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BEFORE THE OIL AND GAS CONSERVATION COMMISSION  
OF THE STATE OF COLORADO

26-10

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 )

CAUSE NO. 26

The above-entitled cause came on regularly for hearing before the Commission on Thursday, June 3, 1954, at the hour of 10:00 a.m., at Room 704, State Capitol Annex, 14th Avenue and Sherman Street, Denver, Colorado.

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CHAIRMAN DOWNING: We have here two matters, plus minutes. If there is no objection, the minutes will be approved.

You all have the next hearing, Cause No. 26. Application for two exceptions. I understand that will not take very long. Are you ready in that matter, No. 26?

First, Madame Secretary, have the notices of the meeting been given?

MISS HOGSETT: Notice has been sent by Mr. Stockmar. He will file waivers.

CHAIRMAN DOWNING: Notice has been sent to everyone under the statute and regulations? You have those waivers?

MR. STOCKMAR: Yes, sir.

[REDACTED]

CHAIRMAN DOWNING: Are they satisfactory?

MISS HOGSETT: I am sure they are.

CHAIRMAN DOWNING: It is hereby declared that service is satisfactory and complete.

MR. STOCKMAR: We have these waivers which have been obtained from each of the interested parties.

CHAIRMAN DOWNING: We will determine the matter. Who all are present?

MR. STOCKMAR: I am appearing for the United States Smelting, Refining and Mining Company, the Applicant.

MR. RAYMOND J. GENGLER: I am appearing on behalf of Mr. W. H. Gaddis and Franklin W. Baumgartner.

MR. STOCKMAR: Mr. Tom Garber, who will appear as a witness for the U.S. Smelting, Refining and Mining Company.

CHAIRMAN DOWNING: Are you all appearing in favor of it, or is there some appearing against the application?

MR. GENGLER: Gaddis and Baumgartner are appearing against it.

CHAIRMAN DOWNING: All right. Proceed.

MR. STOCKMAR: Mr. Howard Glenn is also appearing. I don't know what position.

MR. GLENN: I am for it, because I happen to be the mineral owner.

CHAIRMAN DOWNING: Have we got an extra copy of the petition?

[REDACTED]

MISS HOGSETT: I think so.

CHAIRMAN DOWNING: As I understand it, it is a petition for two exceptions to the spacing order in Adena.

MR. STOCKMAR: Yes, sir. Those exceptions are asked for in the Southeast Quarter of Section Thirty-two, T2 North, R 57 W.

CHAIRMAN DOWNING: All right, now. How many witnesses have you?

MR. STOCKMAR: I have one witness, sir.

CHAIRMAN DOWNING: One?

MR. STOCKMAR: Yes. I would like to call Mr. Garber.

THOMAS B. GARBER,

called as a witness in behalf of the Applicant, the United States Smelting, Refining and Mining Company, having been first duly sworn, upon his oath testified as follows:

DIRECT EXAMINATION,

BY MR. STOCKMAR:

Q Will you state your name for the record, please?

A Thomas B. Garber.

Q Would you state your educational background?

A Educational background: graduated from the University of Oklahoma with a degree in petroleum engineering.

CHAIRMAN DOWNING: Unless there is objection, we will

[REDACTED]

assume the witness is qualified.

MR. STOCKMAR: Is there any objection?

I would like to state that the witness is qualified by the Texas Railroad Commission and Oklahoma Railroad Commission in similar matters.

Q Mr. Garber, have you examined representative log and other analysis with respect to the "J" Sand in the Adena field?

A Yes, I have.

Q If you please, let us limit all our remarks to the "J" Sand in this particular matter. Representing the Applicant here, are you a member of the Engineering and Geographic Committees of the Adena field?

A I am.

Q Have you worked on the factual data information which was submitted in the May 6 hearing of the Adena field?

A I have.

Q You were present at that hearing?

A Yes, sir.

Q And acquainted with the factual data presented?

A Yes, sir.

Q Do you recall testimony at that hearing with respect to the nature of this particular reservoir?

A I do.

Q Would you state briefly what it was?

[REDACTED]

A You mean from a geological sense, or from the--

Q From a reservoir viewpoint.

A From a reservoir viewpoint—in the factual data presented by the Engineering Committee from and for the Adena Field, it was determined that the reservoir had a gas cap and the gas-oil contact was presented in that testimony. And it was also stated that the reservoir had a gas cap drive and a solution gas drive mechanism.

Q Is that your opinion, also?

A That is correct.

Q From your study of the factual data, do you recall the testimony in the May 6 hearing concerning the results of excessive production particularly in the lands underlined by the gas cap area?

A One of the points in forming the Engineering Committee, and accumulating all this factual data for control production or observed production was to maintain a pressure differential from the gas cap to prevent encroachment of oil into the gas cap, migration of oil into the gas cap zone by the depleting of that higher pressure zone.

Q Also, was it to conserve the waste gas and the dissipation of reservoir energy from the gas cap?

A That is correct.

Q And that is your opinion, also?

A Yes, sir.

Q What was the Committee's conclusion and recommendation

[REDACTED]

to the Commission with respect to a limitation on production?

A Well, the Committee recommended for a six-month period that production be curtailed to 125 barrels a day per well, with a limit--gas limit of 150,000 cubic feet per well, which would result in a maximum gas-oil ratio of 1200 to one.

Q In your opinion should that on a trial basis lend itself to the conservation of reservoir energy in the gas cap?

A It should. It was the opinion of all the operators that agreed to the factual data presented in that hearing.

Q Under the Committee's recommendation, an operator could still produce the maximum production of 125 barrels a day from a well which had a gas-oil ratio of 1200 to 1?

A That is correct.

Q I believe the records of the Commission, without further testimony here, will show that Applicant's Glenn # 1 well was completed in the southeast quarter--southeast quarter of Section 32 on a northwest location as one of the pioneer wells in this particular part of the field. And that was long prior to the establishment of any spacing order or specification as to locations of the wells.

That well, as indicated in the factual data, was originally completed with a gas-oil ratio of approximately 8,000 to 1. In accordance with practical operating practices, the Applicant here shut the well in, pending a work-over and

[REDACTED]

recompletion. The records of the Commission will also show that that work-over has been completed, and that the gas-oil ratio has been successfully reduced to approximately 860 to 1. That was accomplished by cementing off the gas cap area and by gradual perforations beginning at the bottom below the productive zone, coming up until two feet of the oil sand had been perforated.

Q Mr. Garber, even though you consider the recompletion job to be completely successful, does the gas-oil ratio of 860 to 1 indicate that the well produced some gas cap material?

A Yes, it does. In the factual data presented, the solution gas-oil ratio of the reservoir was below 600.

Q Then, for wells in the same area underlain by the gas cap, a well with a lower gas-oil ratio than this Glenn No. 1 indicates that the well is producing more efficiently and with less dissipation of reservoir energy from the gas cap?

A That is correct.

Q All other considerations being equal, if you had your choice of two locations from that, you would select the location where the lower gas-oil ratio was to be obtained?

A That is correct.

Q Specifically, with respect to the two forty-acre tracts which we are concerned with here, what recommendation

[REDACTED]

have you made to your employers with respect to the feasibility of drilling on a northwest as opposed to a southeast location?

A In the interest of conservation, and in the interest of maximum efficient recovery of oil from the reservoir, we recommended the locations be drilled in the northwest quarter.

Q You expect a lower gas-oil ratio well to be completed there?

A Yes. As shown on the structural map that we present, wells are expected to penetrate the sand below the gas-oil contact which has been established at minus 10-600.

Q Speaking generally again, what was the Engineering Committee's conclusion on a field-wide basis with respect to the effects of the controlled conservation of the gas-cap energy?

A Well, it is thought that by controlling the gas cap there and allowing the gas cap to expand down structure and across a grading there that it will move the oil ahead of it or with it, thereby increasing the oil recovery from the reservoir.

Q I think the factual data indicates that an expected increase on a field-wide basis is between 25 and 35 percent.

A That is under competitive operations there, and can be increased.

Q Disregarding the possibility of unitization?

A That is correct.

[REDACTED]

Q Then, I gather that wells which are lower structurally will produce oil displaced from up-structure lands by the expanding gas cap?

A The indications are that is correct.

Q Do I also understand that the wells located higher structurally will sooner have an increased gas-oil ratio?

A That is correct.

Q Than wells located down structure?

A As the gas cap expands down structure, the entire reservoir is soon overlain by the gas cap and as the gas cap expands down structure, the wells closer to the gas cap will go into gas first?

Q And eventually will become a gas well?

A That is correct.

Q With respect specifically to the southeast quarter of Section 32, is it your opinion that the expanding gas cap will push substantial quantities of oil from your lands to the northwest which will be produced from wells on lands to the north of you?

A The expanding gas cap in conjunction with the gravity drainage and the pressure differential down structure toward the northwest will cause drainage in that direction.

Q Even without the benefits of an expanding gas cap, do you consider there is a strong probability that wells on lands to the north of this particular 40 are and have been and will continue to drain the lands?

A That is correct.

Q Without respect to the benefits of expansion, what

reasons do you have for that?

A The structure itself dips to the West, and with the permeability, good permeabilities and relative permeabilities to give us an oil in the reservoir without the benefit of gas cap encroachment, oil will probably tend to migrate in that direction regardless.

Q I see from the isopach map attached to the factual data production that there is a substantial pressure differential in existence at this time?

A That is correct. The isopach map prepared by the Adena Engineering Committee and with all the wells shown in the field, shows a distinct pressure gradient to the west from the high pressure on the east side of approximately 1,530 pounds to a lower of approximately 1,430 pounds on the west, showing a distinct pressure differential across the reservoir on the gas cap to the lower flank well.

Q Mr. Garber, in your opinion, will--again with respect to the northeast corner or northeast quarter of Section 32--will a well drilled by your company on a southeast location give your company offset and drainage with respect to the wells to the north?

A No, it will not. The gas cap drive mechanism is from the east and the wells located closer to the eastward boundary of the field will not benefit as well as the well located closer to the other side.

Q As well as being a substantial distance from his lease line?

[REDACTED]

A That is correct.

Q Do you consider--from the testimony that you are being and will continue to be drained, and your statement that you are not down on this southeast location for the benefits of offsetting drainage--do you consider that equitable and reasonable?

A I certainly do not.

Q Then, is it your opinion that both the interests of conservation and the protection of the respective rights of both working interest and underlying royalty owners require that these exceptions be granted?

A That is definitely so.

Q Referring to the maps which show the locations of the wells, here, either of them, and the Commission's records generally, we find that two of the wells drilled on this particular southeast quarter--the only two other wells drilled on the quarter to the west, all of the wells drilled on the half section directly south--the only well drilled on the northwest of section 4 to the southeast--the only productive well drilled on the south of Section 33 to the east and the only well in the northwest quarter of Section 33 to the northwest, have been drilled on northwest locations, either as exceptions permitted in the original spacing orders, or as exceptions subsequently granted on applying here, and evidence here. That leaves primarily to the direction to the north, only, in which we have the



established spacing. And it seems that those are the off pattern wells with respect to this particular area. I understand that the "Oil Conservation Act" may not be primarily a correlative rights statute. And there has been considerable discussion and some litigation over that particular point.

Whatever the general intention of the Act may be, the conclusion is inescapable that correlative rights must be considered with respect to the specific situations covered by Section 6(c) of this Act. That is the section which permits such exceptions to the spacing orders as may be reasonably necessary if, and I quote:

"the requirement to drill the well at the authorized location on the unit would be inequitable or unreasonable."

The use of those words "inequitable or unreasonable" in this Act to me clearly demonstrates legislative intent that with at least with respect to this particular situation that appropriate consideration must be given to correlative rights.

Now the correlative rights problem has several viewpoints. One, from the operator-working-interest owners viewpoint, and another from the underlying royalty and underwriting royalty viewpoints.

I have had an opportunity to investigate the title to each tract surrounding this tract except one, and find a substantial variation in royalty and mineral ownership. As obviously each working interest owner wants to produce his fair share of the oil.



He is prompted in that desire by an obligation to his underlying mineral owners to appropriately develop and to protect the lands against drainage.

Now, I have assumed from this Commission's handling of the South Adena spacing that a rigid specification of the location of a particular well promptly results in difficulties for the Commission, for the operators, and inequities between them, and these serious correlative rights problems, particularly where we are near the edge of a field or in an area where prior exceptions have been granted.

The action of the Commission in the South Adena area in permitting a well to be drilled in that location on the 40, 330 feet from the boundary line and not less than 1,320 feet from another well drilled by the same operator appears to me a significant step forward in solving the problem, at least with respect to working-interest operators.

I anticipate that there will still be problems unsolved with respect to diverse royalty owners across those lease lines.

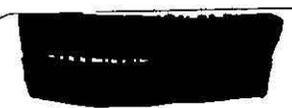
Mr. Garber has testified that the Adena field is a combination of solution gas and gas cap drive field; that the expanding gas cap will in time force substantial quantities of oil to the north and northwest, forcing oil from beneath the Applicant's land to wells which will be produced down structure by wells on land to the north.

[REDACTED]

He has also testified that wells drilled on the prescribed southeast location would probably be completed as wells with a higher gas-oil ratio than wells completed on the northwest locations, with a consequent less efficient use of the expanding gas cap and the energy in it. Also, that the expanding gas cap would still convert to gas wells, wells on the southeast location. The net result being that wells drilled on the southeast locations here will require more energy, more gas cap energy to produce the same quantity of oil than will wells on the northwest location.

If you will refer to the map where the proposed-- where Applicant's Glenn No. 3 has been asked for in the southwest, or southeast of Section 32, it is apparent from looking at the map that drilling a well on the prescribed southeast location would result in very close spacing to the wells southwest and northwest. The net result of that would be to leave in the center of that 320 acre-tract a rectangular 80-acre patch on which there is no well whatsoever. And the Commission's own determination that 40 acres is the appropriate spacing situation seems to me to require that the application as to the southwest of the southeast quarter be granted as a matter of course, taking into consideration all of the arguments which we have heard here this morning.

The application for the exception on the northeast of the southeast quarter does present a more difficult



problem to the Commission. It is equally obvious, however, that requiring a well to be drilled on the southeast location would leave on applicant's land a substantial area of proven oil lands which would not be drained effectively by the well for applicant's benefit. And considering the impact of the expanding gas cap, the effects of the existing pressure gradient, and the effects of gravity, it is quite apparent that substantial drainage loss would be suffered to wells located to the North.

It is unfortunate that the north half of Section 32 is nearly surrounded by wells which are drilled at close proximity to the land. The existence of those has been granted by the Commission for good and sufficient reason, and I think our attention ought to be directed more specifically to these two 40-acre tracts which we have in common here, which are offsetting each other, with a serious drainage problem in one direction, and no substantial opportunity to recover that, to offset that drainage by a well on a southeast location.

I gather from Mr. Garber's testimony that even a well on the northwest location might not sufficiently or equally offset the drainage loss which would be suffered to wells to the north, because all of the forces pushing the oil are going against it.

I believe it is clear from the record--from

[REDACTED]

Applicant's handling of its existing high gas-oil ratio well, that it has acted as a splendid operator and will continue to do so. Its cooperation with the Adena Field Engineering and Geological Committees further tend to show that.

I think it is quite clear that the granting of both of these exceptions will much more tend to carry out the underlying policy of the Commission with respect to spacing than it will to confuse it or alter it. Because it is in an area in which it is surrounded on three sides by wells which are on existing northwest locations, I think both exceptions should be granted.

Does the Commission have any other question of our witness, or the engineer?

CHAIRMAN DOWNING: Do you have--

MR. STOCKMAR: If you have any question--

CHAIRMAN DOWNING: You gentlemen that just came in-- are you interested in this pending case, the Number 26, Adena spacing order.

UNIDENTIFIED VOICE: No, sir.

CHAIRMAN DOWNING: If you are interested, will you give your names to the stenographer. Apparently you are not.

MR. STOCKMAR: They are on the other one, Judge.

CHAIRMAN DOWNING: Does anyone wish to examine this witness?

MR. STOCKMAR: Before we do that, I would like to introduce in evidence a letter from McElroy Ranch Company to the

[REDACTED]

Applicant, McElroy approving and recommending the granting of the application. A similar letter from Harold Carmack, an adjoining owner. And I would like to have the record show that the Commission has received from Gem Oil Company and V. H. Simmons a letter of May 25, 1954, making the same recommendation.

CHAIRMAN DOWNING: I was going to ask--how about the other adjoining owners?

MR. STOCKMAR: We do not have--

CHAIRMAN DOWNING: Who are they?

MR. STOCKMAR: We do not have recommendations from them that the application be approved here, but the extent to which there is any contest over it will have to develop here.

CHAIRMAN DOWNING: If there is no objection, those will be filed as exhibits C, D, and E.

COMMISSIONER VAN TUYL: On the structure contour map accompanying your application, there is shown by means of a dotted line the supposed gas-oil contact in the Adena Field. Do you mean to imply that there is such a definite boundary as indicated on this map?

MR. GARBER: Oh, no, sir. We certainly don't intend to imply that there is a definite foot there that we can pin the gas-oil contact on. We know from experience that there is a transition zone there. But the factual data presented by the Engineering Committees and supported by work done

[REDACTED]

by the Commission has established that as a point to be recognized as the gas-oil contact, but by no means is it an exact foot. There is a transition zone there for sure.

COMMISSIONER VAN TUYL: Rather wide zone, isn't it?

MR. GARBER: The exact width of the zone has not been determined absolutely conclusively. They are in the middle of a study now to determine the magnitude of such things as that, but the factual data presented here to the Commission on May 6 did pick that 10 minus 1060 as the approximate gas-oil contact on a line that we can consider as the gas-oil contact.

MR. STOCKMAR: Mr. Garber, it is not a vertical line separating the gas from the oil?

MR. GARBER: No.

MR. STOCKMAR: You understand it to be the western limits of the area in which an increasingly--in which the oil zone begins to thin out and the gas section begins to take over more of the formation?

MR. GARBER: That is correct. It is definitely not a vertical line. It is a structure line.

COMMISSIONER VAN TUYL: The gas cap, as a matter of fact, overlaps the oil zone?

MR. GARBER: That is correct.

COMMISSIONER VAN TUYL: Two or three miles, or--

MR. GARBER: The exact extent hasn't been determined which the gas overlaps the oil zone. On the eastern flank of the field there it overlaps the field substantially.



The ratio of the gas cap to the oil zone is a 4 to 1, which is a substantial gas cap.

COMMISSIONER VAN TUYL: Thank you.

CROSS EXAMINATION,

BY MR. GENGLER:

Q Mr. Garber, I believe you stated that the present gas-oil ratio of the No. 1 Glenn is approximately 860 to 1?

A We filed that information with Mr. Jersin, and that work-over was approved; that is correct.

Q That is the fact?

A That is correct.

Q And that is well within the limitation set by the Commission at this time, isn't it--the order of the Commission, 1200 to 1?

A That is correct. However it is above the solution gas-oil ratio as determined by fluid analysis from the reservoir.

Q In your opinion, and with the facts before the Commission at this time, and your knowledge, do you believe that your Glenn No. 1 is an economic well? And by that I mean, that it will produce oil and gas in sufficient quantities, paying quantities?

A Well, let me say this: the well had to be re-worked after it was initially completed. We went below the gas-oil contact and we know that six feet below the determined gas-oil contact the well was producing with a ratio of approximately 8,000 to 1, which is extremely high, and

[REDACTED]

evidence that the well is producing gas cap gas.

Q How much oil is being produced from that well at this time?

A The well is now producing the field allowable of approximately 100 to 125 barrels a day.

Q Are you acquainted with the recent well completed by the, I believe, Carmack and Crawford line. I believe the location would be the northwest quarter of the southwest and northwest of 32?

A I am.

Q Thirty-three?

A I am acquainted with the well to the extent that I have seen some information on it. I have not made a study of the well, but I am--I have a working knowledge and acquaintance with it.

Q What knowledge do you have of that well?

A Well, I believe that my knowledge that the well was completed low to some of the offsetting wells there which extends a known 10, or trend of a low in the extreme north part of that lease up there.

Q Would you consider with your knowledge at the present time that that well is a--would be an economic well?

A Well, that would be hard to say. It will depend on the rate of gas cap encroachment into that zone. However it is down dipped, and substantially down-dipped from the exposed tops of the well. The down dip wells would probably

[REDACTED]

make better wells.

Q Other than the gas cap drive and with the information regarding the Glenn No. 1, and the recent well completed by Carmack and Crawford, what is your opinion as to a well drilled in the southeast location of the northeast, southeast corner of the northeast quarter of the southeast quarter of Section 32, which would be the regular location for that particular quarter quarter of a Section of land?

A As we testified, we initially developed that section, that quarter section in the northwest quarter of those quarter quarters. And to follow our pattern and to take advantage of our structure, we drilled that on seismic information which has proved very substantially correct.

We determined that it was necessary to drill an economic well in the northwest quarter of that quarter quarter.

Q Would the well in the southeast location be an economic well?

A It would be hard to determine. It would not be as good a well, nor would it be as efficient a well as a well-- further down-drainage well would. It would produce oil possibly, but it would penetrate the gas zone, as we have testified, and would produce gas cap gas, in all probability.

Q Now, assuming that you will get--I mean in the northwest quarter would be your best location, that in itself does not mean that a very satisfactory location might not be within your northwest location that you are requesting,

[REDACTED]

and the southeast corner, which is the present pattern?

A Would you rephrase that, please?

Q In other words, I can see that in between the regular location as fixed by the Commission at this time, and the location that you are requesting, a well between those two locations might very well be a most satisfactory well?

A Well, now, if you will look at your structural contour map, there, which Mr. Van Tuyl just referred to, that well that we propose is just beyond the gas transition zone and just beyond the gas cap zone, and any well that would be south or east of that location would penetrate the gas cap.

Q This information that you submitted was formulated at your meeting, or presented on May 6, would you not now change your opinion as to where the line should be drawn in light of the recent Carmack well which has been drilled subsequent to your map?

A Again, if you will notice, we have a control point there between the Carmack well and our well, which shows that there probably will not be much difference in the structural contours as we now have them in our section of the field. It will definitely change it to the north, but the control point is between us and the new well.

MR. GENGLER: I don't believe at this time that it is necessary to make any arguments as to the law on that and what we believe the action means, until after we present

[REDACTED]

our witnesses--in answer to any argument that was presented before.

CHAIRMAN DOWNING: Is there any more testimony?

MR. STOCKMAR: I may have misunderstood. But did Mr. Gengler ask concerning a center 40 location, is that right?

MR. GARBER: He asked me a location between our proposed location and the southeast quarter quarter location there.

MR. STOCKMAR: Q If such a well were drilled, that would seriously disrupt any future consideration of 20-acre spacing, would it not?

A That is correct. However, as I pointed out, the location as we have pictured it there would be beyond the gas cap, which is our interest to drill beyond the gas cap and avoid penetrating it if possible.

Q Should our usual analysis of the actual location of the edge of the gas-oil contact be in error and that you actually do penetrate the gas cap, is it not true that the further northwest that you are permitted to drill the more effective completion of the well you could make, one of the terms of saving gas cap energy?

A That is correct.

MR. STOCKMAR: That is all I have.

CHAIRMAN DOWNING: Any further questions--any one in the audience. You are excused. Any further testimony?



MR. GENGLER: I would like to present Mr. Baumgartner as a witness.

FRANKLIN W. BAUMGARTNER,

called as a witness in his own behalf, and in behalf of Mr. W. H. Gaddis, having been first duly sworn, upon his oath testified as follows:

DIRECT EXAMINATION,

BY MR. GENGLER:

Q Will you please state your name?

A I am Frank Baumgartner and I am with myself and Mr. Gaddis.

Q What is your name?

A Franklin Baumgartner.

Q What is your occupation?

A I am a geologist.

Q Do you have an interest in the north half of Section 32, Two North, Fifty-seven West?

A Yes, I do.

Q And for the purposes of this hearing, are you contesting the applications as made by the United States Smelting, Refining and Mining Company?

A I am.

Q Are you fully acquainted with the particular area in which the application has been filed for the variations?

[REDACTED]

A I am.

Q And you have heard the testimony of Mr. Garber just given?

A Yes, sir.

Q Now in connection with the gas cap drive, and as the facts are known at the present time, what is your opinion as to the gas cap drive insofar as it may affect the oil which is now in and under the southeast quarter of Section 32, and particularly with reference to the application for variation from the southeast corner location?

A Well, the way I feel about that is that it has been generally determined that we do have a gas solution drive in the field. However, I don't think that there is--well, the gas cap in that particular area is going to affect the drilling of a very economic oil well. I believe that we shall have possibly ten feet of oil sand in that particular area with a gas cap above your oil column. In all of our Glenn Walsh wells to the northeast we had, oh, approximately four to six feet of gas in the core, on each one of those wells, but we were able to complete the wells and operate them economically.

I would like to make one more statement there in regard to the Howard Glenn No.1, drilled by Chittim



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and Allardyce that has a gas-oil ratio now I believe of 860 to 1. Well, that possibly and probably is due to the fact that you would have a gas coning there to begin with, and if the well had been completed right in the first place, you would have a much lower gas-oil ratio, which is true.

I happened to be there when the core was pulled out there, and there was quite a mishandling of the core; so, consequently, when they came to complete the well--they completed in the wrong zone in the first place. Then we had to go back and re-complete the well in the right zone, in the proper place.

So, consequently, there was quite a gas coning there which lasted for several months, and it will take quite a while for this reservoir to adjust itself to where it should be.

Now, as to the proposed location in the south-east where the application should be--could I borrow that map for a moment?

MR. GENGLER: Yes.

MR. BAUMGARTNER: I can hold the map up so that every one can see. There is the Chittim Allardyce well, and there is the proposed -- or the proposed location is up here. But if we look and see where the well should

[REDACTED]

be drilled in the southeast, we find that it is in the same relative place structurally as the Chittim Allardyce well, which is located in the northwest. Therefore, it would be economically feasible to drill a well there, an economic oil well, because I don't see in any way where it would be affected by a gas cap encroachment there.

Q Is that also structurally located--how is it structurally located in connection with the recent well drilled by Carmack and Crawford in Section 33?

A Well, it is located structurally about five feet higher, but that in any way would not affect this well. Incidentally, the Carmack well that was drilled up here shows no sign of having any gas cap or any gas encroachment. It was purely an oil well.

Q In connection with Mr. Garber's statements as to the drainage or the migration, we will say, of oil from the south half of Section 32 to the north half of Section 32, what would you say in regard to that?

A I don't see where it would be possible, a great migration of oil from the south to the north, because you would not dip.

Q Now those wells are--say, the wells on the north half of Section 32 have all been drilled in the

[REDACTED]

southeast corner pursuant to the order of the Commission?

A That is right.

Q And then in your opinion and the knowledge of the facts from your personal knowledge of the facts of the conditions in the field, with the evidence tendered by the various parties and submitted to the Commission, what is your opinion as to the inequities or unreasonableness in requiring the Applicant to drill in the regular location?

A I can't see any objection at all to having the Applicant's conform to the 40-acre spacing pattern as outlined by the Oil and Gas Commission on January 19, I believe, something like that.

Q In your opinion, would the applicant in drilling in the regular location recover his fair share of the oil in and under the lands?

A Yes, I should think possibly even in the long run--if they unitize, and they have re-pressured--he would probably get a little more of his share if he were a little more up dip.

MR. GENGLER: That is all.

CROSS EXAMINATION,

BY MR. STOCKMAR:

Q Mr. Baumgartner, are you arguing for 20-acre spacing in this field?

[REDACTED]

A No, I sure am not.

Q You are arguing economics with respect to particular wells?

A That is right.

Q And you are saying that simply because we can have an economically feasible well on the particular spacing that we have now, that we should be required to drill there on that instead of what we have sought.

A You haven't proved to me that it is a better location. I don't think you have proved it to anybody else either, except that you are just stating the facts.

Q Mr. Gengler didn't attempt to qualify you as any particular type of witness here; I gather, though, that you have had substantial experience with respect to the completion of wells?

A Well, not--I have seen an awful lot of them completed.

Q Sufficient to criticize the handling of the completion of Glenn No.1.

A Well, I didn't criticize the completion. I think the completion was done according to Hoyle. However, I think the cores were mixed up at the time the core was laid on the floor, there was a--well, slight

[REDACTED]

panic at the time and cores were going back in the wrong place. When they came to the perforation it was perforated in the wrong zone as has been shown by the results of the re-completion.

Q You say there was evidence of coning of gas into the oil zone in that well?

A Yes.

Q On what do you base your opinion? What evidence was there that gave rise to your conclusion?

A They did--they were on the border between the gas and the oil, actually, and it initially flowed oil; however, it went to gas.

Q Is that an indication that there is good permeability in the area?

A Sure. Yes. Gas would take over from oil anyway.

Q In any location, then, whether or not your well is completed in the gas cap area?

A Yes.

Q And in good permeability, you would expect coning?

A Well, that all depends on how fast you produce the well, and how far you get below the gas cap. If the well is completed correctly, you shouldn't have any trouble with coning.



Q By completing it correctly do I assume that you mean they have perforation from the bottom up?

A Yes.

Q As apparently this particular well has been re-completed?

A That is right. I have no fault to find with the completion of the well at all. I say it was a mistake initially when they did come to perforate the well.

Q Without going back into the record here, I would like to have again from you the statement that there would be no drainage from south to north in this area because the lands to the north are down dip?

A Yes.

Q Would you clarify that?

A Well, actually, first of all, you are worried about a gas solution drive or the gas taking over from the oil. So when you say that you admit that the gas is following the oil from the east down into the wells-- right? And when the oil has gone, gradually the gas will take over.

Q I tried to keep from testifying this time.

A Isn't that right?

Q I think Mr. Garber stated that it is a combina-

[REDACTED]

tion solution gas and gas cap drive.

A Yes.

Q And that the joint effects of both as far as will be felt--

A Yes.

Q That the effect of the gas cap expansion will be to drive oil ahead of it. I gather that it will expand up, carefully controlled on a fairly uniform front, generally parallel to the existing gas-oil contact line?

A I mean structurally our northeast of 32 and your southeast of 32 are related structurally. I can't see where there is going to be a great amount of drainage if we go by that map that I had for the Adena Committee. Do you have that map again.

Q What does this map purport to show?

A Prepared by the Lion Oil Company and the Adena Committee for unitization.

Q What is it, an isopach?

A No. Structural contour map. I believe Mr. Garber is familiar with this map. Anyway, this is the north half of 32. This would be the north half of 32 where we have our positions, and this is the south half where this smelting and refining is located.

[REDACTED]

And, structurally, this is a nose that dips to the northwest; and if it dips to the northwest--that is what your seismic indicates, isn't it, what you drill on--structure nose dipping to the northwest. If you will notice now, both of these are located almost structurally in the same position. So I can't see-- and I think everyone that knows anything about such things here would agree that there couldn't be too much drainage in such a circumstance.

Q What is the meaning of the hatch around that particular elevation?

A That particular well was about 20 feet lower, or 15 feet lower than the other wells in the area.

Q Actually you have a substantially lower area there?

A In that one particular place, yes.

Q That is right in the middle of the area, is it not?

A No, it is up to the north.

Q From this map looking at the northeast quarter, southeast quarter, only, as opposed to the southeast quarter of the northeast quarter which has the "J" Sand, which lies structurally higher?

A The northeast quarter of the southeast quarter.

[REDACTED]

Q Getting back to this business of no drainage because it is up dip--

A Actually we don't even know because there hasn't been a well drilled there. That is only a phenomenon that we can imagine because of the structure contours.

Q To my mind, from your statement that there would be no drainage from south to north because the north lines were down dip, that oil will travel up hill?

A No, but because you have this gas cap--

Q That the gas cap--

A Forces the oil down.

Q You say that the gas cap will force the oil down structure?

A It is right at the present time, yes.

Q And gravity will assist in forcing the oil down structure?

A That is right, because you have greater pressure on the east than you do on the west.

Q Do you agree that gas will be--oil will be forced from an area of high pressure to an area of low pressure?

A Yes.

Q You are acquainted with the factual data of the

[REDACTED]

isopach map submitted here?

A Yes.

Q Are you contesting both of our locations, or simply the one?

A I am contesting both of the locations because I don't think either of them ought to be off pattern, and according to this map I can see no reason why a well drilled in the southeast here would--I can't see where you would hurt anything. In fact, you are even better structurally located than Glenn Well No. 3.

Q Was our Glenn No.1 drilled prior to any of your wells?

A This well here?

Q Yes?

A Yes.

Q You think we should be penalized for having pioneered the area and for not having selected a southeast location?

A I don't think this is in any way being penalized; drilling in the southeast. You are going to get just as economical a well there as you would in the northwest.

Q He showed that the map shows that there will be a rectangular 80-acre area squarely in the center of

our leases.

A Yes.

Q Where there will be no well drilled. Do you consider that the other wells will effectively drain all this area?

A I surely do. I think the permeability is good. That is why at the present time they are not on 20-acre locations.

Q Then possibly 40-acre spacing is too close?

A Possibly.

CHAIRMAN DOWNING: Is that all? Are there any other witnesses?

MR. GENGLER: Yes, Your Honor, Mr. Couch.

J. E. COUCH,

called as a witness in opposition to the applications for exceptions, having been first duly sworn, upon his oath testified as follows:

DIRECT EXAMINATION,

BY MR. GENGLER:

Q Will you please state your name?

A J. E. Couch.

CHAIRMAN DOWNING: Is it cumulative, or different?

MR. GENGLER: Just a little bit different, Judge.

Q What is your occupation?

[REDACTED]

A I am an advisor to Mr. Gaddis on operating problems.

Q Professionally, what is your background?

A I am an engineer by training and experience.

Q How much time have you spent in the oil fields as an engineer?

A Approximately 20 years.

Q Are you a member of the Adena Operating and Engineering Committee?

A I am.

Q You have heard the testimony of Mr. Garber, and in connection with his interpretations of the factual data now known in the field, as a member of that Committee are your conclusions the same as his in connection with, we will say, the gas drive and so forth?

A The Committee is conducting studies now which we hope will lead to a plan of operation of the "J" sand of the Adena reservoir, which will be most efficient and will recover the ultimate amount of oil from that reservoir. Now, those studies have not disclosed the nature of the operating method to be used to depletion as yet. We have a temporary condition there due to the existence of a market for crude oil,

[REDACTED]

and an absence of a market for natural gas, which results in a gas cap being currently the high pressure area of the field. This--it is hoped our studies will find a solution for this, so that this gas-oil contact may be controlled.

Q Now, at the present time, what is your opinion as to the reasonableness and equitableness of the Applicant's request for a variation in the drilling pattern, with particular regard to the exception requested in the northeast quarter of the southeast quarter of Section 32?

A It is my opinion that a well drilled in the southeast corner of the northeast quarter of the southeast quarter would encounter the J Sand at or about the same structure position as the present well in the northwest of the southeast of the southeast.

Q Is it your opinion that such a well would be an economic well?

A It would have an equal opportunity to be that, yes.

Q Do you think that the gas cap drive would interfere or lessen the production that might be obtained from such a well?

A If the gas cap expansion is not controlled

[REDACTED]

through the operating life of the field, it could result in a loss of recovery in that well. However, with control of the gas-oil contact, recoveries of the well should not be jeopardized--oil recoveries.

MR. GENGLER: I think that is all.

CROSS EXAMINATION,

BY MR. STOCKMAR:

Q Mr. Couch, you made some reference to a control of the gas oil contact. Would you re-phrase what you meant there? Talking in terms of no existing market for gas.

A Currently we have a market for crude oil in the Adena field. We don't have a market for gas. We are producing that oil, and there is currently a differential in pressure across the reservoir. Beyond the gas cap area there is no withdrawal in the west edge of the field where the oil is produced due to those withdrawals of oil on the west slope.

Q By controlling the gas-oil contact, it would tend to keep it where it is?

A Within reasonable limits.

Q And that, since we have a pressure gradient that could only be done by also producing some of the gas from the gas cap?

[REDACTED]

A Correct.

Q And your well is located in the gas cap area?

A Yes, or in the transition zone.

Q I gather, then, that you feel conservation can be effected by producing gas from the gas wells even though they do not assist in the production of any oil-- simply as a means of keeping the gas-oil contact within reasonable bounds?

A I believe--I understand that these studies that our committee had under way were investigating the possibilities of doing that, of accomplishing a control of that contact.

Q Is it a control of the contact to its existing location, or the control of the expansion of the gas cap that the Engineering Committee is concerned with?

A It is.

Q Which?

A It is the control of the reservoir, and in specifically the gas-oil contact. In other words, we are attempting to devise a means of operating this reservoir efficiently--most efficiently.

Q Do you concur in the conclusion of the commission-- excuse me, of the Committee--that the most efficient operation is to produce the most oil with the least

[REDACTED]

expenditure of reservoir energy?

A At the present time, yes. We have made a recommendation to that effect to the Commission as of May 6.

Q Of those similarly or reasonably similarly situated wells, then, which have different gas-oil ratios, what is to permit you to select the well which is producing the most efficiently?

A Depending upon the geographic location.

Q Do you agree that--I don't want to be--is a well which is producing at a lower gas-oil ratio than a similarly situated well producing more efficiently, that is, using less reservoir energy to produce the same amount of oil?

A It is presumed to be, yes.

Q Do you take any issue with Mr. Garber's testimony that a well drilled in an area where the gas cap over-lay is the thinnest ought to result with appropriate completion methods in a lower gas-oil ration well?

A No. That would be correct. It would be expected.

Q Then, of these two alternate locations, southeast and northwest, on the basis of the Engineering



Committee's information here, a location on the northwest ought to have a lower gas-oil ratio than a location on the southeast?

A We would expect--I would expect it to occupy a lower structural position than the J Sand, and therefore might possibly have a lower gas-oil ratio.

Q Should the Commission accept the recommendation of the Engineering Committee and permit a controlled expansion of the gas cap, which of the two locations, southeast or northwest, if there were a well on each, would reflect the higher gas-oil ratios first?

A It is likely that the well at the higher structural position would.

Q The southeast location?

A Yes.

CHAIRMAN DOWNING: Any other questions?

MR. GENGLER: Q I want to clarify one thing, that is as to both of these locations--the one in the southeast which is the regular location, and the one in the northwest, which is being requested--the gas-oil ratio in your opinion would it be within the limitations as fixed by the Commission at this time? In other words, within the 1200 to one?

A At which location?

Q Either one or both?

[REDACTED]

A I believe so, yes.

Q Mr. Stockmar was bringing out the fact that one would be lower than the other, but both would be within the limitations fixed by the Commission?

A Correct.

CHAIRMAN DOWNING: Any other questions? I want to ask one question.

Q What do you think of a rule and general application--subject, of course, to the right to change under the statute--of a rule of one well on each 40 acres, cite to be selected by the operator, but a distance of 660 feet from any line?

COMMISSIONER VOLK: 330 feet, Judge?

CHAIRMAN DOWNING: 330 feet from the outer boundary and 1,320 feet from any well?

MR. COUCH: I would like to give that some thought before I answer that question. I wouldn't care to answer that extemporaneously?

CHAIRMAN DOWNING: Any other questions?

MR. BRUCE ROLL: May I answer that question. I believe that a spacing location for 40-acre spacing with a well located 330 feet from any lease line is not any efficient well spacing. It is no spacing pattern whatsoever.

MR. GARBER: I would like to say something. In



Texas they have found it very satisfactory to base the spacing of wells on distances from lease lines and minimum distances from wells, and with the great number of wells down there it has worked out very satisfactorily. In some locations, however, down there, it is as we have here, there are requests for exceptions to those locations, but as we can see here, these locations were not laid out on a quarter-quarter section pattern, and some tolerance should be given to the location of the well with respect to footage dimensions rather than a square block of 10 or 40 or 20 acres, there, and set it in the center of it.

CHAIRMAN DOWNING: Other questions?

MR. BAUMGARTNER: I would like to say one more thing: I am not in favor of that 330 feet from a lease line either. I think that seeing that the Adena Field was laid out on 40-acre spacing that as far as we can, that everyone should possibly try to abide by that. At the same time it has been amply demonstrated today that a well in the southeast of the northeast of the southeast would still be within the limits of the gas-oil ratio which has been established by the Oil and Gas Commission, as 1200 to one. In fact, I think you will find that when the well is completed it will probably be much less--the

[REDACTED]

gas-oil ratio will probably be much less than the Chittim Allardyce well, due to the fact that the gas coning which I mentioned earlier in the testimony. I would just like to say that that would in no way affect the gas reservoir or operation or operating economically or anything like that.

CHAIRMAN DOWNING: Any further testimony? Do you wish to testify?

MR. HOWARD GLENN: As a mineral owner.

CHAIRMAN DOWNING: Do you want to make--

MR. GLENN: I just want to make a speech, is all. I have no argument with either one of these operators. I call them both mine because they have leases for me

CHAIRMAN DOWNING: What is your interest in the matter?

MR. GLENN: The production in there. The mineral owner in there, Your Honor. I am the land owner. On this one quarter we have in question there is two wells, with the discovery well on it, and they all started off with northwest locations in there. You can follow by your map in there. They are northwest locations in there even when you went over into the northeast quarter to the west, there was one northwest location granted in that. And the Simmons well in five was the northwest location-- the McElroy Ranch well was a northwest

[REDACTED]

location; there were two other locations granted in the northwest--northwest locations in the south half of 33. And if we connect these back and go back to the pattern, that is all surrounded with northwest locations, excepting to the one pattern to the north in there. When that was dug that was the second well, the No.1, Glenn Biddle well was dug on a southeast location, presumably to try to get as close to this gas well, in case it happened to be small, and then since that the pattern has come in and went on southeast locations. And to be on the one quarter of the southeast quarter of the quarter in question, from a mineral owner, I have  $14\frac{1}{2}$ , and to the West in there I have  $8\frac{1}{4}$ .

So, from that one reason; and then from a drainage standpoint, and like has been mentioned, that triangle, I would like to see you go ahead and finish that one quarter, being it was started that way, and all of the other locations to the east and in there and to the South, and I would like to see that in there but not leaving that big hole out in the middle in there from a depletion or a drainage standpoint.

So, I guess that is the end of my speech, I think.

CHAIRMAN DOWNING: Thank you very much.

MR. BAUMGARTNER: Your Honor. I would like to bring to the Commission's attention, and also to Mr. Glenn's attention one fact. And that is that these northwest locations, with the exception of the discovery wells were all granted because they were known to be within the gas cap completely, and one of them it was found, the Simmons well, also in the gas cap, and it was a producing oil well.

Another thing now is that these permeabilities that have been present and are eventual in Section 32 on the basis of 40-acre spacing that would completely drain all the area around. I mean, there hasn't been any type of permeabilities, or low permeabilities in the area to sufficiently warrant 20-acre spacing.

Another thing I would like to bring to the Commission's attention is the fact that all of these letters of agreeing to this exception in this northwest location have been from previous applicants for the northwest location.

CHAIRMAN DOWNING: Any other testimony?

MR. BRUCE ROLL: Lion Oil Company.

CHAIRMAN DOWNING: Whom do you represent?

MR. ROLL: Lion Oil Company.

[REDACTED]

CHAIRMAN DOWNING: Do you want to be sworn?

MR. ROLL: Lion Oil Company objects to this request for an exception to the established spacing patterns. Several months ago a pattern was established for the Adena Field which it was felt would efficiently drain the J Sand reservoir. The majority of the operators since then have complied to this spacing pattern and drilled their wells according to the rules of the Oil and Gas Commission.

Numerous instances have passed whereby Lion Oil Company, as well as other operators, could have completed better wells and wells with lower gas-oil ratios had they been drilled on a different location from the established pattern. In view of the fact that there is a pattern for the field and that the majority of the operators have not taken advantage of the knowledge gained to drill better wells with lower ratios, I would like to state that Lion Oil Company wishes the Commission would reject this application.

CHAIRMAN DOWNING: Anything further?

MR. GLENN: I would like to make an answer to the gentleman's question in there, that he has--I don't know why he should come down in our territory and object. The closest lease production he has is within one-half

[REDACTED]

a mile in there, and I don't see why he should come down and start to dictating or testifying to how we should run our pattern down there. We have about 7 or 8 different operators in there and I think they can-- we don't come up and join in on their business.

CHAIRMAN DOWNING: You are from Texas.

MR. ROLL: I believe the spacing pattern was established for the Adena Field and not on a lease basis.

CHAIRMAN DOWNING: Any further testimony?

MR. STOCKMAR: It is the custom in the trade, I understand that the plaintiff ought to get the last word. I will make it very brief. It is apparent here--

MR. DOWNING: Has everybody else been heard, now, so that when you are through, we can take it?

MR. STOCKMAR: It is apparent here that our pioneering in the field and then our subsequent conformation to the spacing order is the real cause for this, and for these serious gaps in our property that are not being drilled for our benefit. And I think Mr. Glenn raised a very handsome point there that the parties to the north here moved in just as closely as they could get to the pioneer well, and that they themselves contributed substantially to the problem which exists here.

I think that is all.

CHAIRMAN DOWNING: I want to thank you all for your attendance and very able presentation of this case, gentlemen. Now, another, for us to try to figure out, the next case. We will take this under advisement and try and decide it later in the day.

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STATE OF COLORADO )  
 CITY AND COUNTY OF DENVER )      ss.

I, C. DAVID ROHRER, do hereby certify that I am a Certified Shorthand Reporter; that as such reporter I was present upon the occasion of the hearing of the above-entitled Cause No. 26, before the Oil and Gas Conservation Commission of the State of Colorado, on the third day of June, 1954, at the hour of 10:00 a.m., State Capitol Annex, Denver, Colorado.

I do hereby further certify that I took down in shorthand all of the testimony given and the proceedings had in the above-entitled matter at the aforesaid time and place; that I caused my said shorthand notes to be reduced to typewritten form, and that the foregoing pages numbered 1 through 50, inclusive, constitute a full, true, and correct transcript of my said shorthand notes, so taken as aforesaid.

*C. David Rohrer*  
 C. David Rohrer,  
 Certified Shorthand Reporter.