BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
April 17, 1957

IN THE MATTER OF:	
Application of Lillie M. Yates for approval of an oil well drilling location in the potash area of Eddy County, New Mexico, as defined by Commission Order R-111-A. Applicant, in the above-styled cause, seeks authority to drill an oil well in the center of the NW/4 SE/4 Section 4, Township 19 South, Range 30 East, Eddy County, New Mexico. Said location is in the potash area as defined by Order R-111-A and Southwest Potash Corporation has objected to the drilling of said well. The parties to this case have waived the provisions for arbitration set out in Order R-111-A and the matter is hereby set for hearing.	Case No. 1233
Application of Carper Drilling Company, Inc. for approval of an oil well drilling location in the potash area of Eddy County, New Mexico, as defined by Commission Order R-111-A. Applicant, in the above-styled cause, seeks authority to drill an oil well in the center of the SE/4 SW/4 Section 4, Township 19 South, Range 30 East, Eddy County, New Mexico. Said location is in the potash area as defined by Order R-111-A and Southwest Potash Corporation has objected to the drilling of said well. The parties to this case have waived the provisions for arbitration set out in Order R-111-A and the matter is hereby set for hearing.	Case No. 1234

BEFORE:

Mr. A. L. Porter
Mr. Murray Morgan

TRANSCRIPT OF HEARING

MR. PORTER: The Hearing will come to order and we will

consider next Case 1233.

MR. COOLEY: Case 1233 is the application of Lillie M. Yates for approval of an oil well drilling location in the potash area of Eddy County, New Mexico, as defined by Commission Order R-111-A.

MR. PORTER: Mr. Losee.

MR. LOSEE: I would like for the record to show that A. J. Losee appears for the applicant Lillie M. Yates, and in Case 1234 for the applicant Carper Drilling Company. I move that the cases be consolidated for the purpose of hearing the testimony, and that the facts in both cases are similar.

MR. REESE: George L. Reese, Jr. appears on behalf of Southwest Potash Corporation. We second the motion.

MR. PORTER: Is there any objection to the consolidation of Cases 1233 and 1234, 1234 being a similar application for a well located in the same section as the case that you have just heard described. Any objection to that motion? Let the record show that the two cases have been consolidated for the purpose of taking testimony. Mr. Losee.

MR. LOSEE: Mr. Porter. We have certain stipulations of facts that exist and we would ask Southwest to consent to them. If I may I will read them into the record at this time. It will save considerable testimony down along the road.

MR. PORTER: You may proceed.

MR. LOSEE: That Lillie M. Yates is the owner and Martin Yates, III is the operator of Federal Oil and Gas Lease LC 060585, insofar as it covers the S/2 NW/4, E/2 SW/4 Section 3, Lot 3, S/2 NW/4, SE/4 Section 4, Township 19 South, Range 30 East. That Carper Drilling Company, Inc. is the owner and operator of Federal Oil and Gas Lease LC 060585-A, insofar as it covers the W/2 SW/4 Section 3, S/2 NE/4, SW/4 Section 4, Township 19 South, Range 30 East. That both leases are out of the same base lease issued April 1, 1957 by the United States of America, and by an appropriate application was extended until April 1, 1957 by decision of Mr. Henriques of the Bureau of Land Management in Santa Fe.. Both leases were continued for two years until April 1, 1959.

That Southwest Potash Corporation is the owner and Operator of Federal Potash Lease LC 067319-B, covering, in part, the NW/4 SE/4 Section 4, being the proposed location of Lillie M. Yates-Federal No. 1 well, and the SE/4 SW/4 Section 4, being the proposed location of Carper-Oliver No. 1 well.

That the proposed locations of the Lillie M. Yates-Federal No. 1 well and the Carper-Oliver No. 1 well are within the boundaries of the potash-oil area of Eddy County, New Mexico, as defined by Order R-111-A of the New Mexico Oil Conservation Commission.

That on January 31, 1957, Lillie M. Yates and Carper Drilling Company, Inc. filed their respective Notices of Intention to Drill the Lillie M. Yates-Federal No. 1 well and the Carper-Oliver No. 1

well, with the United States Geological Survey at Artesia, New Mexico. That by letter, dated March 1, 1957, John A. Frost, District Engineer of the United States Geological Survey, stated that the Director of the Geological Survey has retained the authority to approve and/or deny approval to drill wells within the oil-potash area, on those leases which contain the potash stipulation, and if further attention is desired looking to final action on the Notices of Intention to Drill, then it will be in order to present the case before the New Mexico Oil Conservation Commission, in compliance with provisions of Order R-111-A.

That Lillie M. Yates and Carper Drilling Company, Inc. have complied with the procedural stipulations required under Order R-111-A of the New Mexico Oil Conservation Commission, and that all interested parties, including the protestants and applicants, have waived the provisions of said Order providing for arbitration of the matter before a final hearing of the Oil Conservation Commission.

MR. REESE: We agree to the stipulation as read, but would suggest an addition with regard to the potash stipulation which is contained in the Federal oil and gas leases.

The stipulation which is contained in those leases reads as follows: "No wells will be drilled for oil and gas in formations above the base of the Delaware sand or above a depth of 5,000 feet, whichever is the lesser, except upon approval of the Director

Geological Survey. It being understood that drilling for production to these formations will be permitted only in the event that it is satisfactorily established that such drilling will not interfere with the mining and recovery of potash deposits, or the interest of the United States would be subserved thereby. No wells will be drilled for oil or gas at a location which in the opinion of the oil and gas supervisor of the Geological Survey would result in undue waste of potash deposits, or constitute a hazard to or undue interference with mining operations being conducted for the extraction of potash deposits."

Do you agree, Mr. Losee, that those provisions are in the leases involved here?

MR. LOSEE: Yes.

MR. PORTER: Do you have any witnesses to call at the present time?

MR. LOSEE: Yes. Mr. Yates and Mr. Rowley.

MR. PORTER: Will you stand and be sworn, please.

(Witnesses sworn.)

MARSHALL ROWLEY

called as a witness, having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. LOSEE:

Q Would you state your name, please?

A Marshall Rowley.

Q Where do you live, Mr. Rowley? A Artesia, New Mexico.

Q What business are you in?

A Drilling and production of oil wells.

Q Are you Vice President of Carper Drilling Company, Incorporated? A Yes, sir.

Q Did Carper Drilling Company, Incorporated file a Notice of Intention to Drill its Carper Oliver No. 1 well with the United States Geological Survey on January 31 of 1957?

A Yes, sir.

Q Was a similar Notice of Intention to Drill filed with the Oil Conservation Commission on March 11, 1957?

A Yes, sir.

Q I'll hand you this copy and ask you if this is a copy of the Notice of Intention to Drill which was filed with the United States Geological Survey and with the Oil Conservation Commission.

A It is.

Q Would you read the proposed casing program as outlined on this notice?

A The Carper Drilling Company, Incorporated propose to drill, run nine and five-eighths casing to a depth of approximately 700 feet, and cement with 225 sacks, seven inch casing to a depth of approximately 2,000 feet, and cement with 110 sacks, four and a half casing run to the total depth drilled, and cement with 250 sacks.

Q Did your Notice of Intention to Drill contain a further provision with reference to Order R-111-A of the Commission?

A It did.

Q What was that statement?

A "All operations will be in full compliance with Order R-111-A of the New Mexico Oil Conservation Commission, including the requirements as to setting cement and testing casing.

Q Does this casing program comply with the provisions of Order R-111-A of the Commission? A It does.

Q Mr. Rowley, the particular location of the Carper-Oliver No. 1 well is in the potash-oil area and part of your lease is outside of that area. I wonder if you would just explain to the Commission why you picked the particular location you did to drill this well.

A There was a well drilled here in 1939 which encountered a show of oil and a small amount of water.

MR. PORTER: Would you indicate the location?

A The location of it?

MR. PORTER: The exact location.

A There was a well drilled in the southwest of the southeast quarter of Section 4, 19, 30, which encountered a show of oil, and we feel that if we move up dip from that well the way we have worked it out on this contour map, which would give us from 50 to 75 feet, we would probably be above the water. And under the present-day

methods of sand frack which they didn't have back in those years, that a commercial well could be made out of the show that they had in this well.

MR. LOSEE: The applicant will offer the contour map as Exhibit 1.

(Marked Carper's Exhibit No. 1, for identification.)

MR. REESE: No objection.

MR. PORTER: Do you have any other exhibits? We might as well enter this exhibit now. If there are no objections, Exhibit 1 will be received.

Q Have you had prepared under your supervision, a strip log showing the lithology of the formations encountered in this old well?

A Yes, sir.

Q Will you explain in part that part of the strip log pertaining to the show of oil and gas or oil?

A As near as we can determine from all information available, the production --

MR. PORTER: (Interrupting) Mr. Losee, just one moment. The witness seems to be getting into expert testimony. Perhaps we had better qualify him at this point.

MR. REESE: We don't believe this witness is a qualified geologist, but he is a practicing oil man and we have no objection to his testifying regarding the showings that are made on that strip log, if the Commission cares to hear it.

MR. PORTER: We would like to have a statement of Mr.

Rowley's training and experience for the record, please.

Q Mr. Rowley, how long have you been in the oil business?

A Started in 1934.

Q In what phase of the oil business have you been in?

A Just about all phases from roustabout right on up.

Q In the drilling of oil wells? A Yes, sir.

Q And the producing of wells?

A Yes, sir, I had charge of Production Department for Carper Drilling Company.

MR. PORTER: The witness's qualifications are accepted. You may proceed.

Q Proceed.

A From the information that we were able to obtain, the show of oil to which I referred awhile ago came in in this section right here from 3308 to 30 and what we based our opinion on that we might obtain a commercial well on up dip and get out of the water.

Q What formation or sand would you say this show of oil was encountered in?

A Well, it's pretty hard to pin it down because it appears to be a stray sand, it is below what we feel is the Penrose and above the Grayburg. It's probably a Grayburg series all right, but it's in that interval there and we are unable to pin it down on the information we have had.

MR. PORTER: Just a minute. You refer to the Penrose isn't that

in the Queen sand?

A Lower Queen, yes, sir.

MR. LOSEE: We apologize for not having additional copies of the strip log, but because of the difficulties of reproducing them in Artesia, this is the only copy. We will offer it as Carper Exhibit No. 2.

(Marked Carper's Exhibit No. 2, for identification.

MR. REESE: No objection.

MR. PORTER: Any objection to the admittance of this exhibit? It will be admitted.

Q One further question, Mr. Rowley. If you were successful in this drilling operation and obtained oil in the sand that you feel might be productive, would you care to estimate the ultimate recovery of this sand, based upon production in similar sands?

A Well, from our study, we feel that there was 22 feet of gross pay in the old well and we estimated that 15 feet would be the effective net pay out of the 22. We think that there should be at least 1500 barrels of oil per acre recovered, based on similar instances throughout the field.

Q Mr. Rowley, do you have any other statements you would like to make to the Commission in support of your application?

A No, I believe not.

MR. LOSEE: I'll pass the witness.

MR. PORTER: Just one question, Mr. Rowley.

A Yes.

MR. PORTER: What is that estimated recovery?

A 1500 barrels per acre, 60,000 per 40 acre.

MR. PORTER: Does anyone else have a question of Mr. Rowley? Mr. Mankin.

MR. MANKIN: Warren Mankin with the Oil Commission.

CROSS EXAMINATION

By MR. MANKIN:

Q Mr. Rowley, did you say that you anticipated production from the Queen or stray strand in the Grayburg?

A It is a stray sand that we feel is between the Penrose and somewhere along the top of the Grayburg. It's a little bit deep to be in the Queen series.

Q On your Exhibit 1 you show two wells in Section 33 of Simms and Reese, are those two wells not what is known as the Norben zone Queen Pool?

A I can't give you the name of the pool.

Q Those two wells, are they not Queen production?

A I believe that they are.

Q You don't feel that the production you would expect to get would be in the same zone as those two producing wells?

A No, sir, not based on the well which we were offsetting, because there is a wide base of difference in the salt from those

to the north and where the production was encountered in the old well.

Q Who prepared the strip log, Exhibit 2, Mr. Rowley?

A One of our employees, a geologist, and one of the employees of the Yates Brothers who was a geologist.

Q The reason I ask that question, on Exhibit 1 it shows the base of the salt in the dry hole in the southwest of the southwest of Section 4 as 1812, whereas on the strip log the base of the salt is shown at 1807. It was a slight difference.

A It wasn't a deliberate mistake. We were handicapped on the logs, these old samples, they didn't have much back in those days. We were trying to base it on newer wells and correlated to cross it.

Q What is the producing formation from the Benson Pool, do you have knowledge of that? A No, sir.

Q Would that be Yates production?

A I believe Mr. Yates can probably tell you better than I can.

Q There is oil production to the south in the Benson Pool which is possibly Yates production, and production to the north which is possibly Queen production, and you expect production in a zone that is not presently in the area. Is that correct?

A Yes, sir.

MR. PORTER: Does anyone else have a question of Mr. Rowley? You may be excused, and you may call the next witness.

(Witness excused.)

MARTIN YATES, III

a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. LOSEE:

Q Would you state your name? A Martin Yates, the Third.

Q Where do you live, Mr. Yates? A Artesia, New Mexico.

Q Are you the operator of the Lillie M. Yates Federal Lease LC 060585? A I am.

Q What business are you in?

A I'm in the oil producing business and the drilling contracting business.

Q How long have you been in the oil producing business?

A Since 1937.

Q On behalf of Lillie M. Yates, did you file a Notice of Intention to Drill the Federal No. 1 well in the northwest quarter in the southeast quarter of Section 4, Township 19 south, Range 30 east on January 31, 1957? A I did.

Q Did you file a similar application with the Oil Conservation Commission in March of this year? A I did.

Q I'll hand you a copy of a Form C-101 and ask you if that is a copy of the notice of intention that was filed with the United States Geological Survey and with the Conservation Commission?

A It is.

Q I will ask you if you will read the casing program outlined on this notice of intention.

A Yes, I will. We propose to set eight and five-eighths inch casing, that is 24 pound per foot casing, and it's new casing at 750 feet, and cement it with enough cement to surface it, which I have here I believe 225 sacks, and I intend to run a salt protection string which would be seven and seven-eighths casing which would be 20 pounds per foot new casing, at approximately 200 feet, and cement it with a nominal amount of cement, which would be 110 sacks.

Q You mean 2,000 feet down?

A Yes, sir, 2,000 feet, yes, I beg your pardon. In the event that production was encountered, I intended to run five and a half inch casing, new casing, the weight of it is 15½ pounds per foot, the total depth and cement it with a sufficient amount of cement to circulate this production string to the surface. The estimated amount being 250 sacks of cement.

Q Did this Notice of Intention contain a statement with reference to compliance with Oil Conservation Commission Order R-111-A?

A It did.

Q Would you read that statement to the Commission?

A I will. "All operations will be in full compliance with Order R-111-A of the New Mexico Oil Conservation Commission, including all requirements as to setting, cement and testing casing."

Q In your opinion, Mr. Yates, is this casing program and cementing program as outlined in your notice, in full compliance with Order R-111-A? A It is.

Q Turning to Exhibit 1 which is a contour map, would you explain to the Commission why you picked this particular location for the Yates Federal No. 1 well?

A I certainly will. This particular location that I picked in the northwest quarter of the southeast quarter of Section 4, Township 19 south, Range 30 east, is a direct north offset to an old well drilled in the southwest quarter of the southeast quarter of Section 4, 19, 30. The purpose of this location is to offset this old well, which has a show of oil from 3308 to 3330. This particular location, based on our geologist and the Carper Drilling Company geologist, contour is approximately, would be approximately from 35 to 50 feet higher than the old well which encountered the show and which our geologist feels would be high enough structurally to be out of the water which was encountered in the old well which we are offsetting.

Q Mr. Yates, what is the name of this old well that you are offsetting?

A I think it is the W. E. Elliott Canon No. 1.

Q Is that the same well that Mr. Rowley was referring to in his testimony?

A Yes, it is the same well.

Q Turning to the strip log, would you agree with Mr. Rowley's statements as to the lithology of the production encountered in the old well?

A Yes, I would.

Q What kind of a sand is this that you hope will be productive of oil?

A You mean the age?

Q Yes.

A It would be one of the sands of the Grayburg series.

Q Do you agree with the estimate of Mr. Rowley as to the estimated ultimate recovery from that sand if it is recovered?

A Yes, approximately I do. Very close, yes, I agree with Mr. Rowley.

Q Do you have any additional statements to make to the Commission in support of your application?

A No, I don't believe I do.

MR. LOSEE: Pass the witness.

MR. PORTER: Mr. Reese.

CROSS EXAMINATION

By MR. REESE:

Q Are you familiar with the Barber Pool south of the dry hole in question?

A The Barber Pool, I know approximately where it is. I think it's producing out of the Yates lime. I could be wrong about that.

Q You have been familiar with a number of wells drilled in the vicinity of these potash leases during the years from 1934 or 5

down to date, have you not?

A Well, I'll be familiar in the last, well approximately during that period.

Q Now, over to the west of the potash lease area there is some more production from the Yates sand, isn't there?

A West of the potash area. I couldn't say whether that's Yates or Seven Rivers sand. I do know that a well which was drilled by B. M. Cohan in the northwest, northwest of 7 encountered a good oil show of around 3960 from the Delaware sand.

Q In the wells that have been drilled in the general area, there, is it not true that from the Seven Rivers sand and from the Yates sand there is ordinarily a small quantity of gas encountered even though oil may not be found in commercial quantities?

A Well, I wouldn't say that would always be true.

Q I say wouldn't it be ordinarily true?

A Well, I don't know. I have drilled enough wells in the general area. I don't believe I have encountered any.

Q Do you know if any of the gas in those sections was encountered in this particular dry hole that you have described?

A I don't believe the log does not show it.

Q You have no information other than what is shown on the log about it?

A That is right, and this information was compiled, as I said before, by the Yates Brothers' geologist and Marion Stedler

and Bob Boling of the Carper Drilling Company geologist.

Q Do you know how deep that Simms and Reese Well No. 2 is?

A No, but I could check and see. No, I don't know how deep. It just has 1944 on it.

Q I think the Commission records will show that that well is some three thousand and eighteen, twenty feet, such a matter?

A Yes.

Q Where it was completed? A Yes.

Q Would that section compare with the section that you hope to find in your well?

A No, it would not. As I understand it, that particular well was completed out of the lower Queen or the Penrose zone. This particular well, our particular proposed location that I intend to drill, is producing lower in the section out of the Grayburg. I mean that's where the show was, was out of the Grayburg.

Q Are you familiar with that Blackwell noted on your plat there? A Yes, sir.

Q Is it not true that they encountered some gas in that well above the Queen section?

A I believe they did have a show in the Yates in that particular place.

Q Will you give the location of that, please, in the record?

A Yes, I sure will. That well, the W. H. Blackwell, was drilled in the northwest quarter of the northeast quarter of Section

3, Township 19 south, Range 30 east.

Q That's approximately how far from the location that you propose and in what direction?

A Well, this particular well is approximately, I'd say three quarters of a mile to a mile northeast of my proposed location.

MR. REESE: That's all I have.

MR. PORTER: Anyone else have a question? Mr. Mankin.

By MR. MANKIN:

Q Mr. Yates, do you have knowledge that the proposed well that you intend to drill is within the projected open workings or mine workings of Southwest Potash Company?

A Well, you mean the proposed future workings?

Q The projected, yes.

A Yes, I have been advised of that. Of course, I didn't know it at the time I first filed my first Notice of Intention to Drill.

Q Do you feel whether any kind of casing you put in this well, whether new or not, when secondary mining is started, that any kind of casing will withstand the shear in pulling pillars in secondary mining?

A Yes, I believe there is casing that would withstand that if the potash companies would put a sufficient pillar to protect the well. It is my opinion that it could be protected just ordinary casing. I believe the Potash Company would do that if I made a producer in order to protect their mine.

Q With six and eight foot sub sides, you feel that casing would not be sheared?

A As far as I know it has not subsided at this particular location.

Q Has there been any secondary mining in this area?

A I'm so advised there has been. I don't know it for a fact. That is my understanding there has been.

Q What makes you think that there would be Grayburg production in this area rather than Queen production as has been predominantly Queen production in the area surrounding this?

A Well, I'm offsetting a well that made oil in the Queen. That is the best geology I know of to offset an oil that made some oil.

MR. LOSEE: You mean in the Grayburg?

A In the Grayburg.

Q You were speaking of the abandoned hole just south of the proposed location? A Yes, sir.

Q You indicate that you feel that the Potash Company should leave a barrier or a pillar around this particular well. Do you have any knowledge of how much should be left around it to keep from shearing the casing?

A No, I don't. I'm not an engineer. It would take a mining engineer to determine that.

Q Would it not take all the five year projection to protect this?

A That I couldn't answer.

MR. MANKIN: That is all.

MR. PORTER: Anyone else have a question of Mr. Yates? Mr. Nutter.

By MR. NUTTER:

Q What size casing did you say that first string would be at, 550 feet?

A That would be five and five-eighths casing.

Q I believe when you gave the location of the W. H. Black well you stated it was in the northeast of the northwest of Section 3.

A Let me check that map again. I beg your pardon. It is in the northwest of the southeast quarter.

Q One more time?

A Yes, it is northwest, northwest 3.

MR. NUTTER: Thank you. That's all.

A I sure had that wrong. Thank you a lot.

MR. PORTER: I believe we decided the location was in the northwest of the northwest? A Yes.

MR. PORTER: Anyone else have any questions of Mr. Yates? The witness may be excused.

(Witness excused.)

MR. NUTTER: I would like to ask Mr. Rowley one question if I may.

MARSHALL ROWLEY

having been recalled, testified further as follows:

CROSS EXAMINATION

By MR. NUTTER:

Q Mr. Rowley, you stated that your nine and five-eighths inch pipe would be cemented with 225 sacks. Would that be sufficient cement to circulate the cement to the surface?

A I believe that it would, but we would run enough cement to theoretically give it fifty percent over what it should take. One hundred fifty percent of calculated volume. I believe the 225 would do it, but we would be sure it was circulated.

Q Does that also hold true for the four and a half?

A On the four and a half it probably would bring it back up to the base of the surface pipe, yes, sir. If the temperature survey was run and it was found not to be there, we would perforate and bring the cement back.

Q To the surface?

A Into the surface string of pipe.

Q So the nine and five-eighths would be cemented to the surface and the four and a half would be cemented to the shoe of the nine and five-eighths?

A No, up past the shoe of the nine and five-eighths.

MR. NUTTER: Thank you. That's all.

MR. PORTER: Anyone else have a question? Mr. Losee, does this conclude your testimony?

MR. LOSEE: Yes, it does.

MR. PORTER: Would you see that your exhibits are properly marked? I believe the strip log should be Carper No. 2.

MR. LOSEE: They have been marked, Mr. Porter. I'll see that they get filed, if you would like.

MR. PORTER: Mr. Reese, how many witnesses do you have?

MR. REESE: We will have Mr. Hubert, Mr. Commissioner, and in addition we will offer in evidence for the consideration of the Commission, the testimony taken by the Commission in a hearing held under No. 1130, an application by the Commission at the request of Velma Petroleum Corporation for the drilling of four wells on potash land held under lease by the Potash Company of America. The testimony of the engineers and other experts in that case with regard to subsidence and with regard to the effects of the subsidence on the oil well casing with regard to the method of valuing potash, and any other testimony that is pertinent to this hearing.

I think the admission of that transcript is agreeable to the applicants and that the Commission may consider the testimony shown in the transcript as though it were given by the witnesses testifying here today, and also in connection with their testimony, the various exhibits that are a part of that record in connection with the testimony of the various witnesses.

MR. LOSEE: The applicants would consent to the offer upon the condition that protestant in this case show similarity of their

mining operations, or the Commission only consider such part of the Velma transcript as will be pertinent to the protestant's case.

MR. REESE: We will show a similar mining operation that was involved in that case.

MR. PORTER: Are there objections to making any part of the record in Case 1130 which was the Velma Petroleum case, a part of this record, the record for these cases? Without objection the Commission will consider those portions of the transcript and the exhibits that we consider pertinent to these cases. It will be limited to the stipulations as noted by the two attorneys. Mr. Reese.

MR. REESE: Will you swear Mr. Herbert, please?

MR. COOLEY: Is that your only witness?

MR. REESE: Yes, sir.

(Witness sworn.)

IRA A. HERBERT

called as a witness, having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. REESE:

Q Will you state your name, please?

A Ira A. Herbert.

Q By whom are you employed?

A Southwest Potash Corporation.

Q In what capacity? A Mining engineer.

Q What is your training as mining engineer and where did you get it?

A I have a B.S. degree in mining from the University of Nevada, 1925.

Q After your graduation, have you been employed continuously in the mining industry? A Yes, sir.

Q In the capacity of mining engineer?

A Well, I started at the bottom and worked up.

Q How long have you been employed in the capacity as a mining engineer?

A About twenty-seven years.

Q How long have you been employed by Southwest Potash Corporation? A Seven years.

Q Were you employed as mining engineer during all of that time?

A Yes, sir.

Q At the start of your employment had Southwest Potash Corporation gone into production? A No, sir.

Q Then you were employed at the start of their operation in Eddy County, approximately?

A Well, I started before actual production during the exploration stage.

Q As mining engineer, what are your general duties there at the mine?

A Mine planning, cost efficiency, the general run of mine engineer work for a mine.

Q You are in charge of those matters for the Southwest Potash Corporation?

A In cooperation with the Superintendent. Yes.

Q I understand. Now, then, Mr. Herbert, have you made a study of your mine with reference to these proposed drilling sites, and in connection with that, prepared certain exhibits?

A Yes, sir.

Q Before talking about the exhibits, I wish you would briefly outline to the Commission the general characteristics of your mine and the kind of operation that is being performed there in getting out your ore.

A Our operation is similar to all the other mines in the area. We use a room and pillar method on our first mining. Approximately a sixty percent extraction on the first mining, track haulage, the usual coal mining equipment, I believe that's about all.

Q Following your first extraction of approximately sixty-five percent? A Sixty percent.

Q Sixty percent, what is next done?

A There's a time where mining additional, roughly a total of 91.8 percent total recovery, that would be 31.8 above the sixty on secondary mining.

Q In obtaining the additional percentage of your first mining,

what do you call that operation? A Secondary mining.

Q Is it also --

A (Interrupting) Pillar robbing.

Q Have you, since the start of your operation, had occasion to change the time within which you begin your pillar robbing or secondary mining after your first mining in any given area?

A Well, we have found that we should do our secondary mining as rapidly as possible after the first mining. Is that what you meant?

Q Yes.

A There is a longer period of time that you allow your first mining to stand, you may run into difficulties on your second mining.

Q What is your practice now in that regard?

A Well, the practice that we have set up is to second mine as rapidly as we can after our first mining.

Q How long have you had that practice?

A That is our new, for about a year that is the thoughts on it for about a year. Our second mining was not at the present time, wasn't at the present time quite in that form.

Q You have an exhibit on the board over there to the left. What is that?

A This exhibit is merely to show the limits of our potash lease, the limits of the potash oil area, and the estimated oil limit as given by the United States Geological Survey. This area

in here which is marked, is mined out area, is where we have done our second mining. We have no first mining this side. The first mining is this way.

MR. REESE: I would ask that that Exhibit be marked as Southwest Exhibit No. A.

(Marked Southwest's Exhibit No. A, for identification.)

Q I believe just before I interrupted you, you were pointing out that your first mining is now to the east and south of what is shown on that plat as your mined out area?

A Yes, sir. We've taken first mining from this point to this point, the first mining extends further to the east. We are now retreating in this direction.

Q Do you have a main drift going northward in the vicinity of these proposed well locations?

A No, sir. Not at the present time.

Q Do you have one planned? A Yes, sir.

Q Have you filed with the Commission as of January 1st this year, your plan of operation with regard to that drift?

A Yes, sir.

Q Is that drift shown on the other exhibit that is on the board? A Yes, sir.

MR. REESE: Would you mark that exhibit Southwest Exhibit No. B, please?

(Marked Southwest's Exhibit No. B, for identification.)

Q Will you point out on Exhibit B the main drift that you have planned that will be in the area of these well locations?

A Take-off of our mains to the west and drive the main entries to the north to deliver the ore body and we propose on the exhibit we gave the Oil Commission, to start the first mining in this area.

Q You are pointing to the area around the Lillie Yates application, are you not? A Yes, sir.

Q Is there another drift shown on the plat from which you are now mining?

A I don't understand your question.

Q How close to that Yates location do you have a drift at this time?

A Oh, our panel limit, which is this line, is roughly 1280 feet from here to here. It is shown on this map.

Q What do you mean by panel?

A Well, in the mining expression you use your main entries to here and you'll mine a certain distance economically to your haulage to the main entry from both sides. This then, becomes the panel limit and the main entry system becomes a panel limit from the panel entry this way, and you do have a panel entry on this side. This would be two panels of the main entry. This would be one panel of this main entry, and another panel to your east.

Q In your mining operation, where you have the mined out area

shown, are there any old oil wells in that area?

A There's one oil well in the area. We bypassed right here.

Q What did you do with that area there when you say you bypassed it?

A We checked the log of the well, the abandonment, it was abandoned quite a few years ago. We considered it wasn't plugged well enough to mine through. We were afraid of it, so we left 150 foot radius pillar around that well for protection.

Q In that immediate area have you done second mining?

A We have done no second mining. We planned to do no second mining because of the well and the shaft location. We have done approximately fifty percent extraction.

Q That old well that you plugged and left 150 foot pillar, you have marked with a red "x", and it shows in a circular shape there at the bottom of Exhibit B, does it not?

A Yes. This is a solid pillar.

MR. PORTER: For the record, could we get the exact location of that plugged and abandoned well as to quarter quarter section?

A Yes, it's in the southwest quarter of the southwest quarter of Section 10, 19, 30.

MR. PORTER: Thank you.

Q What percentage of the potash ore has been taken out of the area where that old well is?

A Approximately fifty percent outside of the pillar.

Q Outside of the pillar? A Yes, sir.

Q You intend to leave that as protection for your mine buildings and shaft and so on?

A Yes, sir. We will not take anything around this well at all. It's very poorly plugged, that is according to our schedules of plugging.

Q What, if anything, did you do with reference to the abandoned well that was testified to by Mr. Rowley and Mr. Yates?

A The abandoned well they mentioned, right here, we reopened that well to approximately 200, 250 feet below the salt section. Then, under my supervision, we filled that well to the surface with concrete, with cement. When we ran the well we were very careful after we ran up through the salt through the ore zone we checked to make sure we had our cement that high. We checked it at intervals. So this well now, from approximately 200 feet below the salt, is a solid pillar of concrete. It actually overflowed on the surface. There was a little slope on the surface.

Q Now, from your experience, what is your estimate as to the amount or size of potash pillar which should be left around a well in order to prevent subsidence and the contamination from any gas that might be in the well?

A Well, I feel that if you take either one of these wells, we should leave, providing the wells are drilled before we mine it,

we should leave a 250 radius pillar around that well which will not attempt to mine at any time. Apart from that, we would move out some 1200 feet from that well, and we would only be able to take 65 percent extraction, that is 5 percent more than our normal first mining. At the end of the five percent extraction, that would kill the whole area. We would attempt to do no further mining because of the danger of cracking or shearing the casing in either one of those wells.

Q On Exhibit B you have a line drawn around those two well locations. I don't know how you would describe the shape of that.

A You mean this or this?

Q Yes. A This?

Q What does that line represent?

A That represents an area coming up to this line we would be able to take a 90 percent plus extraction inside of this line. We would only take 65 percent, as our total extraction, minus no extraction around the 200 foot radius pillar at each well.

Q Have you compiled any figures showing the value of the ore which would be taken with your 93 percent recovery?

A Not 93. I didn't make a statement of that amount.

Q 90 -- A (Interrupting) 918.

Q 918, pardon me. With relation to the value, assuming the wells were drilled and you had to leave the pillars and the remaining 40 percent or 35 percent.

MR. REESE: We ask that the one labeled Combined Wells be marked as Exhibit C. The one marked Yates Well be marked Exhibit D, the one marked Carper Well be marked Exhibit E.

(Marked Southwest's Exhibits Nos. C, D and E, for identification.)

Q Referring to Exhibits C, D and E, what formula did you use there in computing your figures?

A I used the same formula that is used by the United States Geological Survey.

Q Is that the same formula that was used in the test in the Velma case?

A Yes, sir.

Q You might explain your figures and give the totals with regard to each of the exhibits.

A Well, the combined wells, which are shown on the plan, both wells are drilled simultaneously or at the same time before we mine them. This has been calculated in the following manner, Recoverable Value Per Acre - 2,722.5 times thickness of ore in feet times grade of ore in percent K_2O times percent mining extraction times percent mill efficiency times units of K_2O per ton times price of units of K_2O.

The constant, 2722.5, represents the tons of ore contained in one acre-foot, using 16 cubic feet equals one ton of ore. The price per unit of K_2O in muriate is 36 cents.

Those are the same methods that the United States Geological Survey uses for calculating.

The following are calculated values: Case No. 1, Normal mining, no wells. Using a 90 percent extraction only, we have better than that extraction at the present time, total mine, 90 percent. Mill efficiency, 90 percent; recoverable value per acre $77,235. For the 198.4 acres involved, it becomes $15,323,424.

Case No. 2, two wells, 200 foot radius pillar around each well with no extraction in that area, 65 percent mining extraction in the area marked on Exhibit B. Total mining extraction is 65 percent. Mill efficiency, 90 percent; recoverable value per acre is $55,781. For the 192.8 acres, your two wells are zero extraction, it becomes $10,754,576.

So summarize this, the loss of recoverable value if the wells are drilled per acre, is $23,028 or $4,568,848. That is with the combined wells, both wells being drilled more or less in the same time, and we are not able to mine to full extraction during that period.

Q That would also be on the assumption, I take it, that the wells make the oil or gas? A I assume that.

Q Now, with regard to Exhibit D, I assume those figures are calculated in the same fashion shown that you have described, and that the totals arrived at in the same manner?

A Yes, sir.

Q You show a loss of recoverable value as to the area around the Yates well, of $2,343,502, is that correct?

A Yes, sir.

Q With regard to the Carper well, a loss of $3,809,654, is that correct?

A Yes, sir.

Q Do you know of any way in which an oil well could be drilled in your potash mining area where you could obtain any higher percentage of your ore than you have outlined in these exhibits, safely?

A Before we mine?

Q Assume a well is drilled and oil is obtained and you go in to mine.

A At the present time, no.

Q You know of no method?

A No, sir.

Q What is the danger to your mine to be encountered from a producing well within the limits of your mining?

A Well, if we should second mine in an area too close to a producing well, the ground subsidence would affect us by a probable shearing of the casing, allowing oil or gas to enter into our workings, which is very unstable. It would probably mean the losing of the area or the whole mine.

Q Why do you say the whole mine?

A Because the mines, you start out at two shafts and you gradually work out to an area, and the area towards your shaft is open behind you. So if we are in any one of the areas between the outer limits, we have no way of removing the gas, or if the oil should flow from the mining system to the outside.

Q ~~The same would be true of water?~~

A Yes, sir.

Q Do you have any leases, potasium leases, potash leases, from the State of New Mexico, that would be affected by an oil well drilled on these proposed locations in the event there should be subsidence and the oil or gas or water get loose in your mine?

A You mean in the immediate area of these two wells?

Q That would be affected by them. A No.

Q How about Section 16?

A Section 16 is quite a distance to the south. Section 16 we would have to protect.

Q Would your mine openings, would they extend from the well locations down to Section 16? A Yes, sir.

Q Do you have any plats based on figures made by you from your mine showing the actual subsidence at your mine following primary and secondary mining?

A Yes, sir, I would like to call on Exhibit A. It shows it a little clearer. We have a grid that we placed over the area. I haven't shown the complete grid, which we have taken measurements at different intervals to check our vertical subsidence. The highest vertical subsidence we have to date is 3.7 feet, which is at this point. It tapers out to your mining edges. We have a horizontal movement, a maximum of 2.3 feet at this point. Seven tenths here and seven tenths there, the general direction being to

the east slightly south.

Q You have been referring to Exhibit A?

A Yes, sir.

Q Those figures are noted on your plat, I believe?

A Yes, sir.

Q All right, if you will continue.

A These maps show in contouring vertical subsidence, we have been doing this since soon after the start of operations.

Q Are you going to talk about the big long map up there first?

A Yes. I suggest that be marked Exhibit F.

(Marked Southwest's Exhibit No. F, for identification.)

Q Now, you might explain what that is.

A We started the secondary mining operation in the triangular shaped area, the latter part of June. We did not realize it that the subsidence would be reflected so rapidly on the surface. First measurements were made on October 4, 1956. The green line represents the area of second mining that we have taken during the start of operation October 4. For emphasis, the red line is a half foot vertical subsidence contour. This is your panel limit. There is no first mining on the left of this. The first mining is all in this area.

Moving over to October 29, you can see that our second mining has moved out, our half foot contour has stayed approximately the

the same, mainly because we are coming out of an area that is not moving too rapidly.

Moving over to November 19, we started second mining, bringing this area back, and your half foot contour is beginning to move a little bit more. Approaching December 12 we are gradually moving out on our corners, bringing our middle back the half foot, contours extended a little greater, but not to a great extent with faster miner in this area. On the 24th is really beginning to move, it is beginning to move down this way with the effect of the second mining in here.

I would like for you to note between January 24 and February 28, approximately four weeks, you can see what your half foot contour has done, mainly because of rapid mining in this area, the weight coming from here and it coming to here, and the weight on this. The last measurement on the 30th of March, your half foot contour being more or less the same on that, but it has moved right out to the edge to your second mining limit.

Understand that from here down we do not plan to take anything more, this is a little over 1200 feet to our muriate, building portion has been 50 percent mined and portion 70 percent mined. We will not attempt to move any of this on secondary mining. This gives you a graphical picture so you can see how your contours move with your mining.

Q What are the other contours on the plat?

A The other contours are half foot intervals. This contour is three and a half foot vertical subsidence with a 1.37. The next one is a three and so forth for each half foot interval. Actually by now we believe that this contour is connected at the present time.

Q To summarize what those plats show, how would you do that for us?

A To summarize what the plats show, the effect of secondary mining as reflected on the surface in subsidence over a period of time interval from the start of secondary mining in this area.

Q Roughly speaking, what is the surface subsidence in feet or inches? A You mean maximum?

Q Yes, sir.

A We have found 3.7 feet.

Q Going out to what --

A (Interrupting) It comes out to zero. From zero to 3.7 is our maximum at the present time.

Q Then your contours all reflect surface subsidence?

A Yes, sir.

Q What is the plat below that one?

A Well, this is a section taken through here showing first the surface, these figures show a one-tenth subsidence at that point, four-tenths here, 3.2 and 3.7 and 3.5, 2.8, so forth, clear across to zero.

MR. REESE: Let's mark that Exhibit G,,please.

(Marked Southwest's Exhibit No. G, for identifcation.)

Q What part of your mine is that section drawn to represent?

A It's a section right through this row of stakes on the underground workings of the elevation. If you want to know, that would be, I've left my number of this. Just a second.

Q It would be to a point approximately midway of the last of that long series Exhibit F?

A Yes, right about through the old oil well that they mentioned of the Elliott Canyon well on an east-west line.

Q Now, describe your Exhibit G to us.

A This is to the west, which is this panel limit. No first mining on this side. This is to show you what we have developed in the second mining as far as angle to the surface. We have this up to a one-tenth. We then move it to a zero, we moved it to the last measurement, this angle is 69½ degrees. It is still moving.

This shows a 45, this shows a 38, which United States Potash has found in theirs, but this shows our own experience to date. On the side where you have first mining to the east, you'll notice that this angle is quite a bit flatter, being down to 56½.

The tendency is over your first mining area, for this to be slightly flatter. This shows a 45, this shows a 38. This section in here, I cannot prove to you that it is actually clear to the

floor. It's slightly dangerous. I have known it to be down to two feet. This area is around five feet high. It is crushed to about two feet. Whether it is actually touching the floor, I can't tell you.

Q What is the significance of those lines as to 38 degrees or 45 degrees? What does that mean to our picture here?

A Well, this means that if a well is drilled or is in this area out to here, that the surface subsidence will crack through there and probably shear off casing, allow either oil, gas or water to enter into the mine. This line here eventually will move right on over, especially after mining is being done in this area.

Q In other words, from the place where your mining has ceased, the subsidence line goes out at an angle from your ore, from your mine down below the ground, in your experience already 38 degrees, and is that what you mean?

A No, we haven't had experience 38. The United States experienced one of 38. We have only experienced on the side where we mined 79 and the side where we have first mining ahead of us we have 56½.

Q That is still moving you say?

A That is still moving. Well, it is indicated by this.

Q Does that have relation to the amount of ore you must leave around an oil well? A Oh, yes, sir.

Q What relation?

A We feel that if we take 65 percent in this area and no more, leaving a solid pillar on your oil well, and we estimate is here, the ground will not subside around the oil well in any shape or form to cause a shearing or breaking of the casing, but we would not mine only 65 percent of this area within a 38 degree angle of the well.

Q Then you have applied the degrees of subsidence from your experience there at the mine in calculating the amount of ore which you must leave around these projected wells in the event they were drilled and found to be productive, is that correct?

A Yes, sir.

Q Do you have any photographs showing the surface and subsurface subsidence in your mine?

A They have copies, Mr. Reese.

Q They do? A Yes.

Q As you describe one and tell us what it is, would you have the reporter mark it beginning with H?

A I will just hold these up. I would like to show you where these were taken. Next, these were taken at a point right here on April 2nd.

Q April 2nd of this year?

A April 2nd, this year, yes, sir.

Q You are pointing to what?

A Right there. The photograph was taken just outside the

red line.

Q You are pointing to the last of the long contour series in about the --

A (Interrupting) March 30, 57.

Q The one headed March 30, 1957? A That is right.

Q The label, and you are pointing to a point near the southwest corner of your green line?

A I'll mark this surface picture.

Q You are referring now to what exhibit?

A This shows the surface crack developed along this side. These will vary from, or two to six inches in width in this area. These same pictures, they are taken, there are three pictures of cracks I want to correct myself, they are not continuous. We don't find a continuous crack for four or five hundred feet. We find them for a distance of maybe fifty feet. We can't find them in between. You pick up a crack, it might be in the general line or a little bit up above or a little bit below, but they do follow a north-south direction.

MR. PORTER: That is after what percentage of the ore has been extracted?

A We have taken out 91.8 out of this area. This is just another one of the same type of crack.

MR. REESE: Will you mark that Exhibit, and mark the third one J?

(Marked Southwest's Exhibits Nos. H, I and J, for identification.)

Q All three of those were taken at the same relative location?

A Yes, sir.

Q You stated that the crack varied in width from two to six inches. Did you mean two feet to six inches?

A No, two inches to six inches.

Q All right.

A We have a set of prints which have been taken underground.

Q Just one question before you proceed, how deep below the surface are you mining?

A This is approximately 1,000 feet.

Q Then the cracks in the other pictures, would they indicate that the ground has subsided from your mining operation clear up to the surface?

A Yes, sir. That's indicated here by the movement of this stake down from the four-tenths, three and a half, 2.8. It is down and to this area, which is in turn shown by your contouring, this being the largest subsidence from the side. This picture was taken on 28th of February of this year, of a pillar 478.

MR. REESE: Will you mark that K, please?

(Marked Southwest's Exhibit No. K, for identification.)

MR. MORGAN: Does it mean there is a suppression of the natural pillar that has been left there?

A Yes, sir. This pillar we have mined out on the sides. This is one of the stumps, I can't tell you exactly right now, it is probably a 9 x 18 in size, that was left. That was on the 28th of February of this year. On March 7 this pillar is partly obscured here.

MR. REESE: Will you mark that photograph L, please?

(Marked Southwest's Exhibit No. L, for identifcation.)

A This was swung, the camera swung a little bit to show a floor heave to give you an idea of the tremendous pressures they were operating under after we removed the second mining on these pillars. You can see that the back is closing down, that is one week's time in this pillar.

Q What do you have there, four? A Yes.

Q Are they related? A Yes.

MR. REESE: Why not label them M, N, O and P.

(Marked Southwest's Exhibits Nos. M, N, O and P, for identification.)

Q Then when you refer to them in your statement, Mr. Herbert, whichever one you have in your hand, you call it M and so on.

MR. PORTER: Mr. Reese, do you have several more of the pictures?

MR. REESE: I think that is all.

A This will complete it. It will take about five minutes. This is taken of another pillar, Exhibit M, see the pillar No. 558,

showing a cutting machine. We are doing the second mining at this time. We are coming in and cutting between this pillar and the pillar on the other side. The height here at the measuring point was 5.7 feet on the 12th of February of this year.

On Exhibit N we have now completed the second mining on the side and you can see the pillar, the same pillar 558. Our machines are moved back to another row of pillars. The measurement is 5.2 feet. That is the pillar has subsided a half a foot in the time that we have moved in and taken out our second mining and moved out in a week.

The Exhibit O, one week later, same pillar on March 7, is now closed down to 4.4 feet. It's a little bit over, almost one foot in one week, we're still mining in the first mining area behind it. You can see the effect of this sag and the breaking up.

On Exhibit P, the pillar is very rapidly disappearing. It is disintegrating, it is broken up and spread on the floor. That was on the 14th of March of this year and was down to 3.2. Since that date there hasn't been any of us who desire to go back in there and look at it again. We can tell by looking at it it is probably down to a neighborhood of two feet, but I have no actual measurement.

This indicates a tremendous pressure that you have on this ground as your second mining moves on out. It is constantly moving and it will follow your first mining right along behind it, being

reflected in turn to the surface or to an area outside of our mining.

MR. MORGAN: Do I understand that there is no subsidence on 65 percent mining?

A That has been the accepted theory on previous hearings I believe. We have not done any 65 percent mining;from actual experience I can't tell.

MR. MORGAN: Sixty percent?

A Sixty percent, we have found no surface subsidence. I would like to make one more statement, if I may, on this Exhibit F. We have a fourteen-inch cast iron water line which feeds our plant for milling purposes. The water line, as you can see, is right over our caved area, and it's going to be over more of it. The water line has been acting like a small snake, it has been going up and down and it is going sideways. We have developed leaks up to seventy gallons a minute. We have uncovered the whole line and we are continually, not continually, excuse me, we do have to make minor repairs on the line for leaks which is a very good indication of your ground movement.

This will drop a foot in here and the next day it will go up and be up half a foot and it will go down and go sideways anywhere from two to three inches. Another indication of the tremendous movement that you have in the area over your second mining.

Q Mr. Herbert, with regard to the area around these wells,

I think I asked you awhile ago if you hadn't filed your mining plans with the Commission last January. Actually when did you first file that plan?

A We filed it according to R-111-A. We filed the first one in January of 1956, indicating we would be in this area within five years based on estimates of mining at that time. January of 1957 we still feel that we'll be in this area within five years. That is we have not changed our plan in the last two years as far as mining the area in question.

Q You still intend to be there?

A Well, under present plans, yes, sir. You have to understand that mining plans do change, based on production, and well, there's quite a few reasons, that is ore, tied up with the mining that is you can say that in five years I'm going to be right there, but there are many reasons why you will not get at that point in five years.

Q You might get there sooner too.

A Yes, sir, we can be there sooner or later. I don't believe there is any mining engineer in the room who will say that the company five years from now is going to be right there.

Q Can you think of anything else, Mr. Herbert, right now that might be material to the issue here as to the effect on your mine if those wells are drilled and production is obtained?

A Well, personally I would hate to see it done because

of the loss of ore in here. There is another thing that enters into this thing. If you have to come up here and mine out a little piece in here and wiggle out through here and come in here and mine this piece you are doing a very inefficient mining, both costwise. It is really extreme headache on those wells if we have to leave that 65 percent. We would normally take our sixty. We have to re-adjust the whole planning system to take another five percent in this area. It can be done, but it does upset the continuity of your work.

I forgot to mention that this is the outline on Exhibit A, shows the Carper lease and the Yates lease.

Q How about that little triangle up in the northwest corner of that. Would you probably second mine that?

A This?

Q There.

A Yes, I think we might. As to what way you would do it, you probably wouldn't mine it here, you might mine it from another panel at another date. I believe you could second mine it.

MR. REESE: I believe that is all we have, Mr. Commissioner.

MR. PORTER: At this time the hearing will recess until one-thirty.

(Recess.)

AFTERNOON SESSION

MR. PORTER: We will proceed with the Cases 1233 and 1234.

MR. REESE: At this time the Southwest Potash would offer in evidence all the exhibits which have been heretofore identified, A to P, inclusive.

MR. PORTER: A through P?

MR. LOSEE: The applicants have no objection.

MR. PORTER: Any objection to the admission of these exhibits? They will be admitted.

MR. REESE: At this time we would ask the Commission to take judicial knowledge of their record showing the production of oil from wells in the vicinity of the proposed wells.

MR. PORTER: Presently producing wells that you are referring to?

MR. REESE: All that might be material. I think the Commission has a record of total production on the wells in the Barber Pool, for instance, the wells northwest of this area in the North Benson Queen Pool, and I believe those might be, you might also include the undesignated wells north and a little east of the Simms-Reece Wells by Mr. Randall and Mr. Jones, I believe.

MR. PORTER: The Commission will consider the records for those wells as to any possible bearing they might have on this case.

MR. REESE: I would like to resume the direct examination for one point that may not have been brought out clearly.

(Direct Examination continued by Mr. Reese.)

Q This morning, Mr. Herbert, you testified that in the event

production was secured on these proposed wells, you would be forced to leave the area occupied by pillars and then only take 65 percent in the remaining area shown in your dark outline there around the wells. What would be the probable outcome of the remaining 26 percent which you would normally get by secondary mining?

A You are speaking about this area?

Q Yes, sir.

A We would not get it.

Q Why?

A Well, these wells are under production. Their life is anywhere from five to 20 years. We would mine this area completely out of it; we would have pulled out our equipment, track trollies, power lines and we would have to re-tool that to go in and try to get the other 25 percent after they had completed their wells. Also, by that time this would have been caved. This would have been caved, we would be sitting in a little hot spot in the middle and attempting to go in there and get our full 90 or 92 percent, that would be extremely dangerous.

Q What sort of danger?

A Well, the danger would be that as soon as we started to attempt to get the remaining 20 or 25 percent, we just couldn't hold her back with any timber, or anything else, to allow us to mine out the pillars and retreat safely. What I am trying to say is that the ground would be coming so fast behind us it would just run us out.

Q It would be dangerous to the workmen?

A Yes, sir.

Q Due to the caving of the bank?

A Yes.

Q That is what we might call the roof here?

A The roof here, which would be the breaking up of the roof and dropping down.

Q You apply the term back to roof?

A Yes, roof.

MR. REESE: I believe that is all I have on direct examination.

CROSS EXAMINATION

By MR. LOSEE:

Q There is no mining in the area of these proposed locations at this time?

A No.

Q There is, likewise, no subsidence in this area?

A We haven't measured any.

Q Do you know if, for a fact, the percentage of potash in the area of these two wells is the same as the percentage figure used in computing your figures on your Exhibits C, D and E?

A We have a fairly good control on this area right here by your Carper Well, we have a potash vault within four or five hundred feet, or maybe six hundred feet.

MR. PORTER: You have what?

A A potash test hole; we have controlled, the black circles here are potash test holes in the immediate area, around this part (indicating). The method of calculations are more or less the same as United States Geological Survey. The proof on the figures

that I used for this, we have met my figures, my calculations in other areas of our mine within a reasonable limit, so that the figure that I presented here, which I utilized the percent of K_2O I believe is accurate.

Q Is it possible that figure could differ?

A It can differ, yes, sir, but not materially.

Q Does your company know that there is a sufficient amount of potash in the area of these two locations so that it could be economically mined?

A We believe so at the present time.

Q You do not know that as a fact?

A At the present time, yes, sir. We know there is potash that we can economically mine within a certain allowance on my calculations at the present time.

Q I believe you stated this morning, Mr. Herbert, that Southwest had filed a program, or proposed program for five years in advance, one on January 1 of '56 and one on January 1 of '57?

A It was in January of each year, not January 1st.

Q Well, in January, with the Commission?

A Yes, sir.

Q Has Southwest always in the past exactly carried out the proposed plan of operations?

A We have, up to the present time, yes, sir. In fact, I would like to mention that over our all property, we have mining plans established. We have followed that plan since 1952, in general. Minor variations, because of conditions or tonnage requirements, or grade requirement, but in general we have followed our original

mining plan that was set up in 1952.

Q Is it possible that you would vary from your proposed five-year plan to any extent?

A Certainly we can either be in there inside of five years or a little bit over. Your economics enter into situations whether we have increased tonnage or production requirements, grade requirements, X number.

Q Is it possible that you might not be in that area for ten years?

A No, I don't think so. I think we will approach the five years in that area, under the present plans we have now.

Q I believe you stated this morning that you had, or Southwest had, under your supervision, plugged this old Elliott Cannon Well solid with cement?

A Yes, sir.

Q That well is in your proposed five year plan?

A Right on the edge, right in the corner here.

Q By reason of the existence of the plugged well, do you contemplate that the amount of potash recovered around it will be reduced?

A We'll take all the potash.

Q You will take it as if the well was not there?

A Yes, sir, it is not a producing well, and it's not plugged. We have no fear of caving the ground around that well. We will take the 90 odd percent extraction. In other words, we will not lose any money, or I should say, production because of that well.

Q Then, by the same token, if either the Carper or if both the Carper and the Yates Wells were drilled and plugged solid with cement, and abandoned, it would not cut down the amount of potash recovered?

A If you could say that you would not have production in those wells. If you had a dry well, then you plugged it we would, that is, plugged it according to our specifications, and under our supervision, we would mine that area. That is a dry well, or you have finished production.

Q I believe this morning you stated that Southwest Potash plan, at least for the last year, was to commence the secondary mining as soon as possible after the primary?

A Yes, sir.

Q Do all potash mines in the Carlsbad area follow that same procedure?

A I can't speak for them.

Q Do any of the other potash mines follow that procedure that you know of?

A In the past I don't believe they have.

Q Actually some of the potash mines have waited several years to commence their secondary mining?

A Yes, sir. I believe that's mainly because to some extent we were a little bit timid about starting secondary mining because of the water situation. There has to be a point of somebody taking the lead, and finally they took it, and they found that we can do secondary mining safely.

Q Mr. Herbert, would it be possible in the area involved in

these two wells and throughout that panel passageway leading to it, to go in and make your primary mining operations and withdraw 65 percent clear down to your main passageway.

A May I correct that? We mined 60 percent, normally on our first mining.

Q 60 percent on your first mining?

A Yes.

Q Then after the production of oil, if any were obtained in either the Carper or the Yates Well, and those wells were plugged solid with cement, is it not possible that you could then commence your secondary mining throughout that passageway?

A Mr. Reese brought that up previously. By the time you completed that period of time, we would be completely out of this on our first mining. We would probably be mining on this side, which makes this ground very unstable, and very dangerous to go back in again and try to get our second mining, plus the high additional expense of re-tooling. I mean by relaying track, power lines, equipment and everything that had been moved in the area.

Q Have any other potash mines in the area carried on a similar operation of waiting several years before they went back in the area and started their secondary mining?

A As a matter of fact, I don't know. I really couldn't say as to that.

Q Do you understand that any have?

A All I can assume is that they waited for a period of time. I don't know if they left their lines and power lines and everything in there. You have quite a capital investment when you start moving

equipment, track and power lines and trolley and everything else in there for a long period of time. I really don't know, as a matter of fact, to be stated as a fact.

MR. LOSEE: I believe that's all.

MR. PORTER: Mr. Mankin, I believe you had some questions?

By MR. MANKIN:

Q Mr. Herbert, what is the closest point that open mining is going on, to either one of the proposed locations?

A May I ask a question on that? I would like to say this, our open mining is over here and our secondary is over to here. The first is here, from our panel where we did our first mining is about 1280 feet to the Yates Well. If you add this, if you meant from where we are actually secondary mining, now you have to add on quite a large amount of footage.

Q No, sir, I just meant the closest point to any mining, to either one of the wells?

A About 1280 feet.

Q Is not the Yates Well within the five-year plan which you propose?

A Yes, sir.

Q Do you believe that with the plan which you have suggested here of 65 percent mining, that Southwest Potash Company could live in that particular area and not expect casing to be sheared?

A You mean if the well was drilled, if we left a 200 foot solid pillar around the well and we only took 65 percent up to the, what we so far know is the angle of breakage, yes, it really would do no damage to the well and there would be no damage to the mine.

Q You outlined an area on Exhibit B of extraction, which currently encompasses this 1200 foot radius, is that correct?

A That has 200 foot radius around here, 1230 feet from here to here, which is based on U. S. experience of 38 degrees. Now, that in future experience may change that to 45 or some other angle, but I calculated on the 38, based on their experience of cracking out that part.

Q So, actually some of these corners would not be included in the 1200 foot radius, although it is just a general picture.

A The reason I do not take a radius is mainly for mining operations. You can make an example, if you have a tree in your lawn and it is a lot more work to keep backing up around the tree. For normal operation we would square this off.

Q For normal mining areas in blocks rather than radius's?

A Yes.

Q Is not the U. S. G. S. cut off point the point of siluite in the amount of footage?

A This line is four feet at 4 percent K2O.

Q That was based on many, numerous core samples, was it not?

A This line is copied from the map that is in the files of your office.

MR. LOSEE: I believe that is all.

MR. PORTER: Mr. Nutter?

By MR. NUTTER:

Q Mr. Herbert, it has been suggested that certain parts of the record in the previous case on drilling oil wells in the potash area, be incorporated in this hearing, are you acquainted

with that record, sir?

A Fairly well, yes, sir.

Q Rather than go through a rather long explanation, does your method for establishing subsidence and horizontal movement, is that similar to the method used in the other instance?

A It is similar, but not as accurate. If you remember, in the Velma case they didn't have detailed survey down to hundredths of thousands of a foot for accuracy. My survey over this, for this location is probably within maybe five feet of its actual location, but my elevations are within one hundredths of a foot. I was interested in the vertical movement on my stakes and not pinpointing it down to a hundredth or thousandth of a foot; but we do have scattered through this area where I pointed out this horizontal, we do have steel pins or pipes in concrete. These have either been triangulated in, or run in under accepted standards of surveying within at least a hundredths of a foot, on these fixed points for horizontal movement. But our vertical movement is within one hundredths of a foot.

Q I think that explains that very adequately, Mr. Herbert. What provision in normal mining operations is made to prevent the subsidence, including the horizontal and vertical movement from shearing off a mine shaft?

A If you will look at Exhibit B, the mine shafts are here (indicating). We have left approximately a 300 foot solid barrier, or more than that, roughly four hundred. Moving on over this area we have left over -- We have left from the shaft 2,000 feet, which we have only mined 50 percent. We will not mine anymore of that.

That is for two things, one is to protect our plant, which lies over this area here, and to protect our shafts. We, in no case, would mine closer to our shafts than probably 1,500 feet. That's what we have established, and we would only take 50 percent at the most.

Q 50 percent is a standard accepted practice?

A Well, we have, we have mined, you'll see this around our shaft, we have taken out 50 percent and we have no movement in our shaft at any time, and no evidence of movement, no increase in water flow through our lining. We feel satisfied that this ground is stable around our shafts so long as we don't tear up our barrier pillar or take too close extraction close by, the 50 percent is adequate to protect it, plus a barrier pillar around it.

MR. PORTER: Mr. Mankin?

By MR. MANKIN:

Q Mr. Herbert, just south of the area shown on your Exhibits A and B, in Section 16, there is about at least four oil wells in the Benson Pool, Southwest has a potash lease on that as a State lease. Have you not found it inadvisable to not mine around in that particular area?

A I think it's inadvisable and highly dangerous under the present circumstances. Your recovery would be very small, very very low in the area. Probably if you mined and left your large pillars, you might get an overall of 50 percent. Some of those wells, I'm going by memory now, some of these wells are rather close together, which means there's probably 1,500 by 1,500, maybe 2,000 foot pillar actually left around those wells, a solid pillar,

We have plugged, under our supervision and our expense, two of their wells that they have abandoned, which we have no fear of going back into that area and taking our 90 odd percent; but these wells being old and not plugged, and under production, it's anybody's guess as to how the casing is, how the ground is, if there may not be also some oil and gas in the salt area at the present time.

Q Then, as long as those wells are produced, Southwest and the State has lost 50 percent of the reserves of that entire section, is that correct?

A Yes, so far as my memory goes on it, yes, sir. I mean, it could be a little more or less, I don't remember any figures.

Q Does the potash company normally expect considerable trouble if they let the water get on the potash or the salt section?

A You mean on top of it?

Q Yes, sir, does it not cause lots of caving and problems in mining operation?

A No, sir, you do have a certain amount of water on top of your salt section anyway, perched water, we do not have very much, but the other properties I believe do. There should be no trouble as far as water coming down into the mine because your silt bends, and it doesn't crack, so there is no way for the water to come on clear down into the mine workings. It may come into a small place where it is bent, but the clay will block it off. We are working on that theory that the salt bends and there is no danger of the water coming in.

MR. MANKIN: That is all.

MR. PORTER: Mr. Montgomery?

By MR. MONTGOMERY:

Q You mentioned awhile ago, Mr. Herbert, that you had four foot of 14 percent K20?

A No, I said that the United States Geological Survey calculated the ore limit using an economical cut-off of four feet at 14 percent.

Q The point I wanted to make is that will the mine shaft be from the floor to the roof be as high in the area where the oil wells are as, for example, the surface subsidence?

A This ore is not as high as those exhibits are shown there.

Q You would not expect as much subsidence?

A No, I would expect in this area it would approach within about a half a foot of what we expect there. You understand that the subsidence is still moving in that part?

Q Or half a foot as opposed to 3.7 right now in that area?

A Well, I think that will stop at four feet, and I would say roughly, this will stop at three and a half, that is as near as I can predict it.

Q To your knowledge, has there ever been any casing severed due to movement in this area?

A I don't know, no I don't. If it had been, I believe that you would have lost yourmine, put it that way.

Q You were mentioning earlier these tremendous forces that were involved by this earth subsiding. What type of forces, can you put that in pounds, psi, or what?

A I don't remember the U. S. Bureau of Mines tests on that.

Do you, Mr. Stewart?

MR. STEWART: I think the pressure develops about a pound per square foot, per foot of depth. The loading on the potash bed a thousand feet deep, you would have about a thousand pounds per square foot.

Q Are you familiar with the mill test on the type of casing that the operators propose to run?

A No, sir.

Q If I would say on the order -- I don't recall the exact figure, if I say on the order of 2,000 pounds, would that change --

A (Interrupting) We don't know the exact figures on this thing. I don't believe anybody can tell you the horizontal and vertical forces exerted on your casing. It is logical to assume that when your casing starts moving this upper, the upper area which is rather unconsolidated, you get a movement this way as well as this way (indicating). When you start moving cross-ways, you are going to get a terrific shear. This pipeline which has maybe not too good a case, we have welded bands on two sides of a joint, and our welds are broken, which means that there is quite a pull on this line as well as vertical. I doubt if there is any casing at the present time that can withstand those pressures.

Q This case of subsidence is certainly nothing new to the oil industry in casing programs. I am told in Lake Marcibeau they have subsidence in the order of 16 inches per year, they have huge craters on the order of tens of feet deep, due to the subsidence, due to withdrawal of oil. In California fields there are mobile areas

that are presently being faulted and have movement. Have you happened to study any of those particular situations in connection with this?

A No, I haven't.

MR. PORTER: Anyone else have a question of Mr. Herbert? The witness may be excused.

(Witness excused.)

MR. REESE: That is our case.

MR. PORTER: Does anyone have a statement to make in this case? Mr. Losee?

MR. LOSEE: I will make a short statement, if I may. The testimony of the applicants has reflected that their drilling program, or proposed drilling program will be in compliance with the Rules and Regulations of this Commission, referring to the oil-potash area. We assume that the program, as outlined, was considered safe by the Commission when it was specified in the order. Beyond that point on your case, the applicant's case, looking towards approval of these two drilling sites depends upon really what is two unknown factors. We don't know for a fact that there is oil down there, and although they are much more sure of their position that there is potash, by reason of some core holes several hundred feet apart, they cannot state as a fact that there is potash that it will be economically feasible to mine it in that area.

Actually, Mr. Herbert not testifying to it as a fact, has stated it is his understanding that some of the other mines in the area have conducted a primary operation of withdrawing 60 or 65

percent of the potash, and then at a later date, some years later, gone back in and completed the secondary program. That statement, of course, he qualified by stating, pointing out the dangers involved, but if it were possible to follow that procedure and the applicants could drill their wells, there might not even be oil, and nobody would have any worry, because then they could be plugged as the present Elliott Well is plugged, and the potash company could recover their 90, 91.8 amount of potash; or if there was oil in the area and then the operator produced it for five or ten years, or whatever would be the normal life expectancy during that time, or, I assume, the next five years, Southwest would be in a position to withdraw their 60 percent down that entire panel, and then move on to another operations, and then at a later date when the oil operator had plugged his wells, go back in and complete secondary mining and withdraw his other 26 percent.

Now, those are possible factors, I grant you, but based upon the unknowns that the Commission has to consider, we do not feel that the Commission should disapprove the location and we respectfully ask your consideration of our applications.

MR. REESE: I would like to make a short statement.

MR. PORTER: Mr. Reese.

MR. REESE: These applicants are asking permission to drill under Federal lease, which they took with a provision in it providing that no wells will be drilled for oil or gas in formations above the base of the Delaware sand, or above a depth of 5,000 feet, whichever is the lesser, except upon approval of the Director of the Geological Survey. It being understood that drill-

ing for production on these formations will be permitted only in the event that it is satisfactorily established; that such drilling will not interfere with the mining and recovery of potash deposits, [illegible], or the interest of the United States would be subserved thereby.

Now, this record, I think, is entirely adequate to show that the proposed wells can not be drilled without seriously interfering with the mining and recovery of the Potash deposits, that are of many times the value of any hoped for production. I think that that the terms of the lease itself are such that the burden is on the applicant to establish that their operations will not interfere with the mining. Certainly that has not been accomplished. It would be entirely uneconomical to take a chance, because here we have, the ~~Immense~~ investment involved in that mine, to be considered as well as the value of the ore itself.

I think that it would be entirely unreasonable to grant permission at this time that the wells be drilled.

MR. PORTER: Does anyone else have a statement to make? If nothing further we will take the case under advisement.

STATE OF NEW MEXICO)
: SS.
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 24th day of April, 1957.

Ada Dearnley
Notary Public

My Commission Expires:
June 19, 1959