u>FOR IDENT.</u>	<u>IN EVIDENCE</u>
Applicant's A	5	32
Lion's A, B and C	31	32
Baumgartner No. 1	55	55

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P R O C E E D I N G S

MR. DOWNING: The meeting will come to order.

Are you ready in Cause No. 26, Adena Field?

MR. STOCKMAR: Yes, sir.

MR. DOWNING: Our record shows that proper service has been made and we have jurisdiction to proceed. Now let's first enter the appearances. Who is here representing who?

MR. STOCKMAR: I am Ted Stockmar, representing Carmack and Crawford, the applicant.

MR. WESTFELDT: I am Patrick M. Westfeldt, representing Lion Oil Company, in opposition to the application.

MR. GENGLER: R. J. Gengler, here representing W. H. Gaddis and F. W. Baumgartner, in opposition.

MR. DOWNING: Is there anyone else here present who wish to participate?

MR. GLENN: I am Howard Glenn, representing my mineral interests individually.

MR. DOWNING: Do you wish to present any evidence or just to be heard?

MR. GLENN: Just to be heard is all, thank you.

MR. DOWNING: All right. Don't let us forget you. We will try not to.

You may proceed.

MR. STOCKMAR: Just for the record, sir, our application shows that we have asked for an exception to the Commission's Order No. 26-1 and 27-1, to permit the drilling of a well at the center of the northwest quarter, northwest quarter, northwest quarter of Section 33, Township 2, North, Range 57 West.

I would like to call as our witness, Mr. John F. Tolleson.

MR. DOWNING: Have you just the one witness?

MR. STOCKMAR: Yes, sir.

JOHN F. TOLLESON

was sworn and testified as follows:

DIRECT EXAMINATION

BY MR. STOCKMAR:

Q Mr. Tolleson, for the record, will you state your name, please?

A John F. Tolleson.

Q Have you previously qualified as an expert witness before this Commission?

A Yes, I have.

MR. DOWNING: If there is no objection, he will be accepted as a qualified expert.

Q (By Mr. Stockmar) Mr. Tolleson, you testified at the hearing of April 20, 1954, in behalf of the same applicant with respect to two locations immediately south of the

location requested today, right?

A That's correct.

Q Your testimony at that time was based on your study of the then available logs, core analyses and other information?

A That's right.

Q In order to save time I would like to review the testimony there and possibly we won't need to repeat it. I recall that you established that the eastern edge of the Adena Field in this immediate area lies somewhere in the west half of Section 33?

A That's correct.

Q Is that still your opinion?

A Yes, it certainly is.

Q And by the eastern edge do you mean the absolute limit beyond which there will be no production of oil and gas if a well were drilled?

A Yes.

Q Did you not also testify that along the eastern edge of the field in this area there exists a strip of land of indefinite thickness where the effective pay section of the "J" sand pinches out and becomes too thin to justify the drilling of an economic well?

A Yes, of indefinable width, I think is what you mean, don't you?

Q Yes.

A Correct.

Q On the basis of your recent studies, is that still your opinion?

A Yes, it is.

Q In addition to the pinch-out, did you testify that the permeabilities of the effective pay section decrease as you approach the eastern edge of the field?

A Yes.

Q That is still your opinion?

A Yes.

Q That makes it less likely that a commercial well could be drilled along the eastern edge of the field?

A Yes.

(Document marked Applicant's Exhibit A for identification.)

MR. DOWNING: Have you copies for other counsel?

MR. STOCKMAR: I only have limited copies.

I would like to introduce Applicant's Exhibit A.

Q (By Mr. Stockmar) Mr. Tolleson, did you prepare Exhibit A?

A Yes, I did.

Q You have studied all pertinent information, like electric logs and available core analyses?

A All that are available, yes, sir.

Q Are you familiar with the results of the study of

the Adena Engineering Committee?

A Yes.

Q And Geological Committee?

A Yes.

Q And you utilized all that information in compiling this exhibit?

A Yes.

Q Will you please explain to the Commission how you prepared the exhibit and what the various colors mean?

A Well, this is rather a composite map here which I prepared to--well, I will tell you how it was prepared. First, I made a structure contour map on the top of the "J" sand, of the producing zone of the "J" sand, and then also an isopachous map of the thickness of that producing zone, and one was superimposed on the other, and from the structure contour map we established mainly the oil-gas contact in here, which has also been established, I believe, by the Engineering Committee at a datum of a minus 1060. That would be the oil area; that is, the oil productive area essentially would be the area shaded in blue on here. The gas area would be the area which is shaded in red. The area where the gas cap overlies the oil, in other words, the zone where a well could be perforated low enough in the section and still make oil is that which is cross-hatched in red and blue in here.

The gray is from my isopach work in the area, my estimation of where the sand shales out to where it is thin enough that a commercial well could not be expected. It is the shale-out zone, the ultimate zone in which I would dare to want to recommend the drilling of a well. That, essentially, explains what the colors are on this map.

Q I understand that your boundaries that you have traced here are your own opinion and are, to a great degree, somewhat indefinite and actually where we have shown distinct lines we actually have a merging of one area into the other?

A Yes. You can't pin anything down to an actual point, but it is as close as I can show it on a map.

Q I believe you testified previously that from your studies you believed the Adena Field to be a combination of solution gas drive and gas cap expansion drive?

A That is correct.

Q That is still your opinion?

A Yes, it is.

Q Then, Mr. Tolleson, if the production from the oil area is controlled either under the type of limitation on production which we now have or under unitization if it should be accomplished, we will find that the gas cap will expand roughly parallel to the gas-oil contact line, thus driving oil down structure ahead of it to the northwest in this particular area?

A Yes.

Q That will mean that the wells which are located nearest to the gas-oil contact or in the dual area will go to gas first?

A Go to gas first, yes.

Q And will show a gradually increasing gas-oil ratio until such time as they do?

A Yes.

Q Is it then your opinion that to conserve the most of the available gas cap energy, that a well should be drilled at a location furthest from the advancing gas cap?

A Yes, that would follow.

Q Mr. Tolleson, you have described the red, blue, cross-hatch and gray areas. What is the small white area which you have indicated up there?

A Well, frankly, I am not too sure, but my best opinion of what we could call that would be, I do not think that it is a gas area connected with the main gas body as shown in red down here, because I think we have an effective shale-out between there. It may be a small gas area which lies between the oil zone, the known oil producing zone and the limit of the effective sand, but I don't think that it will contain enough gas to act as a sufficient drive to push the oil ahead of it in that area. It may even be another oil area at a different level, I don't know, but as near as I can tell, I am quite certain that it isn't a gas area

connected in with the main gas body which affects the drive on the Adena Field.

Q You are acquainted with the study made by the Engineering Committee, which is in the records of the Commission, which had attached to it an isobaric map showing the pressure across the field at this time?

A Yes.

Q Do you recall that that map showed any indication of any effective pressure force coming from the area, this white area?

A No, it didn't. It showed just a gradual pressure gradient across the whole field from the main gas cap on to the west.

Q And the pressure gradient was in what direction?

A From east to west.

Q Directly from the east or--

A Well, from the southeast--from this area in here (indicating on exhibit) is what I mean, going up to the northwest.

Q I gather from your analysis of the reservoir and your examination of the isobaric evidence presented to the Commission by the Operators Committee, that it is your opinion that such oil as lies in advance of the gas cap will be pushed in the general northwest direction?

A Yes, I believe it will.

Q Then looking specifically at our area here, a well drilled in the prescribed southeast location would go to gas and have a higher gas-oil ratio sooner than a well drilled in the northwest location?

A I would think that it would, yes.

Q From your map here, is it your opinion that a well drilled in the southeast location would be in or on the very edge of a debatable or a risky zone to drill in?

A I would be--I think it would be a dangerous location to drill from the point of view of sand development.

Q You believe that a well drilled in the northwest location would effectively conserve more of the gas cap energy than a well drilled in the southeast location?

A Yes, going along the reasoning that we have been bringing out.

Q Will the wells on the adjoining and cornering lands to the west and northwest ultimately drain a substantial volume of oil from this 40 acres because of the pressure forces operating from southeast to northwest?

A Yes, that's my opinion of that area, that the pressure forces coming from the southeast there will tend to push the oil ahead of it and that any wells drilled to the west or northwest to the location or the 40 in question would be drained by that.

Q Do you believe there would be any substantial

compensating or offsetting drainage against that pressure gradient?

A I don't quite understand your question.

Q Would there be any drainage by a well located on the northwest location of the adjoining lands against the pressure gradient that has been shown to exist? I said compensating, or equivalent, is what I mean.

A By a well drilled on the --?

Q On the northwest location.

A Oh, that a well drilled where we are applying for one?

Q Yes.

A Yes. That should conserve more of the oil on the 40; I would think that the oil driven by the gas across that whole 40 would be more effectively drained by a well located in the northwest there than in any other location, if that is what you are getting at.

Q Well, in the face of the existing pressure gradient, I gather you have shown that a well in the southeast location would stand little chance of recovering all of the oil under this 40 acres?

A That is correct.

Q Moving one step further, would even a well located on the northwest location and acting against the pressure gradient offset the drainage that these wells to the west and north would cause?

A No, not entirely.

Q There would be some but not an equivalent offset?

A Yes.

MR. STOCKMAR: If the Commission please, there has been so much evidence previously presented on this particular matter, that I think we have tried to only outline it here. I would just like to say that our Conservation Act, particularly Section 6(c) provides that in the alternative, if a well is located on the edge of a field and adjacent to producing units, which is clearly established, that an exception may be authorized. It also gives an alternative right, that if equitable or reasonable, without respect to the location of the edge of the field, an exception may be granted.

I think here we have clearly met the first, and with the uncompensated drainage and conservation of existing gas cap energies which would be made by permitting drilling on the northwest location, I think it is very nearly required that we be granted this exception.

MR. DOWNING: Any cross-examination?

MR. WESTFELDT: I will ask a couple of questions, if I may.

#### CROSS EXAMINATION

BY MR. WESTFELDT:

Q Mr. Tolleson, do you have a map showing the contour

lines of the structure in this area that we are talking about here?

A On the "J" sand?

Q Yes.

A Yes. You mean with me?

Q Yes.

A Yes, I think I have got one here.

Q Is the gas-oil contact in this area estimated or shown to be at minus 1060 subsea?

A Well, that is what has been established by the Engineering Committee so far as a 1060. Now, such a thing, to my way of thinking, is a slightly flexible thing, that it can't be pinned down right to one particular subsurface datum, but that is what the Committee has arrived at so far, my understanding.

Q Is the line representing minus 1060 subsea roughly equivalent to this line that you have that extends out in an easterly direction and curves back?

A This one here, yes.

Q And that does extend out into your gray area?

A Well--

Q That is your estimate and that is what is shown by this line here?

A Yes, in such a case as that.

Q Could you show on this map the next line--at 10-foot

interval--a minus 1070 contour, could you indicate where that would go on this Exhibit A of yours?

A I have it on my structure contour map here.

Q In relation to your exhibit which indicates the location that you desire.

A This line here represents my 1060 contour.

Q Where would 1070 be?

A 1070 would follow in--

Q I am particularly interested in your estimate of the location of that line with respect to the location which you are requesting and with respect to the location that would be established by the standard--

A The 1070 contour--

Q Yes, the 1070 contour.

A It will be hard to draw on this. -70 is going to come to the south of the well that we drilled in here, a minus 1075, back somewhere roughly cutting this location about in here.

Q Right about at the location in the southeast corner of the forty?

A Not too far from it, might miss it two or three feet.

Q So the location in the southeast corner of the forty would either be flat with or lower than the location which you request, is that correct?

A It would be--yes, that is essentially correct.

Q Now, one other thing that I would like to know. As I understand it, this gray shaded area that you have here is of indefinable width. Is it also true that that western limit shown on your map is just as indefinable, or how have you established this almost straight north-south line?

A Well, I have established it through making an isopach. I thought I pointed that out, that this map represents a composite of the information, a simplification, if you will, of the information which we got from both the isopach map and the structure contour map of the area, and using more or less accepted practice in isopaching this and using thicknesses derived from electrical logs and core analyses, etc.

Q This line would represent what, the five-foot sand thickness, is that correct?

A Approximately the position of the five-foot sand thickness.

Q Well, shouldn't that line nose out as your contour line does at that point and in an easterly direction?

A At which one?

Q At the southeast corner location in that 40-acre tract.

A No, I have shown it, based on the control that we have, as more or less a uniform equi-distant spacing in through the northwest corner of 33, up to--there is a

zero point here, but we don't know where between this--

Q Why don't you indicate on this map what we are talking about so the Commission can see?

A Well, I think it is--this line here, the edge of the gray, does represent the approximate position of the five-foot isopach. Beyond that, to the north and to the west, we don't have sufficient control to predict what does go on, except that this well and this well both have no sand development, and as far as my interpretation goes, this bench developed in this one--it is a different bench.

Q Where your contour line juts out to the east like that, your five-foot sand thickness line on your isopach could also go out to the east, is that correct?

A Well, I am using my control to the west, which is the established control. To the east we don't have it. But the control to the west would bring that in a relatively straight direction down through there, almost a north-south line. It certainly does in the control we have here. We have 12 feet in this well, 11 feet on that one, 7 feet on this one. So from that I have interpreted it to be that way. There is no justification for jutting this isopach line out. I won't want to argue that it couldn't, but I don't see any reasonable justification for it.

MR. WESTFELDT: I have no further questions at this time.

MR. DOWNING: Any further questions of this witness?

Q (By Mr. Gengler) Mr. Tolleson, I believe you said you testified at the previous exception, where Carmack was given the exception, I believe in the northwest, southwest-northwest of Section 33, is that correct?

A Yes, I did.

Q Has that well been drilled?

A Northwest of the southwest, it has been drilled, yes.

Q Are you acquainted with that well and the drilling thereof and the production from that well since it has been drilled?

A Yes.

Q Could you tell me the amount of production from that well or what its daily capacity has been?

A It is a shut-in gas well. Are we talking about the right well? The northwest of the northwest of the southwest?

Q No, northwest-southwest-northwest.

A Oh, the No. 1 Howard Glenn?

Q Yes.

A Yes, that is an oil well and the present production is probably about--whatever the limit is that the pipeline is taking in there, I don't know exactly what it is.

Q Do you know what the gas-oil ratio is?

A The gas-oil ratio on that was about 450--Mr. Carmack, I think you know what it was.

MR. CARMACK: 548.

A 548, yes.

Q (By Mr. Gangler) The gas-oil ratio on that well is well within the limits set by the Commission, is it not?

A Yes, it is.

Q Do you know what the limits are of the Commission?

A The limits? Well, it is on a ratio of gas to oil, so much, 150,000 cubic feet to--

Q About 1250 to 1.

A 1250, yes.

MR. JERSIN: 1200 to 1. It figures 1200 to 1.

Q (By Mr. Gangler) On your isopach map, in relation to that Carmack well that was drilled, do you have the outline of the sand thickness, or what I am trying to say, carrying on that line, that sand from which that well is producing, how would that formation go to the east?

A To the east?

Q Yes.

A From that well?

Q Yes.

A Well, I show 12 feet of effective sand.

Q And about where does that go over, on your map here, to this point?

A Well, the 10-foot isopach would just about cut the middle of that forty.

Q About the middle of the forty?

A Yes, the 10-foot isopach.

Q But your blue is the oil area, is it not?

A Yes, the blue is the oil area. The 10-foot isopach would be right in here and your five-foot right in here. In other words, this is your five-foot limit, this is the ten.

Q All right. Now, do you believe that a well drilled in the regular location in the southeast corner would be a commercial producing well within the gas-oil ratio established by the Commission as of this time?

A Well, there are two parts to that question. In the first place, I don't believe it would be a commercial well, due to the lack of sand thickness, and I think, also, that if it were drilled in the established location there, that there would be a possibility of having a higher gas-oil ratio than were it drilled farther away from the known gas cap.

Q Now, that regular location would be 330 feet from the east line of that quarter-quarter section, would it not?

A Yes.

Q Now, assuming that you went 660 feet from the east line, would your answer be the same?

A 660 feet from the east line? That would really be the southwest of the northwest of the northwest, wouldn't it?

Q Let's assume the 600-foot line would be the center, straight north and south line of the center of the quarter-quarter section. Assuming you drilled a well located approximately 660 feet from the west line instead of 330 feet where you are now asking the location.

A In other words, moving the 330 feet additional to the west?

Q No, to the east. Well, west, except the southeast corner, that's right, 330 feet further east from the line where you are requesting the exception.

A That would be rather an odd location, wouldn't it?

Q Well, I think whenever you drill and ask for an exception it is based upon the facts and the exception is granted because of some inequitable position or inequity existing on drilling in the regular location. Now, as soon as you have overcome the inequity I don't believe it would necessarily mean that you would have to be on a drilling pattern. You no longer are on a drilling pattern when you ask for the exception, isn't that right?

A I will grant you that part.

Q All right. Now, what would be your answer to the question as to your opinion as to the effectiveness of drilling a well--

A 330 feet farther to the west than--

Q The regular location.

A It would probably stand a better chance of making a well. However, it would still not fulfill my ideas of equity or of draining that 40, which is what we are essentially concerned with here, of conserving the oil in that forty.

Q Yes, but you are also concerned with an exception to an established drilling pattern established by the Commission, and the established drilling pattern is the southeast quarter. Now you are petitioning on the basis that you would not have a commercial well in the southeast corner or the regular location. What I would like to know is where, in your opinion, would it become a commercial well or where could a commercial well be produced? As to that quarter-quarter section and as far east as possible, where would that line be?

A I think that a well in the position that we have--in the location, rather, that we have applied for, in the northwest of the northwest of the northwest of that section, would be the only location in there that would completely, or as completely as possible, as one well can do, effectively drain the oil from that, conserve the majority of the oil from that quarter section, and would also have the best chance of finding the greatest section of effective sand in the first bench of the "J", and that is my opinion, that that would be the only place, due to the number of things

we brought out, our pressure gradient to the northwest across the forty would be the only thing--the only location that would effectively really and equitably drain that quarter.

Q It may be the best location for you to get the most oil from the quarter-quarter section, but again I ask you about where might the line be drawn or the well be drilled to obtain a commercial producing well to the east?

A Well, that's a pretty hard thing to say. If we go east--you mean the farthest east location we could have in that forty?

Q Yes, and based upon the evidence--

A I suppose anywhere where I have shown my ten-foot contour--ten-foot isopach here we could expect to have a commercial well. However--

Q Now, your ten-foot line, is that this line here?

A No, that is not. That is the five. The ten-foot cuts about through this location here--well, here it is.

Q So approximately the center of that might hit to the south, at least?

A It would from the point of view of getting a well that you would set pipe on, yes, but I don't think in effectively--

Q In connection with getting the most oil out of the lands, if you are not allowed to drill in your requested area, would that oil be drained by the other wells to the north and west?

A There are none on the north.

Q Well, to the northwest?

A Yes, north and northwest. Two wells in there. It is my opinion, under the theory that we are working on, that we present our testimony on, that at the present time those two wells, the one to the northwest and the one to the west, are at the present time draining oil from the forty.

Q Now, in connection with a regular drilling pattern, one of the compensating features of having a regular pattern is that where you have your locations off center like that, where the regular pattern is the southeast of a quarter-quarter, that the compensation that the party adjoining receives is that his well, the adjoining party's well, will be drilled 1320 feet away from his well, is it not? In other words, one of the compensating features of drilling this well in the southeast corner here is that the next regular location is 1320 feet to the south because of the fact that there is another well theoretically always to the north which would give them 1320 feet, too?

A Yes.

Q So if an exception is granted to you, it also works an inequity to the party who has drilled on a regular location?

A Except that we are dealing with an edge situation here, and I think that is the only reason for any of these exceptions.

Q That is true.

A And, also, we have tried to bring out the fact that we consider that there would be little drainage from a well drilled--and this is not by our testimony entirely but by the testimony that has already been established by the Engineering Committee--that there should be little drainage of the area to the west of the forty in question by a well drilled in the northwest up there. So I believe that balances out, particularly since we are dealing with an edge situation here and our whole premises are based on that.

Q That is correct, but the other party has already established his regular drilling pattern, and where another party comes in for an exception consideration must also be given to the party having the regular location, should it not?

A Well, that's true.

Q Now, in your opinion, if a well could be drilled further to the east than what you have requested and it would be, in your opinion, a commercial producing well within the limits of the gas-oil ratio, do you not feel that it would be more equitable to drill at that other location than at the location you are requesting?

A No, sir, I don't, because I think that what we brought out would make up for any what you point out as inequalities

in the thing. The fact, as I have repeated here several times, that we believe that that well would drain primarily this forty, I don't think that would be the case.

MR. DOWNING: Any further questions?

Mr. Glenn, do you want to ask any questions?

MR. GLENN: No, not now, thank you.

MR. DOWNING: Any members of the staff? You may be excused.

MR. STOCKMAR: I would like to ask just one more.

#### REDIRECT EXAMINATION

BY MR. STOCKMAR:

Q Mr. Tolleson, are you completely satisfied that a well in the northwest location we are asking for will be a commercial well?

A Well, I don't know. Yes; I am not completely satisfied, no, because I have sat on enough wells in the Denver Basin to know that you never have a sure thing out here.

MR. STOCKMAR: That's all.

Q (By Mr. Jersin) Mr. Tolleson, there is a dry hole in the northeast quarter of Section 33?

A Yes, that's right.

Q And a dry hole in the southwest quarter of Section 33?

A That's correct.

Q Do you have any drill stem test information on those

two wells?

A I don't have it with me. There has been some information released on it and I have also discussed it with the operators. The one in the southwest, I believe, is the McElroy Ranch and the one in the northeast is Mr. Johnson's well. The drill stem tests on both of them, neither recovered any oil that I can recall. They recovered slightly--I think one of them recovered slightly oil cut mud. That is the one in the southwest. And I believe the one in the northeast recovered some oil and gas cut mud.

Q No free gas in either one of them?

A I don't know of any. I am not positive about that, but I don't believe there was any free gas. Maybe Mr. Murphree could correct me.

MR. MURPHREE: There was on our test.

A Not in an appreciable amount, though?

MR. MURPHREE: No.

MR. JERSIN: I believe that's all.

MR. MURPHREE: I would like to ask a few questions, if I might. Don Murphree, representing S. D. Johnson.

Q (By Mr. Murphree) I got in a little bit late on the testimony, but I gathered that in your opinion, Mr. Tolleson, the well would not be a commercial well unless you had at least ten feet of pay section, is that correct?

A No, I didn't necessarily say that. I think we had

established on this that five feet would be more the limit of what a commercial well would be, although I would certainly hate to say right now what I would set pipe on. That, as you know, is something which varies in every particular case, due to the permeability of the sand, etc.; a number of factors.

Q Well, now, doesn't your regular location fall well within your five-foot sand limits?

A You mean the normal spacing pattern?

Q Yes.

A It falls about on the five-foot isopach.

Q In other words, you think you should have at least approximately ten feet but not less than five feet, then, in order to have a commercial well, is that approximately your opinion, then, as far as your testimony is concerned?

A I would like to have ten feet, yes.

Q According to information which you have on thickness of your sand here, doesn't it appear to you that the sand is thickening to the east and south rather than to the north?

A The sand is thickening to the east and south?

Q It thins more quickly to the north than it does to the south and east.

A Due south and going in a southerly direction across that, it seems to remain fairly uniform, with a thinning to the east. In a southerly direction, given any one given



point that you pick on the west side of there, if you go in a southerly direction it will stay more or less uniform in thickness.

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Q It is thicker at any point due south than it is north, isn't that correct, it thins more rapidly to the north?

A Not necessarily.

Q What I mean by that, doesn't the sand stay thicker in this direction longer than it does in this direction?

(indicating on exhibit)

A Well, we don't have enough control to really tell in that direction. It seems to maintain a rather uniform thinning towards the east.

Q Well, now, for example, in our No. 3 well here we have approximately 12 to 14 feet of effective sand, while in our No. 4 well due north we have only eight feet of effective sand.

A Well, that's perhaps a little difference in interpretation.

Q That is the interpretation of engineers who have done quite a bit of work on the thing. Yet that well, with only eight feet, has produced in excess of 20,000 barrels of oil in the last seven months.

A Well, it was probably a better sand than the thicker one. Permeabilities and porosities would have some bearing on that, too.

Q Then I think in Lion's No. 2 Marquardt well due north of our No. 4 well they had even a poorer section of sands than we did in our No. 4 Glenn Walsh.

A It looked that way to me.

Q You also spoke of some inequities as far as drainage of the wells that were being drained there.

MR. MURPHREE: I would just like to point out to the Commission that on the particular tract we are interested in here, if this location is granted, it will have resulted in us being offset in every possible direct offset that we could, with the exception of one. The regular locations are completely drilled, these regular locations on this side. There have been three exceptions granted on this side, one exception granted on this side, and this will be the second one, which will have resulted in, I say, a greater inequity on our tract of land, being drained by direct offsets by everyone.

THE WITNESS: Well, I am sure these has been good geological reason for each one of these, though.

MR. MURPHREE: Mr. Johnson wanted me to inject into the record the fact that in his opinion he thinks that as far as equities are concerned, then, that he should be allowed twenty-acre locations along his west side and along the north side in order to offset the direct offsets which have been granted as exceptions on his south and east side.

MR. DOWNING: Thank you.

(Witness excused.)

MR. DOWNING: Next witness? I guess that is all of your witnesses. Those opposed?

MR. WESTFELDT: I would like to call Mr. George Fentress to the witness stand.

GEORGE H. FENTRESS

was sworn and testified as follows:

DIRECT EXAMINATION

BY MR. WESTFELDT:

Q Will you please state your name?

MR. DOWNING: I assume, if there is no objection, the witness is qualified.

MR. WESTFELDT: The witness is qualified as an expert? No objection? Fine.

Q (By Mr. Westfeldt) Would you please state your name?

A George H. Fentress.

Q And you are employed by Lion Oil Company, Mr. Fentress?

A Lion Oil Company, yes, sir.

Q In what capacity?

A District Geologist for the Denver Basin.

Q Would you please state to the Commission the property near the proposed location that Lion has under lease?

A Lion Oil Company has under lease the Marquardt lease or what we call the Marquardt lease in the southeast quarter of Section 29, Township 2 North, 57 West. We have two

producing wells there.

Q Would you please state to the Commission what your opinion is and the opinion of your company with respect to the exception that is sought by Carmack and Crawford?

A We very definitely object to the location that they are requesting because we think that they will make a far superior well at the required location than they will offsetting a very poor well which is our Lion No. 2 Marquardt, which we have testimony to present regarding that.

Q With respect to the conservation of oil and gas, is it your opinion that a well on the established pattern would adequately drain the area surrounding it?

A Very definitely. It should adequately drain the 40 acres.

Q Mr. Fentress, in preparing for this hearing, have you prepared exhibits in order to support the position of Lion Oil Company?

A I have. I have prepared three exhibits which I have several copies of, which we can pass around if you wish.

Q Well, let's start with Exhibit A.

A I have got them all bunched together.

MR. WESTFELDT: If the Commission please, I would like to have this made a part of the record, Lion's Exhibits A, B and C.

THE WITNESS: I have marked them all except the

cross-section, which is Exhibit C.

Exhibit A is the one without any coloring.

MR. WESTFELDT: Wait, Mr. Fentress. Is it understood that these are now a part of the record? Does the Commission have to make an order on that?

MR. BRETSCHNEIDER: No, we will accept them.

(Lion's Exhibits A, B and C, marked for identification, were received in evidence.)

MR. STOCKMAR: While we are on that point, is there any objection to the introduction of our Exhibit A?

MR. DOWNING: No.

MR. STOCKMAR: I would like to introduce it, then.

(Applicant's Exhibit A, for identification, was received in evidence.)

Q (By Mr. Westfeldt) Would you please refer to Exhibit A, Mr. Fentress, and explain to the Commission what this represents and your conclusions therefrom?

A Exhibit A is marked as such. It is the one without any coloring. It is a structure map on top of the "J" sand, ten-foot contour interval. The information shown is the Powers" derrick floor elevation, total depth of the well, the subsea of the "D" sand, subsea of the "J" sand, and the isopach net pay beside the subsea datum.

The idea on this cross-section is to show that location B, which is the normal spacing location at the Adena Field,

will be slightly lower than Location A, which is the requested location. Consequently, it should be lower from the gas-oil contact than Position A, should possibly have a lower gas-oil ratio and should have more effective sand. We believe it would be a better location to drill. Mr. Tolleson wrote out the same contour line of a minus 1070 running closer to Location B than to the requested location.

MR. DOWNING: Whose contour lines are these?

THE WITNESS: These maps were all prepared by myself, all exhibits here.

Q (By Mr. Westfeldt) But where did you obtain your data for this map?

A The data--the subseas were obtained from electric logs and using Powers elevations. The saturations were obtained from core analyses, core descriptions and electric logs.

Q I gather from your testimony that you believe it would be advisable from the applicant's point of view, as well, to remain as far as possible from the up-dip sand pinchout area, is that your conclusion on this?

A Well, on this particular map my point is that they should remain structurally as low as possible.

Q As low as possible?

A That since there is a gas-oil contact at a minus 1060, that this Location B would be better.

Q And that is one on the established spacing pattern, is

that correct?

A That's correct. I might give some additional datum on this map if anyone requires it, on the wells 3 and 4 in the southeast quarter of Section 32. They do not affect the map here. It was information obtained since the exhibit was prepared. If you would care for it, I would give it. Otherwise, it does not affect our hearing here.

Q Okay, Mr. Fentress, I don't think anybody would require that right now. Why don't you refer to Exhibit B, now, which you have prepared, and tell the Commission what it is, what conclusions you have drawn therefrom?

A This exhibit is an isopach of the net oil pay sand, in the "J" sand body. It is contoured on a five-foot interval; as explained in Exhibit A, I determined the net pay from electric logs, core analyses, core descriptions, etc., and have determined, to the best of my ability, the effective pay in each of the wells surrounding this area.

Q And is the effective pay shown on this map?

A This is the effective pay, yes, sir.

Q Point out to the Commission the particular wells that we are concerned with here.

A They are marked A and B, the "A" being the requested location as an exception by Carmack and Crawford; the Location B is the normal spacing pattern at Adena. I have perhaps given a little more emphasis to the Johnson-Glenn well

in the northeast quarter of Section 33, in that I have given them one foot of pay which actually they may not have. However, on their core description they indicated eight feet of sandstone and shale, with faint to fair odors, which indicates that there is some communication from the west to that well, although they undoubtedly have zero permeability, but I use that as a zero line or close to a zero line in order to establish the eastern limit. Undoubtedly, a well offsetting that would be dry, also, but the area marked in yellow, between the zero line and the five-foot line, I have indicated over at the side as the sand pinchout marginal area, where if a well is drilled it would be very likely non-commercial. It is difficult to draw such a line, but in the light of the Johnson-Glenn well having some odors in it, I have given some emphasis to that well.

The McElroy Ranch No. 1 Arnold was discussed before, and it I also gave one foot, although possibly it could have more. I used it for a zero line, also.

Following the general configuration of such lines, the zero line and the ten-foot line, I have determined the five-foot line, of which Location B, the normal spacing pattern at Adena, should have a great amount of net effective pay. I believe it would have more effective pay. As you can see, there is a slight nosing of effective pay coming across that area to the northeast toward the Johnson-Glenn

well, which should make a thicker net pay in that area--  
at that location.

Q Mr. Fentress, why don't you try to identify on this map for the Commission the apparent thickening of the pay section across the Location B, on the established spacing pattern?

A What now? Will you state that again, please?

Q I would like you to point out to the Commission what appears from this map as a thickening of the pay section across Location B.

A You will see that in the northwest quarter Section of 32, the Carmack well, I have given 12 feet of effective pay just as Mr. Tolleson did. I have given, in the northeast quarter of Section 32, the Johnson 4 Glenn Walsh, eight feet of pay, just as Don did, Don Murphree. The No. 3 Glenn Walsh I have given 16 feet of effective net pay. Perhaps Mr. Murphree has given a foot or two less, but from core analyses and electric logs I believe it has that much.

Then also on our No. 2 Marquardt I gave nine feet of net pay. There is an indication there that the wells to the southwest of Location B have a thicker net pay, and you can see that to the northwest of "B", toward the location requested, that there is a thinner net pay, thus establishing such a nose coming across.

Now, perhaps Mr. Tolleson may have given more net

pay to the No. 4 Glenn Walsh, and if he has it would affect the two locations very little. Actually, you could perhaps say, then, that the 10-foot net pay line could go through Location A and B, which would make the two locations equal. In other words, there should be no difference if you did give more net pay to No. 4 Glenn Walsh. However, we have good information to keep that figure low.

I have also indicated on this exhibit the initial potentials on each of the wells. Our No. 2 Marquardt was the poorest of the group surrounding this area, which well pumped 158 barrels of oil per day. All the rest of the wells flowed. The Johnson No. 4 Glenn Walsh flowed 228 barrels of oil per day on a 1664 choke, Carmack and Crawford's No. 1 Glenn flowed 408 barrels per day, on a 1464 choke, although I understand they did sand-frac that. I do not know if the No. 4 Glenn Walsh was sand-fraced; nonetheless, it is a higher initial potential on the Carmack well. The No. 3 Glenn Walsh flowed 447 barrels of oil per day on a 1464. The No. 1 Arnold is a gas well which hardly affects the oil initial potentials.

Q Then your initial potential that is indicated by these wells coincides with that sand thickening area that you just described to the Commission?

A Yes, sir.

Q And in your opinion that also points up the quality

of the established location?

A That's right.

Q All right. Now, on this exhibit you have also indicated the permeabilities of the wells that you have just referred to. With respect to that information would you explain to the Commission how this affects the relative merits of Location A and Location B?

A I have indicated in the upper right-hand corner of this exhibit the foot by foot permeability from the core analyses on the five wells surrounding this area. You can see from that that the average permeability on Lion No. 2 Marquardt is lower than the average permeability on any of the other four wells. Now, these averages are underlined at the bottom and the net feet of pay from the core analysis indicated. I have listed under the averages the millidarcy feet for each of the wells.

Q I understand it is your conclusion that no particular advantage is gained by moving to Location A, there is no indication of higher permeability?

A If anything, there is an indication of lower permeabilities in that direction.

Q All right, Mr. Fentress, the third exhibit that you have prepared is Exhibit C. Will you explain that exhibit to the Commission and tell what it indicates and the conclusions, the additional conclusions, you draw?

A This exhibit was prepared only to give you a visual inspection of each of the wells surrounding this area to determine in your own minds that the conclusions that I have drawn are substantiated by these logs. You can readily see on the log to the far left, the Lion No. 2 Marquardt, that not only the resistivity of the upper log, but also the microlog separation on the lower log is very erratic, which substantiates the poor initial potential, the low average permeabilities which we have on that well.

As you come to the No. 4 Glenn Walsh, which is the other diagonal from the requested location, the microlog separation is somewhat erratic still. You do have a small resistivity kick on that log, which indicates that it is perhaps not as good a well as might be thought.

Now, Mr. Tolleson may have taken the microlog separation into account in giving that well more effective pay. However, from the core description and core analysis we have only given it that part colored in red.

Q And, again, those are the two wells that will be closest to the location that is sought by the applicant?

A That's right. You can see in all the rest of the logs that they have good microlog separation, a cleaner S. P. and resistivity.

Q Point out the wells that these next three pictures refer to.

A All right. Carmack No. 1 Glenn is the--

Q That is the third one?

A The third well that was discussed previously. Now, it has good clean self-potential on the upper log. It has a fairly clean, although slightly irregular resistivity. It has got a very clean microlog separation, which indicates that it should be a very good well, which it is.

The next log, the Johnson No. 3 Glenn Walsh, although it is a little farther from the area in discussion, still indicates that the sand is better in that direction. You have higher resistivity, good clean S. P. and good clean microlog separation.

The Carmack No. 1 Arnold, although it is a gas well, does indicate some erratic microlog separation, does have a fairly good resistivity kick, but it is in the gas zone and is hardly considered applicable except to affect the net pays in the area, in the structure.

The well on the far right is the McElroy-Arnold, which I have given one foot of net pay to control my zero line. You can see that the microlog separation is very poor, except for one little spot there which I have marked in red. There they tested some gas cut mud. You can see that the S. P. up above and the resistivity curve is very poor, which certainly indicates it is close to that pinchout line.

Q Well, Mr. Fentress, would you summarize very briefly

your conclusions for the Commission?

A My conclusions are that Carmack and Crawford should not be granted the exception, because they should obtain a superior well at the required location in the Adena Field as substantiated by the evidence that I have presented; that they would conserve oil and gas by drilling the west location, not only for themselves but for the land owner, and that just about summarizes it.

MR. WESTFELDT: I have no further questions of this witness at this time.

MR. DOWNING: Any other questions? Anyone else wish to ask the witness some questions?

#### CROSS-EXAMINATION

BY MR. STOCKMAR:

Q Mr. Fentress, I see our major disagreement here has arisen over the determination of the net effective pay in the Glenn Walsh No. 4 well of S. D. Johnson's.

A Yes.

Q You testified that Mr. Tolleson apparently gave that well approximately 12 or 14 feet of pay, and you are setting it up on your Exhibit B as eight feet.

A That's right. Now, I didn't hear Mr. Tolleson mention how much he did give it, but apparently he gave it more.

MR. WESTFELDT: Isn't it correct, Mr. Murphree said eight feet, too?

THE WITNESS: Mr. Murphree said eight feet, yes, sir.

Q (By Mr. Stockmar) Assuming for the moment that Mr. Tolleson's analysis is more accurate than your own, would you then be able to justify our general determination of the isopach?

MR. WESTFELDT: I think that is a little difficult for him to answer. I think that is proper for their own witness to put on.

MR. ROCCHIO: He can cross-examine him.

MR. STOCKMAR: Actually, apparently we have a near identity here, Mr. Westfeldt, except for this one exception. Apparently both people have used the same general principles in applying their isopach thicknesses, and I am asking, as a hypothetical:

Q Had you established from your analysis of the logs that the Glenn Walsh No. 4 effective sand thickness was 12 to 14 feet, would you not have a much straighter contour line or isopach line passing through here, and would not have discovered this nose here?

A No, I would not have a straighter contour line. I would have still an irregular contour line.

Q Would you still have established a nosing here?

A Yes, I would still establish a nosing.

Q Would your ten-foot contour line have been on the west side of the Glenn Walsh No. 1--excuse me, No. 4, or what

you have marked here as the Busman--or the No. 1 Glenn on the Busman lease?

A Would the 10-foot contour line be west of the No. 4?

Q Yes, it would have, excuse me.

MR. WESTFELDT: What well are we talking about?

MR. STOCKMAR: Excuse me; let me start again.

Q (By Mr. Stockmar) Had we established the effective thickness of the Glenn Walsh No. 4 well as 12 feet, where would you have placed the 10-foot isopach line with respect to that well, that is, east or west of it?

A Well, I will draw it here for you if you would like, because I have it sketched on my map as it is. It would still establish in my mind the same type of nosing, whereby, even if you gave it 16 feet, as I did, which would be the maximum microlog separation, although there is nothing to substantiate it except the microlog separation, you would still have the same general nosing which would still push it across Location B. You could say, then, that perhaps Location A and B were maybe equivalent, in which case, if they are equivalent in net pays there should be no reason for an exception. But the evidence which we have on all information except microlog separation--and even the microlog separation is very erratic at the bottom eight feet--but even if you give it 16 feet, you can say A and B should be the approximate equivalent. I still get my nose from

this direction. I have to get this pull in because of our poor No. 2 Marquardt.

Q Would you have the same distinct nosing with 14 feet?

A I think so. I could redraft it if you would like, but I am sure you would get the same thing. I mean you still have the same pull of a low effective pay in this direction, you have the same pull of a high effective pay up through this direction, I feel.

Q Why is it that you did not use the microlog separation in your analysis of the logs with respect to this very poor well, the Glenn Walsh No. 4?

A Because on the core description of the S. D. Johnson No. 4 Glenn Walsh they described it as such, fifty-five ten to thirty; they did not break it down too readily, but they do describe, "20 feet of sandstone, slightly reworked, with wavy shale, stain in the top seven feet, with spotted porosity and permeability", of which they took for analysis all the effective saturation, and they have--I say all; they took five feet of that seven feet. Now, I have given it eight feet. But all they described was seven feet. Of course, you see on the Exhibit B the core analysis of that five feet.

Q Mr. Fentress, in preparing a map of this type, there ought to be a fairly consistent theory used in arriving at the information on which it is plotted to give it accuracy,

is that correct?

A What do you mean, consistency? Yes, there should be consistency in your methods.

Q The determination of information with respect to each well ought to be under consistent theories?

A That's right.

Q Yet you have testified that you had used microlog separation in your reading of these other logs?

A Where it has been substantiated by core descriptions and analysis, yes.

Q But of these wells, this is the well as to which you did not apply microlog separation?

A I have applied it in later testimony, where you can use it if you want to use it, but no other data substantiates that you can use it.

Q Had you not had available core analysis and had applied microlog separation, how much effective thickness would you have given this?

A You can give it possibly--on microlog separation alone, you can possibly give it as much as 16 feet. However, you can tell by the resistivity of that lower eight feet or so on the upper log, and also by the S. P. that you would have to eliminate some of that as being shaley. You could not possibly give it as much as 16 feet. Yet I have used an example where you could use as much as 16 feet and still

come out with favorable results.

Q Mr. Fentress, under your own interpretation of this area, the 40 acres on which we are considering drilling here to some extent lies within the yellow zone which you have indicated to have thin section and low permeabilities?

A Yes, that's right.

Q You have heard Mr. Tolleson's testimony with respect to the expansion of the gas cap in a general northwest direction?

A Yes.

Q Does that conform to your own conclusion of the approximate advance of the gas cap if there is controlled production in the oil area?

A Well, I do not feel qualified to answer as to the behavior of gas or water in a reservoir. I could give an opinion, but it would not be with authority because I tried to remain away from that sort of opinion as much as possible and leave that to our reservoir section. Now, he was stating somewhat--it may be his own opinion or from some of the other work that was done, but I do not feel qualified to say what the gas cap might do.

Q Do you feel qualified to say whether or not a well nearest to an advancing gas cap would sooner go to gas?

A Well, I know we have perforated as much as six or eight feet below the gas-oil contact and had very high gas-oil

ratio wells. That is very possible. But as to why, I think your differences in permeabilities can affect that. I do not have an adequate explanation.

Q Are you familiar with the isobaric map which has been submitted to the Commission with respect to the Adena engineers--

A No, sir, I have not seen that. I may have seen it but have not had occasion to study it.

MR. STOCKMAR: That's all.

MR. WESTFELDT: May I ask just one or two questions?

REDIRECT EXAMINATION

BY MR. WESTFELDT:

Q It is your conclusion, then, Mr. Fentress, that the location that they seek is closer to the edge of possibly productive net pay than the one on the established pattern?

A Yes, on the basis of the work that I have done.

Q And according to the map of the applicant here, I believe it was testified that there was possibly gas up here in this white area?

MR. TOLLESON: I am sorry.

MR. WESTFELDT: Didn't you testify, also, that there was possibly gas up there?

MR. TOLLESON: I don't know what is in there.

MR. WESTFELDT: Oh, you don't know. Well, if you don't know, I won't go any further than that.

MR. STOCKMAR: May I interrupt for one more question?

RE-CROSS-EXAMINATION

BY MR. STOCKMAR:

Q Do I understand, Mr. Fentress, that your No. 2 Marquardt showed possibilities of making a "D" sand well?

A I know it had some stains in there. I can give you that answer if you would like to know. I can tell you exactly what we had. We cored the "D" sand and ran a drill stem test from 5442 to 51, open one hour, shut in 15 -- pardon me, open one hour and 15 minutes; recovered 260 feet of oil, 92 feet of water, with a shut-in pressure of 1350. There have been several wells that have had some "D" shows but no one has completed.

Q No other in the immediate vicinity of Marquardt No. 2 had any "D" shows?

A Yes, sir, I think so. It was on the basis of one of the Glenn Walsh's that had--I don't know if they cored it, but it had some indications on the logs that it might have some "D" sand oil possibilities, was the reason we cored on the No. 2 Marquardt. I believe on the USSR wells down here recently completed, I think they got a little oil recovery in the "D". I am not positive which wells had "D" sand.

MR. WESTFELDT: If the Commission please, may I ask what the purpose of all the information on the "D" is?

It is completely a new thing.

MR. STOCKMAR: Mr. Fentress has indicated by his testimony that there seems to be a parity at least between the various locations we are asking for, and I would like to point up by his own testimony here that there may be some possibility of an overlying "D" sand reservoir, in an effort to show that a well drilled in that vicinity might more likely penetrate a "D" sand section and thus develop and conserve some additional oil.

MR. WESTFELDT: There is no testimony so far that has been with respect to the "D" sand that I know of, and if they want to go into that question it seems to me they ought to put on a case with respect to that, then we can prepare on that point, too, and perhaps rebut it. But I don't think anybody has gone into it yet.

MR. STOCKMAR: I won't go any further into it.

MR. DOWNING: Any further questions? If not, the witness is excused.

MR. ROCCHIO: I have a question, Judge.

Q (By Mr. Rocchio) Mr. Fentress, I gather from your Exhibit B and your testimony that the unit, drilling unit, is on the edge of a field, just exactly how far east or west you don't know for sure?

A Well, that's right.

Q Would that be correct?

A We don't know for sure, that's right; from the established evidence, however--

Q From your information, this is how you interpret it?

A Yes.

Q It could be a variable, however?

A It could be, yes, sir.

Q That particular unit is located adjacent to production, is it not?

A That's right.

MR. ROCCHIO: That's all, thank you.

MR. WESTFELDT: That's all.

(Witness excused.)

MR. WESTFELDT: I would like to state to the Commission in line with Mr. Rocchio's question, he is referring to the statute, of course, when he asks those questions, we are of the opinion and urge the Commission that even though both of the locations that are referred to in this dispute are near the edge of the field, we feel that the one sought by Carmack and Crawford is closer to the edge of the field, and our second point is that no inequity or unreasonableness is clearly shown that would justify the exception being granted.

MR. DOWNING: Any further testimony? If there is no other testimony, does anybody want to make a statement?

MR. GLENN: I would like to make a statement.

MR. DOWNING: Come forward. Do you simply want to make a statement, or give testimony?

MR. GLENN: Just make a statement in there, is all, as a mineral owner in there. I am Howard Glenn, as a mineral owner there. These boys are all operators on my leases, and they have forgot more about the oil business and permeability and things than I will ever know, but I would like to see you folks go ahead. We started over in Five, with McElroy's in the northwest and Arnold and Carmack in northwest locations. Now we come right up to this last one there and it is on the border edge; why, then, jump back onto the pattern? If it is on the border edge it makes a better looking field in there. A fellow might have to get him a blueprint to find these wells if we don't kind of stay on that edge around in there, he is liable to get lost.

So if you could--I know Mr. Carmack, he probably hasn't divulged it--for my part of it I know he has a pretty good hold on that one, so I think he deserves another location on there, more than is on the border edge if we can stay on a northwest location.

That's all. Thank you kindly.

MR. STOCKMAR: May I have two more minutes, please?

MR. DOWNING: Let's just have these statements, not long argument.

MR. STOCKMAR: This will be very brief.

Our testimony, I believe, has established that our requested location is, in accordance with the statute, on the edge of the field and adjacent to a producing unit. I think it has also been established by our opponents that that is true.

I would like to point out that our evidence went further and was based on the equity and reasonableness of conserving to this .40 as much of the oil as can be produced from it by placing the well in this location so that the pressure forces from the gas cap would be operating on it for a longer period of time. There has been testimony that there would be no substantial compensating offset drainage. The contestants here have not given any testimony with respect to the equity and reasonableness of the location. They have limited their defense to the situation that the locations are approximately equal in terms of being on the edge of the field or adjacent to a producing unit. I think their only testimony was that their witness did not feel qualified to consider those questions.

As a final thing, this field is apparently the only one in the State on which there are spacing difficulties arising out of fixed locations. These problems have arisen so often with respect to this corner of the field that the Commission has found it expedient to establish a much more flexible spacing situation with respect to other fields,

including the south Adena Field here. Certainly this situation seems to call for at least that flexibility with respect to this 40 acres.

MR. DOWNING: Any further short statements?

MR. BAUMGARTNER: I have just a little map. I am Mr. Baumgartner.

MR. DOWNING: What is this, more testimony?

MR. BAUMGARTNER: Yes, just a wee bit more. I didn't get a chance--

MR. DOWNING: I thought the testimony had closed.

MR. BAUMGARTNER: He jumped up before I had a chance to get out.

MR. WESTFELDT: I didn't mean to cut out someone on my side.

MR. STOCKMAR: I am not going to object to this if you wish to hear it.

MR. BAUMGARTNER: This is a structural contour map that I have made up, a small one here, and the location that Mr. Carmack seeks up here in the northwest seems to be a wee bit out of place, because, actually, a southeast location would be approximately on the same structural contour as the northwest location.

Furthermore, over here I have constructed an isopach map with a 10-foot sand thickness here and a 20-foot thickness, and it wasn't contoured on effective pay but it

was contoured on the resistivity curve, which actually shows you your sand conditions in the area.

Now, if you take the regular isopach map of effective pay and compare it with the resistivity isopach, you will find that actually the general sand conditions are just as favorable down here in the southern part as they are in the north. In fact, as you go further north your total sand thins out and shales out. However, when you come to the south and southeast and southwest it thickens.

Now, the same thing is going to apply to your effective pay, if you compare your isopach of the effective pay with your complete isopach of the first bench of the "D" sand. So, actually, as you come down here to the southeast you are going to have a larger sand body in which to gain your effective pay and porosity and permeability, whereas as you go north and northwest you get up to Lion's No. 2 Marquardt, your total thickness is going to be reduced and therefore your chances for an effective pay are also going to be decreased.

This map over here, there isn't much on it except a few gas-oil ratios, and it seems to me that the gas-oil ratios in this whole north end of the field--northeastern end of the field--are just about constant all the way around. In fact, actually, in the northwest you have a higher gas-oil ratio than you do as you come south and southeast.

Those are just a few points I would like to bring out. That is all I have for testimony.

MR. DOWNING: Thank you. If there is no other testimony, the testimony will be closed.

Does anyone else want to make any further statement?

MR. ROCCHIO: Mr. Baumgartner, did you want that as an exhibit in the record?

MR. BAUMGARTNER: Yes, you might enter that in the record.

MR. DOWNING: Do you offer it as an exhibit?

MR. BAUMGARTNER: Yes.

MR. DOWNING: All right. If there is no objection, the exhibit will be received.

(The document referred to was marked and received as Baumgartner Exhibit No. 1.)

MR. DOWNING: If there is no further evidence and no more statements, the hearing is closed.

(At 11:30 a. m., the hearing was closed.)