

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
January 14, 1960

DEARNLEY-MEIER REPORTING SERVICE, Inc.

PHONE CH 3-6691

ALBUQUERQUE, NEW MEXICO

I N T H E M A T T E R O F
C A S E N O . 1 8 4 1

TRANSCRIPT OF PROCEEDINGS

January 14, 1960.



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IN THE MATTER OF:

APPLICATION OF SINCLAIR OIL & GAS COMPANY
for the creation of a new pool in the Potash-
Oil Area and for the promulgation of special
rules and regulations pertaining thereto.
Applicant, in the above-styled cause, seeks
an order creating a new pool for Yates pro-
duction in the Potash-Oil Area as defined by
Order R-111-A, said pool to comprise the
SE/4 NW/4 of Section 16, Township 20 South,
Range 33 East, Lea County, New Mexico, and
such other acreage as may reasonably be
proven productive from the same common source
of supply. Applicant further seeks the pro-
mulgation of special rules and regulations
for said pool as follows:

CASE
NO. 1841

A. Cable Tool Casing Program.

Same as Order R-1078 for Teas Pool.

B. Rotary Tool Casing Program.

Surface casing set at 600 feet and cement
circulated. No salt protection string. Pro-
duction casing to be set through pay from
3146 feet to 3232 feet (approximately) with
cement circulated to at least 50 feet into
surface casing.

BEFORE:

Hon. John W. Burroughs
A. L. Porter, Secretary-Director
Murray Morgan, Land Commissioner

TRANSCRIPT OF PROCEEDINGS

MR. PORTER: Case 1841.



MR. PAYNE: Case 1841. Application of Sinclair Oil and Gas Company for the creation of a new pool in the Potash-Oil Area and for the promulgation of special rules and regulations pertaining thereto.

MR. PORTER: Mr. White, you may proceed.

MR. WHITE: Thank you.

MR. PORTER: I am going to call for other appearances before your introduce your witnesses.

MR. WHITE: Charles White of Gilbert, White and Gilbert, Santa Fe, New Mexico, appearing on behalf of the applicant. And, I have also associated with me, Mr. Horace Burton of Midland, Texas.

MR. PORTER: At this time, I would like to call for appearances in this case, any interested parties?

MR. WALKER: If the Commission, please, John B. Walker with the firm, Stagner, Sage and Walker of Carlsbad, New Mexico, appearing for the United States Borax and Chemical Company.

MR. PORTER: Anyone else desire to make an appearance in this case, 1841?

(No response.)

MR. PORTER: Mr. White.

MR. WHITE: If the Commission, please, at this time I should like to make a brief opening statement.

Last month, Sinclair made a new discovery on State Lease 886. This lease is situated approximately midway between the Teas

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Pool and the Salt Lake Pool, within the defined limits of the Potash area. And, it is approximately midway between Hobbs and Carlsbad.

As the Commission knows, Rule R-111-A has, as its main purpose, the strict and stringent regulations of the drilling of exploratory test wells within the Potash area; and particularly is this true as to the provision relating to the relating to the casing program. The rules as to the casing program were drafted and adopted to protect the potash deposits against every possible unknown hazard that might be encountered in the drilling of wildcat wells within the areas. However, we believe the rule does contemplate the multiple use of the land as between the potash operators and the oil operators; and the statutory regulations so specifically provides, that upon the discovery of a new pool within the potash area, new pool rules will be established for that new area.

Accordingly, Sunray has made a study -- I mean, Sinclair has made a study, and proposes new rules and regulations. We adopt and propose Rule R-111-A in its entirety, excepting to certain casing program provisions. And as to those proposed changes, they were designed to meet the specific conditions and the pool characteristics, and to assure both the potash and the oil industry of conservation within the area. I believe you will find that the rules that we propose are not different in any too much particular, than those special rules which the Commission has

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already adopted within the areas, such as in the Teas Pool.

We have two witnesses to be sworn at this time, Mr. Merrill, and Mr. Anderson.

(Witnesses sworn.)

MR. WHITE: Will you mark these as Applicant's Exhibits 1, 2, 3, and 4, please?

(Thereupon the documents referred to above were marked Applicant's Exhibits 1, 2, 3, and 4, for identification.)

MR. WHITE: I might state that Exhibit Number 1 is passed out, but will not be identified by our first witness. It will be identified by our second witness, but by doing so at this time, it might be of some help to the Commission.

H. A. MERRILL

a witness, called by and on behalf of the Applicant, having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Mr. Merrill, will you state your full name, please?

A I am H. A. Merrill.

Q By whom are you employed, and in what capacity, Mr. Merrill?

A I am district geologist for the Sinclair Oil Company.

Q Have you made a study of the area concerned in Case Number 1841?

A I have.

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Q Will you refer to what has been marked as Exhibit Number 2, same being a structural map, and explain that, please?

A Exhibit Number 2 is a structural plat of the area, centering around the Sinclair Oil and Gas Number 1, State 886, Yates Oil discovery in the Southeast of the Northwest, Section 16, Township 27 North, Range 33 East.

The plat shows the structure on the top of the Yates formation, contoured in a 50-foot interval.

Q Now, what conclusions do you draw from this exhibit, Mr. Merrill?

A This structural map indicates a west flanking dip in the Teas area, to a point well below the top of the Yates in the discovery well. We also find an east dip in the Salt Lake area, also to a point below the Yates in this well. Now, that would tend to indicate that we have structural separation between these three areas, and the discovery well would be on a separate structural trap.

Q Separate and apart from the other two pools that you have noted on the plat?

A That's correct.

Q Mr. Merrill, how many wells do you believe will be drilled on 40-acre units, to fully develop this discovery pool?

A With our knowledge of this discovery well, in which we have an 86 foot gross oil column now open, we would project the present lower limits of production at approximately a 500-foot



contour interval, and within this area there are approximately twenty-five 40-acre tracts.

Q And what is your basis for this conclusion, as to the number of wells?

A In any structural trap, ordinarily, the limits of approximate production would be the point where the highest zone of porosity would plunge into the zone of oil contact. And, at this time, we still have no oil-water contact in this well, but the present 86-foot column would project it out to the 500-foot contour interval.

Q When the water-oil contact is determined, is it not possible that there may be more wells drilled within the area?

A That's correct. Any additional section would tend to enlarge the area of production.

Q What amount of oil column do you have in the discovery well?

A From our uppermost perforation at 3146, to the lower perforation at 3232, 86 feet.

Q Now, will you explain what is noted by the long broken line denoted "A" and "A-Prime". What is that?

A That line indicates a cross section that we have made through this area, which will be introduced as Exhibit Number 3.

Q Have you personally testified before the Commission, in your professional capacity as a geologist?

A Yes, I have.

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Q And have your qualifications been accepted?

A I believe they were.

MR. PORTER: Yes, sir.

Q (By Mr. White) Now, will you refer to Exhibit Number 3, and explain that to the Commission, please?

A This is the cross section previously referred to; it extends from West to East, from the Salt Lake area, through the discovery well, on to the Teas Pool.

Q Now, will you tie that in with Exhibit Number 2, as to "A" and A-Prime?

A A. A-Prime; East to West cross section.

Q All right. Now, continue, please.

A This is an electrolog, sample log cross section, showing the formations penetrated from the base of the Salt down into the ~~sedimentary~~ formation. We have the base of Salt, top of Tansill, indicated at this point (indicating). The second line is the top of the Yates formation, and the lowermost line is the Seven Rivers top.

Q Does the exhibit show anything else, such as an oil-water contact in the Salt Lake Pool?

A In the Salt Lake Pool, we have the approximate oil-water contact data of +425; to the East in the Teas Pool, the oil-water contact is approximately +225.

Q Is there any correlation between the Salt Lake Pay, and the discovery well?



A As indicated on this section, the Salt Lake Pay, and the zone we now have open in the discovery well, appear to be correlative.

Q And do you have any comment to make as to the pay in the Teas Pool?

A The Teas Pool Pay is slightly thicker, due to the fact that there is a Seven Rivers Pay open in that area. And, also, the uppermost Yates sand pay in this area has not been tested in the discovery well.

Q Does this exhibit confirm your conclusion that the discovery well is in a new discovery pool?

A This cross section also indicates the West flank dip in the Teas area, down through the oil-water contact at +225. In the Salt Lake area, you have the East flank dip, also down to their oil-water contact +425.

The relationship shown here would indicate three separate structural traps.

Q I believe you stated that the upper zone of the Teas Pool has not been tested, is that accurate?

A We do have a drill stem test on that zone, which was present from 3,060 to 3,070. The drill stem tests in some of these low pressure reservoirs are not conclusive.

Q Now, will you refer to Exhibit Number 4, please, and state what that is?

A This is a Gamma Ray Sonic Log of the discovery well,



on which we have indicated the formation tops in a generalized sample description.

Q Hold up just a moment, until the Commission gets their exhibit on that.

A The first formation top which we have identified on this log, is the base of the Chinle and top of the Santa Rosa sand, this is at 570. The next formation, the Dewey Lake, at 735; and Rustler at 1197; our top of Salt at 1337. The base of Salt, and top of Tansill, at 2776; the top of Yates at 2946; and the Seven Rivers formation --

MR. PORTER: What was that top of Yates?

A 2946.

MR. PORTER: Thank you.

A -- Seven Rivers formation at 3235. Now, this well was completed in the Yates formation; four zones were perforated, from 3146 to 3162; from 3168 to 3176; from 3195 to 3198; and from 3220 to 3232.

The well potential was very decisive. From the lowermost set of perforations, after treatment with 500 gallons of mud acid, averaged a potential of 586 barrels of oil per day by swabbing.

Q Now, did you later do additional perforation?

A Yes, the upper three sets of perforations were later tested. The zone from 3195 to 3198 was tested, and it swabbed 98 barrels of oil in four hours.

Q Is that new oil?

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A New oil.

MR. PORTER: Ninety-eight barrels in four hours?

A Correct.

Q (By Mr. White) And then did you do additional perforation work?

A The upper two sets of perforations were tested together, and after 500 gallons of mud acid, the zones swabbed 198 barrels of oil in five hours.

Q And was that new oil?

A Yes, it is.

Q Mr. Merrill, do you consider this as being what we consider a good well?

A I believe for this area, in this depth, it is a very good well.

Q How does the productivity of this well compare with those in the Teas and Salt Lake Pool?

A The strongest wells I know of in the Teas and Salt Lake area, would have been approximately 250 barrels per day on the potential.

Q And this tested what?

A This lowermost zone was 586 barrels per day.

Q Will you again refer to that exhibit and state whether or not there are any water reservoirs?

A Well, this was a rotary test, and we have no definite knowledge as to the water encountered in the shale formations in



this area, on this particular well.

We did make a study, however, on the cable tool test in this area, and tried to project the water in those tests, as to the zone they would occur in our well.

Q Will you give us those zones, please, and the depths?

A With one exception, we found that the water formation occurred above the top of the Dewey Lake formation.

Q At what depth level?

A On our level, 735 feet.

Q Was there any fresh water within that area?

A I don't believe there is.

Q Any salt water?

A This ordinarily is salt water, in these beds (indicating).

Q Could you be more specific as to where the water-bearing sands are?

A We found that the Santa Rosa formation carried water on a number of the cable tool tests, occurring in our well between 570 feet and 735 feet. Also, the area at numerous depths shows water formation in a zone which would correspond to the upper Chinle sands, which in our well would be between 400 and 500 feet.

Q Were Exhibits Numbers 2, 3, and 4 prepared by you, or under your direction?

A Yes, they were.

MR. WHITE: At this time we move to admit Exhibits



2, 3, and 4.

MR. PORTER: Is there any objection to the admission of those exhibits, Mr. Walker?

MR. WALKER: No objection.

MR. PORTER: The exhibits will be admitted into the record.

MR. WHITE: That's all the questions we have on direct examination.

MR. PORTER: Does anyone else have a question of the witness?

MR. WALKER: If the Commission please, Mr. Walker.

CROSS EXAMINATION

BY MR. WALKER:

Q Mr. Merrill, did I understand you correctly, that your company presently proposes the possible drilling of 25 additional wells in this area?

A I believe I stated that the limits of production, the areal limit, would include 25 to 28 locations.

Q Now, do you definitely know the limits of this pool? Can you state it with any degree of certainty, the outside limits of this pool, at this time?

A At this time, we have indications that the 500-foot contour is a minimum of the area to be covered.

Q And you do not have any opinion as to the maximum?

A At this time, we have no way.



Q Is it possible, Mr. Merrill, that you might be getting some production from the Seven Rivers formation?

A We have reported the Seven Rivers formation at 3235 feet, I believe, and our lowest perforation would be three feet above that formation.

Q Well, would it be possible, then, that you could be getting production from Seven Rivers?

A It is possible, I think.

Q Mr. Merrill, I believe you stated that there are three separate structural traps in this general area, is that correct?

A That's correct.

Q Would you normally consider that you might encounter different problems and different situations in this present pool that your discovery well is in? I mean, different problems than in the others, the Teas Pool and in the Salt Lake Pool?

A I would think so.

Q Is it possible, Mr. Merrill, that you might get high pressure oil or gas, or water pressures, that would be in excess of the hydrostatic weight of your drilling pools in this area?

A We had no indication in this discovery well.

Q Is it possible that you could encounter such a problem?

A I don't think it is probable.

Q Is it possible?

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A It is possible.

Q In drilling a discovery well, Mr. Merrill, what was the depth of the surface casing string?

A Eleven hundred and ninety-nine feet.

Q And what was your test as to the depth of the top of the salt formation?

A I believe it was 1337 feet.

Q Did I understand you correctly then, that your surface casing is not set on the top of the salt formation?

A It is set above it, it is not directly on the top of it.

Q Was a salt protection string placed in this discovery well?

A No, there was not.

Q Could you explain why a salt protection string was not set, in conformance with R-111-A?

A I believe the casing program on this well was proposed by the production department, and I believe our next witness will explain that.

Q Well, let me ask you this questions: At the time you commenced the drilling of this discovery well, did you anticipate hitting the Yates formation?

A We knew we should drill through it, yes.

Q You knew you would drill through it; and at that time, were you aware that there was production a mile and a half to the



East out of the Teas formation?

A Yes.

MR. WALKER: We have no further questions.

REDIRECT EXAMINATION

BY MR. WHITE:

Q Mr. Merrill, you were asked if it is possible that the production might be from the Seven Rivers, and you said that it was possible. From your study and your knowledge of the operation, is it your opinion that the production is from the Yates, or from the Seven Rivers?

A It appears to be entirely from the Yates.

MR. WHITE: That's all we have.

MR. PORTER: Does anyone else have a question?

QUESTIONS BY MR. NUTTER:

Q Mr. Merrill, this application is for the creation of a pool, and establishment of some pool limits for the pool. What do you recommend, from a geological standpoint at least, as the horizontal limits of the pool?

A At this time, I believe the 500-foot contour line would be the limits of production.

Q Now, what is that 500-foot contour line actually based on? How many wells do you have for control, in drawing that 500-foot mark?

A The discovery well only, and the thickness of pay in that well.



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MR. NUTTER: Thank you.

MR. PORTER: Anyone else have a question of the witness?

(No response.)

MR. PORTER: You may be excused.

(Witness excused.)

R. M. ANDERSON

a witness, called by and on behalf of the Applicant, having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Will you state your full name, please?

A R. M. Anderson.

Q And by whom are you employed?

A Sinclair Oil and Gas Company.

Q And in what capacity?

A Senior petroleum engineer.

Q Your qualifications have been previously accepted by this Commission?

A Yes, they have.

Q Are you familiar with the subject area, as pertains to this case?

A I am.

Q Have you made a study of, and have you prepared a set of proposed pool rules, governing this discovery area?



A Yes, I have.

Q For a moment, will you refer to Exhibit Number 1, and explain that to the Commission, please?

A Exhibit Number 1 is an area map, reflecting the ownership of the oil and gas leases in about a 10-mile radius of the discovery well. The discovery well is indicated by a red arrow, and it is located near a highway, which is shown running diagonally across the map, and that is the Hobbs-Carlsbad highway, the well is approximately half way between those towns.

The acreage colored in red on the exhibit, is the Sinclair operated acreage, and indicates our interest in the area.

The orange outline indicates the Potash Oil area, as presently defined by the Commission in their order, R-111-A. There are two Potash Oil areas shown on the map. There is a smaller one located in the southern portion of the map, in addition to the large area in the vicinity of our discovery well.

Q Mr. Anderson, do you, by chance, know who holds the potash under the discovery well?

A Yes, I understand it is the United States Borax and Chemical Corporation, formerly known as the United States Potash Company.

Q After you drafted your proposed rules, did you have an occasion to meet with these operators, with the view of discussing the proposed rules with them, learning what their problems were, and endeavoring to meet on a common ground, or have a meeting

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of the minds?

A Yes.

Q When did you hold such a meeting?

A December 22nd, we had a meeting in Carlsbad, in the offices of the United States Borax and Chemical Company, at Sinclair's instigation. And present at that meeting were technical representatives from The Potash Company of America, The International Mine Company, I believe, the United States Geological Survey, and of course, United States Borax and Chemical Company, and Sinclair. And, at that meeting, I discussed with those gentlemen, and fully explained our proposed casing program for the discovery area.

Q What was the result of the meeting?

A And, I asked them if they had any -- if any objections occurred to them at the meeting, that I would like to discuss them with them, in an effort to possibly modify our problem here before the Commission, if possible.

They advised me that they would take my recommendation under consideration, and that they would advise me if they had any objections. And, United States Borax and Chemical Company did subsequently advise me that they objected to our program, but, however, they did not advise me specifically why they objected.

Q Now, will you refer to what has been marked as Exhibit Number 5.

A Exhibit Number 5, you can see, is a Caliper Log

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on our discovery well; and the purpose of Exhibit 5 is to show the Commission the nature of the bore hole behind the casing, that being the area where the cement will go, and that being considered of considerable interest to the Commission.

Q Mr. Anderson, may I interrupt? Do you have a separate copy of that exhibit?

A Yes.

Q I would like to turn one over to the State Engineer's office.

A This caliper log was run after surface casing was set at about 1200 feet. And, starting at the top of the exhibit and coming down, on the well at the top we see the scale. The lines to the left of the exhibit are indicated as 10-inch diameter hole, and all the way across the scale is 20-inch diameter hole. And, we see that as we drilled out below the surface pipe, at about 1200 feet we had an enlargement of the hole there to about 20 inches, and the vertical lines, each of those scores represents ten feet, so we have about a 30-foot enlargement there. And then, the hole narrowed down to about 13 inches, and at this point I might state that the vertical line, the **heavy** vertical line on the left portion there, platted at about twelve and a quarter inches, is the bit size. That is, just mechanically, that's just the bit size. That was not measured by this caliper, but that is put there as a reference, so you can see how the hole size compares with the bit size. So, at about 1100 feet, the hole is approxi-

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mately three-quarters of an inch larger than the bit.

We have another enlarged area, down to about 1410 feet, and then from that point on down through the Salt section, to the base of the Salt, at about 2780, we have a remarkably uniform hole, approximately 14 inches in diameter. We see no washed out areas down through the Salt section. We are particularly interested in that point at 1850 feet.

It is my understanding from the consultation with the potash people, that the potash mineral deposit occurs at 1850 feet in this well, and it is five and a half feet thick, extending from 1850 to 1855½ feet; and we see at that point that we did not have a washed out condition in the well. In fact, the caliper indicates the hole size was even smaller in drilling through the five and a half foot potash deposit.

Incidentally, that potash deposit is also depicted on our previous exhibit, Number 4, the Sonic Log on the well, and the sample log on the well. It is recognized there, I'm advised, by the radioactivity kick at 1850 feet for about five feet, indicating on that log to be about five and a half feet thick, also.

That's about all the comments I have on the caliper.

Q Has this exhibit shown that you can drill a good clean straight hole in this particular area?

A Yes, it does. It indicates that down through the Salt section, we have a very uniform hole, with no porosity.

Q And does the exhibit help you also in determining

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the amount of cement that should be run behind the pipe?

A Yes, this type of hole lends itself to theoretical calculations of cement required, and I believe it is because of this the hole is in very good condition.

Q Now, your rotary casing program is set forth on Exhibit Number 6. Will you refer to that and explain it in detail to the Commission?

A Exhibit 6 was prepared to illustrate the Sinclair proposal for the rotary drilling program. And, I have sketched what the casing program on the well would look like, if it were drilled in conformance of Order R-111-A, on the left side of the exhibit. On the right side, I have shown the Sinclair proposal, as a matter for comparative purposes.

Now, the exhibit shows on the lefthand sketch, that R-111-A would require surface pipe to be set at about 1300 feet in this area. And I believe that the purpose of Rule R-111-A, which is an exploratory test rule, is to protect against all eventualities that you might find in the Potash area, and it is my understanding that water has been found in the Lynch area; and the Lynch area is located some eight or ten miles from the discovery well, and is on the extreme East side of our Exhibit Number 1.

And so, for wells drilled down in that area, it might be necessary to have -- to protect against rust or water. And another reason for requiring the long string of surface pipe, I believe, is that this rule applies both to cable tool program and to rotary

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program. And, if in drilling with cable tools you must case off all water that you encounter, in order to drill ahead with a reasonably dry hole, then our rotary program does not have to protect against the influx of water into the bore hole, as we are drilling the well, as we have the bore hole full of salt water much more saturated than what occurs in nature, and such influx would not be detrimental to the operation in any way.

So, I have recommended surface pipe to be set at 600 feet, as compared to the 1300 feet. The reason for that is that there is a casing problem above 600 feet, up in the Chinle formation and above, and we are setting surface pipe there to protect against any caving or sluffing off in that area during the drilling operation.

Q Well, why did you dispense with the salt protective string?

A The salt protective string is again, in my opinion, a cable tool requirement. It is a requirement that is necessary to cable tool drilling, in the event that you would drill into a high pressure oil or gas sand and have to shut the well in at the surface, you would put that high pressure to offset the Potash section.

However, in drilling a well with rotary tools, we would have a hydrostatic column in the well of sufficient weight to offset any expected pressures that might be encountered and drilled into. And thus, would confine the oil and gas to the formation



that it occurred in, simply by having a higher pressure in the well bore than what occurred in the formation. So, we have, in our rotary program, recommended that we don't have to set a salt protection string on top of the pay, before we dry-drill into the pay.

Q What is the gas-oil ratio, as to this particular well?

A Approximately a hundred cubic feet per barrel.

Q And what would your hydrostatic pressure be in your drill stem?

A In drilling the well, we would have two different fluids in the well bore; in drilling down through the salt section, we would be drilling with a saturated salt solution, and at that time we would have a hydrostatic head of approximately half a pound per foot of depth, and, at the base of the salt, that would be about 1400 pounds hydrostatic head.

At the time we would mud out, after drilling through the salt, we would mud up with the chemical muds, making a salt mud, and that would increase the weight of the drilling fluid, and we would then drill ahead into the pay zone. At the time of encountering the pay zone, about 400 feet below the base of the salt, we would have a hydrostatic head of some sixteen or seventeen hundred pounds. And the pressure that we measured with a bottom hole pressure instrument in the discovery well, was 1170 pounds.

MR. PORTER: Was that in the Yates formation?

A Yes, sir, that was the pressure measured with all of



the perforations open in the well bore, the present perforations open in the well bore.

Q (By Mr. White) Mr. Anderson, is there any likelihood of encountering any high pressures in this area?

A No, sir, I consider it very unlikely that we would encounter high pressures in the area; and that is based upon a study of a considerable number of wells that have been drilled throughout this area, as reflected by our Exhibit Number 1. In no instance has high pressure been reported, and in only one or two instances in the Teas Pool area have wells been completed with sufficient bottom hole pressure to flow. All of the other wells have been completed with pumping or swabbing potentials, the same as our discovery well.

Q Will you state what you mean by the total well cost being \$41,196.00 against \$34,225.00?

A On the basis of Exhibit 6, I have placed the cost of drilling a well, as shown on the exhibit, and we see that there is approximately \$7,000.00 difference in the two costs. To drill a well under Order R-111-A, would require \$41,196.00; and to drill a well under the Sinclair proposal, would cost \$34,225.00. Now, the difference in those costs is partially accounted for by the fact that in order to run a salt protection string, larger surface casing must be set.

Under R-111-A, we would have to set surface casing of ten and three-quarters inch, in order to permit the setting

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of seven and five-eighths salt protection string, which in turn would permit the drilling out from under, and the running of four and a half inch oil production pipe. And I have compared these costs on the basis of both wells being finished with four and a half inch oil production pipe. We are permitted to set seven and five-eighths inch surface pipe under the Sinclair proposal, as we don't have to set the salt protection string.

Q Assuming 25 wells to be the minimum that would be drilled within this area, what saving would that amount to?

A That would amount to a savings to the operators of approximately \$175,000.00. And, if there are more than 25 wells, as our structure map indicates there is likely to be, why the savings, of course, would be greater.

Q Now, will you again refer to your exhibit and explain the cementing program that you propose?

A Order R-111-A requires that the cement on the surface pipe be circulated back to the surface; and our cementing program for our surface pipe is identical.

R-111-A requires that the cement on the oil string be circulated back to the surface, and in that cementing requirement, we vary in that we are recommending that the cement only be circulated back up into the surface pipe a distance of 50 feet.

Q Is there anything further you wish to explain as to Exhibit Number 6?

A I would like to say at this time, that we do want



to get permission to drill through the pay formation, and set pipe on the bottom, and produce the well through perforations, and there are many advantages to that type of operation. It results in economic savings in future workovers and remedial work. It also permits more effective utilization of the pay zones, in more effective depletion of them. And, in very many instances, and possibly in this same area, it is possible that these zones could be behind the pipe, and prevent waste occurring from that source, in that we would only perforate and open our known pay zones.

Q Will you state some of the advantages of setting the casing, and then perforating that as you go through the pay?

A Well, there are five or six main advantages. It permits selected testing, and therefore better evaluation of your well. It also permits selective treating, and therefore, more effective treating of the various zones. It permits leaving undesirable or questionable thief zones, or water zones, behind the pipe, and not turning them into the well bore. It permits effective gas or water shut-off operations. It is easier to plug back more effectively. It permits the orderly depletion down the line of all the zones; in other words, you would start out with your flush zones, and when you have depleted those, you could go back and deplete the tighter zones, such as this, the zone that we have behind our pipe now, we intend to come back to that at a later date and deplete it.



So, it ~~permits~~ more orderly depletion in some areas; and in this area, there is a possibility that the open hole completions might result in some cavings, and of course, our plan would prevent any cavings coming in the well, and save any workover expense from that standpoint.

Q And it is your opinion that the hydrostatic head in the well bore, will confine the oil and gas in the gas reservoir?

A Yes; certainly, there is a large difference in hydrostatic heads.

Q And also any water that you might encounter in any water zone?

A Yes; I believe there is no history of artesian waters in the area, and I believe that our drilling fluid, being a heavier salt water than what is in the formation, would probably confine that salt water to the formation during drilling. In any event, it would present no problem, in that we are drilling with salt water and salt water mud.

Q In your opinion, will the drilling fluid be heavier than the pressure you might be encountering in the area?

A Yes. Yes, I believe it would. All of the cable tool wells in the area, I should say, none of the cable tool wells in this area, and there are many of them, reported artesian water flowing at the surface when they drilled into these water zones. Therefore, it would lead me to believe that pressures in those zones are less than the hydrostatic head of salt water that we



would be drilling with, saturated salt water.

Q Would you expect subsequent wells drilled in this area, to have less pressure upon completion of them, than the discovery well?

A They certainly would have no higher than the discovery well pressure, 1160 or 1170 pounds; and depending upon the stage of pressure depletion at the time that subsequent wells are drilled, the pressure would be somewhat less, I would anticipate.

Q Do your proposed rules cover any additional safeguards than those contained in the present rules, R-111-A?

A Yes, I believe that our rules present even greater safeguards than R-111-A.

Q Will you state in what respect?

A I believe that, if I may answer that question when we finish with the next exhibit, the cable tool program, I believe it is more apparent --

Q All right.

A -- on that.

Q Refer to Exhibit Number 7, and explain that, then.

A Exhibit Number 7 is the same type of exhibit as Exhibit Number 6, only it is the cable tool casing program, and I have set it up the same way. Drilling under Order R-111-A, is shown on the left of the exhibit, and Sinclair's proposal is on the right.

Q May I interrupt at this moment, and ask: Is it not

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true that under Order R-111-A, the casing program for the rotary drilling is the same as for the cable tool?

A Yes, that's correct.

Q Now, continue, please.

A I have shown on this Exhibit 5, two additional strings of casing, and I have shown --

MR. PORTER: I believe you intend to refer to Exhibit Seven?

A Exhibit 7, thank you. -- two additional strings of casing, which are shown dashed on the exhibit. These additional strings of casings are required in cable tool drilling. The first string is normally set through the red beds, or to the red beds, and the purpose of that string is to shut off any surface water, fresh water, that might occur in the area. And the purpose of the second string is to shut off the upper water which occurs between four and five hundred feet. Mr. Merrill testified to that on his Exhibit Number 4, the Sonic Log and the sample log. And also, it is considered, called a "cave" string, in that it protects against the cavings, that is the same thing I am trying to protect against on the rotary program.

Then, the surface casing is the same as required under the rotary program, about 1300 feet; and the salt protection string, likewise. And you are permitted, after setting the salt protection string, to cable tool drill into the pay formation and cut your salt protection string, remove it from the well, and run your oil

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production string and cement it then back to the surface, under R-111-A.

And in that regard, if you were to have drilled into the Sinclair discovery well with cable tools, you would have filled the hole almost to the surface with oil; and when the salt protection string, if it were cut, and this is under a cable tool program, we drilled our discovery well with a rotary, but under the cable tool program, if you were to cut the salt protection string, you would then be placing the oil on the potash deposit directly during the time it takes to run your oil string, and I don't believe that that short contact would be in any way detrimental to the potash deposit. However, neither of the Sinclair proposals would permit that feature to happen, and therefore, I say our proposals offer even more protection in that respect than does R-111-A.

To continue, in the Sinclair proposal on the cable tool program, we are recommending the same proposal as written for the Teas Pool. And that would require surface pipe set at about 800 feet, which is through the Santa Rosa, which is the lower water producing sand in the area, and into the Dewey Lake formation. We would circulate cement behind that pipe to the surface, after pulling the two upper strings that are shown dashed on the exhibit. Then we would cable tool ahead down to the top of the Yates formation, and we would set our oil string at the top of the Yates.

And I would recommend that we be given the same latitude

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here, that we tack that oil production string until we have drilled into the Yates and have established the production. And then, at that time, come back and circulate cement back up into the surface pipe at least 50 feet. I ask for that option, which is the same option, I believe, that has been granted in the Teas Pool rules. And the cement requirement as to the circulating back up 50-feet into the surface pipe, is the requirement in the Teas Pool rules, so we ask for that option. If we were assured of production, we would cement the pipe before we drilled -- cement it back up into the surface pipe before we drilled into it.

Q What savings would be encountered under your proposal?

A Cable tool drilling this well, under Order R-111-A, would cost \$43,127.00. Under the Sinclair proposal, under the Teas Pool rules, it would cost \$33,589.00, which is a savings of approximately \$9,900.00 per well.

Q Now, as to your proposed cable tool program, I take it from your testimony, that the OCC has granted similar variations to the rule?

A Yes, they have granted this exact rule in the Teas Pool.

Q I believe I forgot to ask you earlier in the testimony, is the discovery well a flowing well, or is it on pump?

A No, it is a pumping well. It was tested by swabbing, and it is completed as a pumping well.

Q Is there any additional information you wish to tell



the Commission in reference to Exhibit Number 7?

A No, sir.

Q At this time, will you refer to Exhibit Number 8, and explain that.

A Exhibit Number 8 is another diagrammatic sketch. And, I have shown on this sketch what the condition of the well and the bore hole would be after depletion of a producing well, and the plugging and abandonment of the well, in accordance with Rule R-111-A, considering that the wells are drilled under the Sinclair rotary proposal.

The sketch on the left is the producing well, and the sketch on the right is the dry hole, what it would look like. This sketch shows, with regard to the producing well, starting at the bottom of the diagram, that after we have depleted the oil and gas from all possible zones in this reservoir, including any that might be behind the pipe, that we would set a cast iron retainer immediately above those pipes, and we would squeeze cement, under pressure, down through that retainer and into the perforations, and back into the formation. Thus, effectively sealing off the old depleted oil and gas zone from this well bore.

Then, we would have a drilling mud up to the base of the salt, at which time we would spot a cement plug from the base of the salt to the top of the salt, in accordance with Rule R-111-A. We would then have mud up to a point near the seat of the surface pipe.

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Now, by cementing the surface pipe, the oil string up into the surface pipe only 50 feet, we are able to cut the oil string and recover it during the plugging operations. We will recover the top 550 feet of the oil string. And, in order to protect against that cut, we would spot a 100-foot cement plug 50 feet below the cut and 50 feet above the cut, thus preventing the possibility of any migration of fluids by virtue of that cut.

Q. Including water?

A. Including water. And of course, the surface would have a cement plug at the surface, and steel markers as required by the Commission. In the case of a dry hole, we would in that case, come up to the base of the salt and spot a cement plug all the way back up, and tie it up into the surface pipe, which would have been set at 600 feet. Therefore, effectively shutting off any water zones that might have been encountered in the drilling.

Q. Mr. Anderson, what are Sinclair's intentions as to further development in the immediate future, within this area?

A. We have a requirement to drill, an obligation to drill in this area, and we are very anxious to get approval of this program so that we can go ahead. We have been holding up on the second well, pending the outcome of this hearing; but we intend to diligently drill ahead and develop all of the acreages as shown in red on Exhibit 1.

Q. Have you tabulated the various instances where the Oil Conservation Commission has granted variations or exceptions



to the Rule R-111-A within the Potash area?

A Yes. I have made a study of the Commission orders file, and I have found where practically all of the **modifications** that we are asking **for** here today, have been granted by the Commission in several instances before.

Q Do you have sufficient copies that you might pass out to the Commission?

A I didn't prepare that in exhibit form, but I believe I do.

Q Well, refer to your own and continue then, please.

A Our proposal that varies from Potash Oil Rule R-111-A, with regard to setting only 600 feet of surface casing, instead of 1300 feet, has been granted in numerous other instances. As shown on the righthand side of this tabulation, in the Teas Pool, they require surface casing to be set through the Santa Rosa, which in this pool would be found at about a thousand feet, it would require about a thousand feet of surface pipe. And, R-111-A in the Teas Pool area, would require 1400 feet of surface pipe. And, over in the Lynch-Yates Pool their rotary rule requires only 80 to a hundred feet of surface pipe; and the cable tool rule requires that you set through the Santa Rosa, which is the same as the Teas Pool. Our 968, our 999, and our 1021 are individual well exceptions, and they don't require any surface pipe to be permanently installed; they provide for use of several strings of pipe, **in** cable tooling the hole, but they permit the pulling of

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all other strings, and the cementing of the oil string back to the surface. So, they dispense with the need of any surface casing. And, Order R-1282 is an individual well exception, and requires 70 feet of surface casing.

All of the above instances just mentioned, have also permitted the elimination of salt protection string in these known drilling areas. The requirement that permits you to bring the oil strings, cement up into the surface casing 50 feet instead of circulating to the surface as required by R-111-A, has been granted in the Teas Pool rule. And then, to drill into the pay without first setting a salt protection string, has not previously been granted; however, as I stated before, R-111-A does permit the cutting and the removal of that salt protection string, thereby opening the well bore to the oil and gas zone at the same time as the Potash zone, which is the same situation, I feel, as we are asking for here, as we are drilling into a known area where we have enough information on.

Q And your rule is actually an additional safeguard, as to what hazards might be encountered by cutting and pulling the casing?

A Yes, sir. As to that, any time that you work on a well, and cut casing and pull casing and what not, there is an element of risk involved, and of course, we are saving that much risk by eliminating the need for all of that well work.

Q Mr. Anderson, where is this closest Potash operation,

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within or near the discovery area?

A I am advised that there is a Potash mine in Section 21, Township 20, Range 32, which is approximately six miles West of the discovery well, and that this mining operation is by another company other than the one that has the potash lease under our discovery area.

Q Were exhibits 1 and 5 through 8, prepared by you, or under your supervision?

A They were.

MR. WHITE: We offer Exhibits 1, and 5 through 8, into evidence at this time.

MR. PORTER: Without objection, Exhibits 1, and 5 through 8, will be admitted into the record.

Mr. Anderson, would it be Sinclair's intention to drill with cable tools, or rotary tools?

A We are actively drilling the area with both types of tools, and the next few wells, at least, we will drill with rotary. However, we anticipate the possibility of drilling with cable tools in the area also.

MR. PORTER: You indicated an element of risk in cutting and pulling your salt protection string. What are some of the dangers that you might encounter by doing that?

A One of the things is, in pulling the salt protection string out of the well, it is possible for it to part, or to slip out of the tool, and drop back down into the hole, and it could

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collapse, accordian, in such a manner that it would be impossible to fish it out. On the other hand, there is an element of risk, you could lose the well, and if you did that, it would be practically impossible to cement that hole back to the surface, to shut off the oil and gas at the bottom.

MR. PORTER: In other words, it would make plugging the hole satisfactorily, impossible?

A Yes, sir. I would like to say that things like that don't happen too frequently, it is a very rare occasion, but there is an element of risk.

MR. PORTER: Mr. Walker.

CROSS EXAMINATION

BY MR. WALKER:

Q Mr. Anderson, when Mr. Merrill was testifying, I asked him a question as to the reason why the salt protection string was not placed in your discovery well. He advised that you possibly could give the reasons behind that. Do you know, and if you know, would you please tell the Commission why that salt protection string was not placed?

A Yes. This well was set up, and as stated on our notice of intention to drill, we intended to complete this well in the Mid-Delaware Sand at a depth of 6500 feet, and that was the objective of the test. We were required to set a salt protection string from 100 to 600 feet below the salt section. We anticipated that we would find porosity in the Yates formation.



In drilling ahead to 7500 feet, we decided that we would drill through that porosity, if it occurred in this well, within that 500 foot range, that R-111-A specifies, and we would drill through it and have the porosity in behind the intermediate pipe. At the time that we drilled into this pay, and discovered it as a new oil discovery, we were drilling with a twelve and a quarter inch bit, preparing to set intermediate casing at eight and five-eighths inch casing, and if I were the geologist, I'd say this: We did not anticipate that we were going to make a well in the Yates.

I don't know whether we were surprised, but we were pleasantly -- it was very nice that we did; so we changed up our well right there. We abandoned our deeper objective, and we set five and a half inch pipe, and at that time we had drilled into it, we didn't know what to do. We considered the problem, we had already drilled into it, had already done the damage, so we contacted the Oil Conservation Commission, and asked them if we could set through it, being as we had already drilled through it and into it; and they approved that under the circumstances, and that's why we didn't set it.

Q At that time that you commenced drilling this discovery well, you were aware of the fact there was a production in the Teas Pool from the Yates formation a mile and a half to your East?

A Yes, sir.



Q Now, referring to the provision of R-111-A, as to the salt protection string, that portion which states that,"provided that such string shall not be set below the top of the highest known oil and gas zone," taking into consideration that requirement, do you feel that at the time you hit the Yates formation, realizing there was production a mile and a half to your East, that you were in a known oil or gas pay zone?

A No, sir.

Q That was your **construction**?

A We considered this a discovery well.

Q I believe, Mr. Anderson, that you stated you might possibly encounter some salt water in drilling additional wells out there. Did I understand you correctly on that?

A Yes, sir.

Q Now, if you encounter the salt water, I believe you stated that you didn't feel you have any problem in maintaining your salt saturation in going through the salt bed, is that correct?

A Yes, sir.

Q Would you normally expect to anticipate any problem of maintaining a potassium saturation, assuming you were getting salt water by your drilling equipment?

A I don't believe that it is very likely that I would get salt water in the drilling fluid. However, I believe that possibly if we got some salt water in the drilling fluid from those



zones, I don't believe that it would be sufficient to dilute the potassium concentration enough to be affected.

Q Is it possible that you could bleach the potassium formation, if you encounter salt water?

A Yes, sir.

Q Mr. Anderson, do you agree that there is a possibility that you might possibly be getting some production from the Seven Rivers formation?

A Yes, sir.

Q Mr. Anderson, are you familiar with any of the problems which were encountered in drilling operations in the Tonto Field, which lies to the Northeast of your discovery well?

A No, sir, I'm not aware of any problems.

Q Do you know from what formation the Tonto Field is producing?

A I believe it is producing from the Yates, or the Seven Rivers.

Q I believe, Mr. Anderson, you stated that, or outlined to the Commission, some of the advantages in setting your production string on the base of your pay zone?

A Yes, sir.

Q Is it possible that this procedure could be followed, and still comply with R-111-A, without exceptions?

A R-111-A permits that procedure, yes, sir.

Q In other words, you could comply with that procedure,

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without any exceptions as to salt protection strings, or surface casings?

A Yes, sir.

Q Mr. Anderson, do you agree with Mr. Merrill, that there is a possibility that you might encounter high pressures, sufficient to overcome the hydrostatic head of your drilling rig?

A Very unlikely.

Q But possible?

A I believe anything is possible.

Q Now, if that situation occurs, what remedies would Sinclair Oil take to confine that pressure if, assuming that the drilling fluid was blown out of the hole?

A In drilling a well, we have on hand weighting material always, and we are prepared for those kind of contingencies. And we always have a lot of circulation material on hand, which before a well would blow out, you almost have to encounter a thief zone too, a zone that is going to take your drilling fluid, to void your hole. And we have, the industry has developed over the years, many safeguards to prevent that; and it is very uncommon for that to happen. Even in drilling through high pressure areas, it is very unusual for a well to blow out.

Q And let me ask you a question this way: Assuming that you did hit a high pressure zone in drilling, that was sufficient to overcome the hydrostatic head of your drilling fluid, is it possible that oil, gas, or water, under pressure, could migrate

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upward into the area in which the salt bed is located, and migrate into the clay seams found in the salt area?

A Yes, sir.

Q That is possible?

A Yes, sir.

Q As far as you know, is that the primary, one of the primary purposes for which the salt protection string provision is made in R-111-A, to prevent such a thing from happening?

A Yes, sir. And I might say further, that the is a self-avowed exploratory test rule, and was necessarily set up to protect against that eventuality. I have now recommended a casing program in an area that we have information on, and it is extremely unlikely, in my opinion, it is almost impossible, to encounter high pressure oil or gas sand before we encounter the pay zone that we are completed in. And in it, which is in the Yates formation, when we encounter the pay zone in the Yates formation, if it is the same reservoir as our discovery well, it is certainly going to have a bottom hole pressure of 1160 pounds or less.

Q Now, assuming that high pressures were encountered in drilling, and the salt protection string had been placed in the hole, would that prevent, or would it be more likely to prevent this oil, gas, or water from migrating up into the --

A Yes, sir.

MR. WHITE: Just a moment. Along this line of these hypothetical questions, as to the remote possibilities of there

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being certain high pressure gas or oil formations in this area, the testimony up to the present is to the fact that there is no high pressure gas or oil formations in this area, which has already been established by the drilling of the discovery well.

Now, on cross examination on these hypothetical questions, we have no objection to it, if Mr. Walker intends to show and establish that there are high pressure areas in this area. If he doesn't, the whole line of testimony is irrelevant and immaterial.

MR. WALKER: Mr. White, I will connect it up.

MR. WHITE: Very well, continue.

Q (By Mr. Walker) Mr. Anderson, you stated that you, at the time you started drilling this discovery well, you did not anticipate encountering production in the Yates formation, although there was production in the Teas Pool one and a half miles to the East, is that correct?

A As I said before, the Yates formation was indicated to be productive in the area, by the Teas and Salt Lake Pools. And while we weren't, I'd say, we weren't completely surprised at finding it, we certainly didn't expect to complete and discover a new oil field in the Yates formation, in drilling this well, in that the Yates formation in the Salt Lake and Teas Pools had been a very marginal formation, and hadn't nowhere exhibited the fine productive characteristics that our discovery well has. So, we were to some extent surprised to discover it.

Q Now, with reference to the exceptions which you have

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previously testified to, did I understand you correctly, or incorrectly, are you attempting to infer, I mean, or to imply, that any form of precedent has been set in this area to the casing requirements?

A Yes, I was attempting to show that after notice and hearing before this Commission, that similar exceptions that I am asking for, have been shown to be feasible and acceptable, and to provide adequate protection to the potash deposits; but I don't expect that fact, however, to be the factor that determines whether those exceptions are granted in our well. Ours is a separate case, and I'm attempting to show pertinent facts in our case.

Q Do you know whether or not, Mr. Anderson, any of those ~~seven~~ exceptions which you have previously testified to, were on lands upon which United States Borax and Chemical has leases?

A No, sir, I don't know.

MR. WALKER: I have no further questions.

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

QUESTIONS BY MR. PAYNE:

Q Mr. Anderson, are the pressures encountered in the Teas Pool in excess of those which you encountered in your discovery well here?

A No, sir.

Q Do you know, of your own knowledge, whether a blowout was encountered in one of the wells in the Teas Pool?



A No, sir, I know of no blowout.

Q Now --

A I might add that those wells were drilled with cable tool, and would have no fluid in the bore hole, air in the bore hole, and if they encountered a gas or oil zone, it could blow to the surface.

Q Now, Mr. Anderson, on your statement here, showing variations from the Potash-Oil rule, it appears that ~~analogizes~~ the situation of drilling into the pay without first setting a salt protection string, to the provision which allows the cutting and pulling of the salt protection string prior to running the oil string. Now, isn't it true that by the time you are ready to cut and pull the salt protection string, you know whether you are going to have a blowout or not?

A Yes, sir.

Q It will have already happened?

A Yes sir.

Q Whereas, if you drill into the pay without first setting the salt protection string, you don't know whether you are going to have a blowout or not?

A In speaking of our particular discovery area -- are you speaking of exploratory test wells, or are you speaking of our discovery area, in asking the question?

Q Well, sir, you propose pool rules for an area which would include some twenty-five 40-acre tracts. So, I am

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interested in, is it the area as a whole, rather than just in the discovery well?

A In the -- with regard to the area, I would say that there is little or not possibility of encountering high pressure oil or gas zones in drilling into the pay. In my opinion, there is little or no possibility, and even if that did happen, I believe that we would be equipped and able to handle the situation, and that no damage would result to the potash deposit.

Q I see. Now, I believe you propose to set your protection string at the bottom of the pay zone?

A Yes, sir. Drill through and set it at the bottom, yes, sir.

Q Now, the pool rules for the Middle Lynch Pool which is in the Potash area, don't allow that, do they?

A No, sir.

Q Do you know why not?

A Now, may -- let me say this. In reading the pool rules for the Middle Lynch area, and for the Teas area, I have given a reasonable interpretation to them; they are not exactly clear. If I were recommending drilling this Sinclair well in those areas, I would, in attempting to comply with that rule, I would set pipe on top of the pay, and then drill into it. However, the rule is not specific in that regard. It is just possible to drill under that rule, and drill through the pay, and set your pipe through, perforate, and produce, it is possible to do it

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that way, I believe, in reading that rule.

Q The rule is somewhat ambiguous?

A Yes, sir.

Q One further question. Mr. Anderson, is this land State land?

A Yes, sir.

MR. PORTER: You mean the entire twenty-five 40-acre tracts will be on State land?

A No, sir; Section 16, which would contain approximately twelve or thirteen of those 40-acre locations is State land. The other locations are on Federal land.

MR. PORTER: About half and half?

A Yes, sir.

MR. PORTER: Mr. Nutter, do you have any questions?

MR. PAYNE: The discovery well was on State land?

A Yes, sir.

QUESTIONS BY MR. NUTTER:

Q Mr. Anderson, referring to your caliper log, Exhibit Number 5, I notice an anomaly there at about 1325 and 1425. How do you account for that?

A Now, that is an indication that the hole size is smaller than the bit size, and that could be occasioned by two different things. What I believe caused that would be the building up of a mud filter cake opposite a porous zone during the drilling operations, after the last time the bit had been run down



and pulled out; the building up of a mud cake opposite a porous formation.

Q This wasn't by any chance a loss circulation?

A No, sir, it was not.

Q In drilling your discovery well, did you encounter any lost circulation zone at any depth?

A No, we did not lose circulation at any depth; we used mud returns when we drilled into the top of the pay zone.

Q Did you use any lost circulation material at all --

A Yes, sir.

Q -- in drilling and completing this well?

A Yes, sir, at that time we immediately -- we had it on hand and introduced the lost circulation material, recovered 100 percent circulation, and went on. I might say that in future drilling, we will have the lost circulation material in the mud prior to encountering that zone, so that there will be no returns lost when we drill into that zone.

Q How long did you lose returns?

A I don't know, a matter of hours.

Q You did lose the return, and introduced lost circulation, and reestablished your --

A No, we never lost circulation. We always had some mud returning to the surface. We always had the hole full of mud; we never lost circulation in drilling the well.

Q But you were adding mud?

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A Yes, we were adding mud.

Q Are there any shows of oil, or gas anywhere in this area, from the Tansill formation?

A Not to my knowledge; our other witness might be able to answer that question better than I can.

Q And then the only Yates production is at least a mile and a half away?

A Yes, sir.

Q I mean Seven Rivers, beg your pardon.

A No, sir, it is Yates.

Q You are producing from the Yates, is it not?

A Yes, sir; so is the Teas Pool, and the Salt Lake Pool.

Q As far as you know, the Seven Rivers production is a mile and a half away?

A Yes, sir.

MR. PORTER: Mr. Anderson, I believe that these pools are open to this formation?

A Yes, sir.

Q (By Mr. Nutter) Now, Mr. Anderson, in looking at your Rotary Program Exhibit Number 6, I notice that the cost of a well under the provisions of Order number R-111-A is \$41,196.00; and the cost of the well under the Sinclair proposal is \$34,225.00. Would you give us a breakdown on those actual costs, including the casing, please --

A Yes, sir.



Q -- particularly casing.

A The intangibles, which include the cost of the drilling contractor, and cost of mud material, and perforating charges, and electrolog, surveys, and cementing services, overhead charges, district overhead, and what not, labor and trucking, and all those, are about the same. Under the R-111-A, I have estimated those to be \$27,328.00. Under the Sinclair proposal, \$24,921.00.

The tangibles, which are your casing, and your Christmas tree -- I don't have a subtotal on my tangibles, I will have to give you those item by item.

Q What I was particularly interested in, now, this R-111-A charge, are you including the cost of that salt protection string there?

A Yes, sir.

Q Are you including the salvage, or deducting a salvaging from that?

A Yes, sir.

Q What does the string cost?

A Figure I am going to leave about a hundred feet of it in the hole, and that's full cost, \$3.03 a foot, would be \$303.00. I am charging for the use of 2800 feet of it that I do get for recovery, and I have charged for the use of that pipe, call it depreciation, if you will, a hundred and fifty dollars.

Q In other words, what you are including at 100 percent value, and then when you pull it out, what value are you giving it

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when you pull it out?

A Normally, the reduction would be 25 percent; I don't know that I gave it that much.

Q How long would that pipe be in the hole?

A I did not give it that much of a reduction, I gave it about a 10 percent reduction.

Q Is it possible to run a four and a half inch pipe to the top of the pay, and then set a liner of some reasonably smaller than the four and a half inch, after you drilled, into your pipe?

A No, sir.

Q Is it possible to set the pipe on top of the hole, and then drill into the pay, and underream and lower your pipe into the pay?

A Setting it on top of the pay without cementing?

Q Yes, sir, laying it on top of the pay, prior to the time you drill into it?

A Well, that is a frequent practice on the cable tool drilling, when you have set water shut-off pipe, or something, and then you drill a little further and find some more water, and rather than set another pipe, you underream it and lower the pipe you have already set. And, of course, you have set that in mud at this depth, 3200 feet; I believe it would be possible. It certainly would be more hazardous than, I believe, than the way I have proposed working with the underreaming tools.

Q What would be the hazard there?



A I believe that it might be desirable on that underreaming, to go to cable tool operations, and there you would have your hole, no fluid in the hole, and you would be underreaming with cable tool operation, and you would have your pipe set there, and you would not have it cemented; and the minute that you moved it, to carry it on down to the pay, you would be exposing behind that pipe any pressures, or --

Q Well, is that advisable for rotary drilling, or not?

A I'm not familiar with that, that is not a usual operation. I don't know of Sinclair in my area, ever having resorted to that operation; I'm totally unfamiliar with it from a rotary drilling standpoint.

From a cable tool drilling standpoint, it would be very undesirable. We probably would rather produce the well as an open hole completion than to do that.

MR. NUTTER: I see. I believe that's all. Thank you.

MR. PORTER: Are there any further questions?

QUESTIONS BY MR. UTZ:

Q Mr. Anderson, I notice you have an area colored here in the S $\frac{1}{2}$ of the SW, is that State land?

A South half of the Southwest quarter?

Q Yes, sir.

A My map indicates that that is State land.

Q Do you anticipate the answer in this area, to be similar to the condition encountered in the discovery well?



A I would say that there would not be too much difference. However, our present structural control and lack of oil-water contact, does not show our reservoir to extend that far at this time. So, as far as oil production is concerned from that tract, I, at this time, I don't anticipate, on the basis of knowledge I have now, that that will be included in the reservoir that we have discovered.

Q In other words, that is going in your drilling program?

A No, sir. With respect to my statement on my drilling program before, we don't simultaneously drill; we will drill out from the discovery well, and extend the field step by step.

Q Are you asking for this exception to apply to this acreage?

A I would like it to apply to the reservoir that we have discovered. And, as that reservoir is extended, as the field, the pool is extended by subsequent drilling, why, I would like these exceptions to apply to the extended area, and to any well that is drilled within a mile of the defined field limits.

MR. PORTER: Any further questions of this witness?

QUESTIONS BY MR. PAYNE:

Q Mr. Anderson, isn't it true that the pool rules for the pool, that have been set up in the Potash Oil area, that those pool rules do not apply to wells within a mile of the pool, that they only apply to wells within the pool?



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A Well, sir, I don't know the answer to your question.

Q Rule 3, of the Middle Lynch-Yates Pool Rules, Mr. Anderson?

A Yes, sir, the Middle Lynch-Yates Pool definitely sets up a large area for those rules to apply to. I don't believe that is true in the case of the Teas Pool.

Q That's correct.

MR. UTZ: That's all.

MR. PORTER: Anyone else have any further questions?

(No response.)

MR. PORTER: The witness may be excused.

(Witness excused.)

MR. PORTER: We will take a very short recess.

(Recess.)

MR. PORTER: The meeting will come to order. Mr. Walker.

MR. WALKER: If it please the Commission, I have one witness.

(Witness sworn.)

THOMAS L. GAMBILL, JUNIOR

a witness, called by and on behalf of United States Borax and Chemical Company, having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. WALKER:

Q Please state your name.



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A Thomas L. Gambill, Junior.

Q By whom are you employed?

A United States Borax and Chemical Corporation.

Q And in what capacity?

A As a junior geologist.

Q What school did you graduate from, and with what degree?

A University of New Mexico, with a Bachelor of Science in Geology.

Q And for whom did you first become employed upon graduation?

A The Office of New Mexico State Engineers.

Q And for how long a period did you work for the State Engineers' office?

A I worked approximately six months as ground water supervisor, for the Lea County Basin.

Q And by whom were you employed after you left the State Engineers' office?

A Gulf Oil Corporation.

Q And in what capacity were you employed by Gulf?

A Subsurface geologist.

Q And for how long a period of time were you there?

A Approximately two and a half years.

Q By whom were you employed upon leaving Gulf?

A United States Borax and Chemical Corporation.

Q And what year was that, sir?



A That was in 1957.

Q Mr. Gambill, you have heard the testimony of Mr. Anderson and Mr. Merrill, as to the proposed pool rules in the Yates formation, upon which this application for exception to Rule R-111-A are made. Do you, of your own knowledge, know whether or not United States Borax and Chemical Corporation has either a State Lease, or a Federal Permit for potash on land embraced within this proposed area?

A Yes, we do. We have State Leases. Our land tenure is outlined in red on the map on the board; that consists mostly of State Leases, with one Federal Potash --

Q You are now referring to Exhibit 9 --

A Yes, sir.

Q -- on the board. And who prepared that exhibit?

A I prepared it.

Q Mr. Gambill, do you know, of your own knowledge, whether or not there is commercial ore under that portion of the land which Sinclair proposes to drill in this pool?

A Yes, I do.

Q What is the source of your information that there is commercial ore in that area?

A My company has drilled a potash core test, at a diagonal offset North of the Sinclair discovery well. This core test was drilled some time previous to this.

Q Do you have any other information, other than your

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company's core test?

A Yes, we do. We have ascertained from other companies, which also have operations and leases within this area, just what their ore -- what ores have been encountered in their core tests in this area.

Q Do these tests indicate that there is commercial ore in this area?

A Yes, sir, they do. Our core test in the immediate area, had five foot five inches of 17.58 percent K_2O silica.

Q And does that meet the standard fixed by the United States Geological Survey for the purpose of determining the presence of commercial ore?

A It is considerably in excess of that. The United States Geological Survey's minimum is four foot of 4.

MR. PORTER: What was this percentage that you had?

A We had 17.58 percent.

Q (By Mr. Walker) Mr. Gambill, had you calculated the approximate value of the commercial ore that would be the gross recoverable value of ore under the area proposed and approved by Sinclair, assuming 90 percent extraction?

A Yes, sir, I have. On 1,000 acres, or 25 locations in this area, and information we have, 90 percent net recovery on mining, 90 percent recovery on milling operations, and that value of the ore would be \$78,000,000.00, approximately.

MR. WHITE: Is that the net value --

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A Yes, sir.

MR. WHITE: -- or gross?

A It is gross.

Q (By Mr. Walker) Now, if 25 wells were drilled in this area, what percent extraction would you anticipate the company could make?

A We could possibly count on making an extraction of not more than 40 percent recovery. This would be to eliminate any **subsidence** within the area.

Q Now, there are rules of United States Geological Survey which require you to stay a certain distance away from wells, as to the **subsidence**?

A Yes, sir, I believe there is?

Q Now, in the event that only 40 percent extraction was obtained on this ore, what would be the gross recoverable value?

A Again, assuming a 90 percent mill recovery, it would reduce the gross value to \$28,000,000.00.

Q Mr. Gambill, are you acquainted with the Tonto Field which lies to the North and East of Sinclair's discovery well?

A Yes, sir, I am.

Q Referring to Exhibit 9, will you indicate the location of Sinclair's discovery well?

A Yes, sir, it is the well circled with the green circle.

Q And would you now indicate the location of the Tonto



Field?

A Yes, sir, it is this small one right here.

Q Mr. Gambill, do you know, of your own knowledge, from information received by you, from what formation they are producing in the Tonto Field?

A They are producing from the Seven Rivers; the Yates was very thin in that area.

Q Do you know whether or not there were any high pressure gases encountered?

A Yes, sir, there was.

Q Would you generally tell the Commission the procedure in drilling up there, and the various problems encountered by them?

A All right. Generally speaking, there was only one well in that Field for some time, a Texas Company well. It had a low gas-oil ratio, it is my understanding, and finally went to water. Sometime later -- well, to backtrack, during the time that that well was producing, several offset wells were drilled. All of these offset tests were dry holes, and they had either no gas, or a very slight show. They were all drilled with cable tools, I believe.

Some time after the abandonment of the well, Mr. T. J. Sivley drilled in that area; he discovered production, evidently from the same zone as the Texas Company well, in his Number 1 Well, which is located 98 feet from the South, and 495 feet from the East line of Section 22, 9, 33, which is to the North of the



Texas Company well. In this well, which was drilled with cable tools, he encountered gas above the normal pay zone. This gas was cased off and utilized, and between the hole and the casing was filled with mud. At some time after this casing off, I didn't ascertain the exact time lapse but it must have been short, the gas blew all of the mud out of annular spacing. The gas was measured at 428 MCF per day. Later, an estimated thirty million cubic feet of gas was encountered below this zone, between 3472 and 3532. The top of the pay in that well was at 3536; it had an initial potential flowing of six barrels of oil a day. In subsequent tests, there was very little or no gas encountered also.

Q Mr. Gambill, what was the source of your information as to the problems encountered by Mr. Sivley in drilling that well?

A These were from scout check sheets.

Q Mr. Gambill, in your opinion, would you normally encounter such high pressure gases as were encountered by Mr. Sivley in drilling into the Seven Rivers formation?

A I don't believe you normally encounter such high pressure gases.

Q Mr. Gambill, would you tell the Commission in your own words, the reasons why United States Borax and Chemical Corporation opposes any exceptions to R-111-A in this area, upon the application of Sinclair?

A Well, my company believes that Order R-111-A provides us some measure of protection against contamination of the



potash bearing ore zones from oil, gas, or water. We feel that any contamination of our potash zones, or any of the salt bearing formations immediately above or below, would be -- well, you could term it disastrous to the mining within that area.

This ore, even though it is ore, is a very relatively low grade. Now, the potash industry has been plagued during the last few years with rising costs of labor and production, and lowering costs of our finished product. Therefore, our margin of profit is quite low. Now, we feel that this area could be mined with a slight margin of profit, and with declining ore reserves, it is possible that it will be mined. However, if there were any additional hazards, such as, and especially charged with gas, and possibly oil, we feel that possibly we could not afford to take the risk of mining it at all. Even though these hazards are very remote, one in a million or so, we still don't believe that we could afford to take the chance on mens' lives, and on our large capital investment, of developing the mine in this area if there was any remote possibility of this happening.

Q Mr. Gambill, do you know, of your own personal knowledge, what the position of the other potash companies in Carlsbad is at the present time, with reference to any exceptions being made to order R-111-A, in areas where there is commercial ore?

A Yes, I do.

MR. WHITE: I object to that question, as calling for an answer that is wholly hearsay.



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MR. PORTER: What was the question again?

MR. WALKER: If Mr. Gambill knew, of his own knowledge, the position which the ranking potash companies in the Carlsbad area have as to any exceptions being made to Order R-111-A, in areas where there is commercial ore, or on their potash reserves?

MR. WHITE: Objection was that this is testimony that is wholly hearsay, what someone else has told him.

MR. PAYNE: Are you entering this to prove the truth of the matter asserted?

MR. WALKER: It would be offered for the purpose of showing that at this time, that not only United States Borax and Chemical Corporation feels that there should be no deviation from R-111-A, but that the other companies concur in that feeling, for the reason that there has been testimony introduced in this case that other companies have allowed exceptions to be made to Order R-111-A in the past.

MR. WHITE: **Companies?** We said the Commission has allowed it. And I have no objection to him testifying as to what any other parties of record might feel in the matter, but if they were not parties to the matter, I think it should be hearsay.

MR. PORTER: Objection sustained.

MR. WALKER: I have no further questions.

MR. PORTER: Does anyone have a question of the witness?

(No response.)

MR. PORTER: Mr. Walker, before we close the direct



examination, did you want to enter your exhibit?

MR. WALKER: Yes, I will at this time. We would like to move for the admission of Exhibit 9.

MR. PORTER: That will be United States Borax and Chemical Company's Exhibit Number 9?

MR. WALKER: It could be our Exhibit Number 1.

MR. PORTER: I believe that would be 1. Let's identify that as United States Borax and Chemical Company's Exhibit Number 1.

Without objection, it will be admitted into the record.

Does anyone else have any questions?

(No response.)

MR. PORTER: You say if this pool is developed, the way I understood you, if 25 wells are drilled in there, without encountering any additional damage to the reservoir, that your gross recoverable reserves would be reduced from seventy-eight million to twenty-eight million dollars?

A Yes, sir, that's correct.

MR. PORTER: Would there be any possibility of recovering all of the reserves, or up to 90 percent, say, if after the oil or gas had been depleted?

A It would depend upon when we initially mined it. Now, depending again on market conditions, and also on the availability of ore, up until the time that the field would be abandoned in other portions of our leases; if the field had been

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abandoned, and if there hadn't been any damaging of the formation with these contaminating materials, yes, sir, we could. However, it is very possible that due to the time lapse in between, that at that time we would either have developed reserves elsewhere, possibly out of the State, or possibly the price of potash would be lowered again substantially, to where this would not be considered ore.

MR. PORTER: Well, in figuring the case of the development of this particular area, do you -- this would be an entirely new mining development? You could not mine this as a part of one of your present operations?

A No, sir, we would not; it would be completely new.

MR. PORTER: Sinking new shafts, and so forth?

A Yes, sir.

QUESTIONS BY MR. NUTTER:

Q Mr. Gambill, talking about this area out here in the Tonto Field, do you have any idea how much pressure was on that?

A No, sir, I don't. Now, the scout check does not have that. I assume it was in excess of the hydrostatic, since it blew the mud out of the hole.

Q Do you think there was any possibility that this mud had encountered a lost circulation zone that had drained out of the well?

A Not -- well, not according to the scout check, but that is my only source of information.



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Q And this was, this blowout was from the Yates or Seven Rivers formation?

A I can determine that. The top of the Yates was 3403, the top of the Seven Rivers was 3428. This gas was at 3430, so it was at the very top of the Seven Rivers.

Q And there was only 25 feet of Yates in that?

A Yes, sir, according to the scout check.

Q Do you know of any high pressure Yates gas anywhere in this area?

A Only by hearsay, that a well being drilled right now by Mr. Sage encountered gas in the Yates, which blew his tools up the hole. This approximate location is fourteen miles Northwest of the Sinclair well in question.

Q Fourteen miles?

A Yes, sir.

Q Does United States Borax and Chemical have any plans at the present time for any mining operations on these leases that they control in this area?

A No, sir. We go on a 5-year mine projection, and during the next five years, we don't plan on mining this. However, with additional price hikes in potash, or with unfortunate depletion of ore within our own mine, due to mining problems, it is possible we would be mining it before that time.

Q Now, if the area had been drilled out, prior to the time you went into it, to do your mining, would your mining recovery



be reduced to 40 percent, rather than the 90, if the area were depleted prior to the time that you mined in the area?

A Assuming all oils had been properly drained and properly plugged, and assume that there hadn't been any contamination to the potash horizons, and assuming that the timing was correct, to where we could economically mine the ore at that time, we could increase our recovery, yes, sir, past 40 percent.

Q To what percent?

A Probably ninety.

MR. NUTTER: Thank you.

QUESTIONS BY GOVERNOR BURROUGHS:

Q You are basing your seventy-eight millions dollars gross recoverable on only one test, one test hole drilled, or do you have other tests throughout the entire area?

A We have other tests; they might not influence this specific area we are talking about, this thousand acres, however, some of the other companies, National Potash and International Potash being the principal ones, have given us information which indicates that.

Q That your potash deposits extend throughout the entire area?

A Yes, sir. The United States Geological Survey also considers that it extends throughout the area, and they have information from all of the operating companies' holdings.



QUESTIONS BY MR. UTZ:

Q Mr. Gambill, with regard to the Tonto well that you testified to blowing off, you mentioned that there was mud in the hole, and yet, I wasn't quite clear on whether the mud was in the annulus between the production string and the outer casing?

A Yes, sir. It was in the production string. There had been a string of casing set in there, expressly to seal off this gas, I assume.

Q This annulus, that was loaded with mud?

A Yes, sir, that's right. They evidently measured the flow of gas from the annulus.

Q Do you have any idea what the weight of that hydrostatic head was?

A No, sir, I don't. Just assuming that since they said it was mud, that it would be in excess of fresh water, is the only indication I have.

QUESTIONS BY MR. PAYNE:

Q Mr. Gambill, are you and United States Borax and Chemical Company objecting only to the proposed cable tool program, or rather to the rotary program, or to both?

A We are objecting to both. We are objecting to any variations from Order R-111-A.

Q Now, do you feel that the Teas Pool Rules have constituted a hazard to the potash deposits in that area?

A I feel that at the time that they were made, they



probably did, yes, sir. I mean, drilling since that time hasn't proved out the fact, but yet there is still a remote probability, yes, sir.

Q But you don't know of any instance where wells have been drilled in the Teas Pool, and did result in damage to the potash deposit?

A No, sir, I don't. However, that isn't our lease, and so I really don't have any knowledge of it.

MR. PAYNE: Thank you, that's all.

MR. PORTER: Does anybody else have a question?

CROSS EXAMINATION

BY MR. WHITE:

Q Mr. Gambill, you stated that if there was a well development program in that area, that perhaps you would lose 40 percent recovery, is that right?

A No, we would reduce our recovery to 40 percent.

Q Well, now, let's assume that this particular new pool would be developed under Rule R-111-A, as it presently is. Would you say that your recovery would only be 40 percent?

A Yes, sir, that's correct.

Q And so, as far as this hearing is concerned, according to your figures, you would have a 40 percent, only a 40 percent recovery, regardless of whether these rule exceptions were granted or not?

A Well, it is possible that if these exceptions were



granted, that we would recover no ore in the area.

Q And what are you basing that on?

A Due to the possibility of contamination of the potash and in allied salt beds, with oil or gas.

Q Do you have any other basis upon which to base that conclusion?

A What do you mean, sir?

Q On what basis, on what do you base that conclusion?

A I base that conclusion on the fact that there is a possibility that pressures in oil or gas reservoirs within the area, would be found that will cause the gas and oil in those reservoirs to migrate upward through the drilling hole, into the potash horizon.

Q And your conclusion is just based upon your personal opinion of that possibility?

A It is based on that assumption, and my assumption is based upon the evidence of the Tonto Pool, and that evidence that actually, other than the three or four producing fields in this area, the drilling density is quite low, and therefore not enough information is known.

Q How many miles away are you from the Tonto Field?

A Approximately seven and a half, it appears.

Q And how many miles away was Mr. Sivley's well?

A Fourteen miles.

Q And those are the two factors that you are basing that

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conclusion on?

A Those, and the idea that very little information is known in the area in between.

Q Now, you are objecting only during the drilling operations, or subsequent operations of the wells?

A Well, we believe that we could live with the subsequent operation of the well, if the beds hadn't been damaged with these contaminating factors.

Q And there is no evidence that this particular pool is contaminated at the present time, is that right?

A There is no evidence that the first well contaminated the salt.

Q When it was completed on your own proposed program?

A No, sir, that's right.

Q Now, as I understood you to say, that in the Tonto Field the Yates formation was approximately 25 feet thick?

A 25 feet thick, yes, sir, according to my information, that's correct.

Q And in the new discovery pool it is approximately a hundred feet thick?

A Well, it is thicker, yes, sir.

Q Do you think you can compare those two wells?

A Yes, sir, I think you can. I think the operations are quite similar. The formation itself compares, is quite similar.

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Q Now, as to the gross recoverable oil, I mean, ore, ninety percent of it could be recovered if the field is not developed; and you could recover only forty percent if it is. Isn't it a fact that you folks were not contemplating the development of this area during any drilling development?

A No, sir, we probably would not while the wells were being drilled. We would want to be assured that the salt section hadn't been contaminated before we would initiate a large capital investment.

Q In other words, you have no plans to go in and develop this particular area, if this oil pool is further developed, until the oil pool has been depleted?

A No, sir, we might actually not go in there until after it appears that it has been drilled up.

Q That is what I mean.

A Yes, sir, not completed.

Q And assuming there is no contamination of the potash, could you get approximately 90 percent recovery?

A No.

Q Approximately how much?

A Well, now, maybe we are talking about two different things. You mean after the field is depleted?

Q Yes, after it is completed.

A Assuming there has been no contamination, and assuming that all plugging procedures have been successfully completed,



it would appear we might get 90 percent, yes, sir.

Q Now, will you get up and show on that plat, just where the thousand acres are, upon which you base your seventy-eight million gross, in relation to the subject well?

A All right, sir. I draw that from previous tests of this area here, which would be this area here (witness draws, indicating). This will have to be a rough sketch.

Q Now, the lease that you have covering the subject pool, was acquired when, in 1936?

A I really don't know, sir.

Q This is just -- before that -- this thousand acres, does that contain just one lease, or is it a part of a larger lease?

A Actually, the thousand acres, as Sinclair has drawn, aren't completely on our lease. However, the land is open in the area, and if we did mine the area, we would acquire additional leases.

Q How many acres of the thousand acres, do you actually own?

A I really could not tell without drawing it on there. It appears that it is a majority of it.

Q You do own more than 640 acres?

A Yes, sir, we do.

Q Have you made any effort to acquire the full thousand acres?

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A Well, no, sir; we were just informed that they have a thousand acres today.

Q Well, how many acres do you actually own, right in the pool area?

A In the pool area, I really don't know; because I really didn't know what the pool area was until just a few moments ago.

Q Well, then, your thousand acres is sort of a false assumption, isn't it?

A Well, I can give it to you on that Section 16, if you would rather.

Q Now, where are your closest operations?

A They are several miles to the West.

Q Approximately, how many miles?

A Approximately eighteen.

Q And you referred to the gross recoverable ore as being seventy-eight million dollars; what would your net be?

A I really don't believe I am qualified to answer that. And I don't know that anyone would be, not knowing what the conditions will be then.

Q You have no idea?

A No, sir, I really don't.

Q Well, now, if you went in there to develop that particular area, you would have to sink a shaft, wouldn't you?

A Yes, sir, we would.

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Q And how deep would you have to sink this shaft?

A This shaft would have to go approximately 2200 feet deep.

Q Approximately how much would that cost?

A This again, is a shirt-tail estimate, approximately three million dollars.

Q Now, do you have any road leading into there to haul out your ore, once you get it to the surface?

A Not at the present time, no, sir.

Q Would you have to acquire a right-of-way?

A We would probably contract with the Santa Fe railroad to haul the ore to our present refinery site.

Q Or else built your own?

A Or else build a new refinery too.

Q How much would the transportation cost you?

A I don't have any idea.

Q Do you have an estimate?

A No, sir, I don't.

Q How many miles would you have to haul it?

A Oh, with the existing railroad lines, probably thirty.

Q Is there any railroad line into the area at the present time?

A Yes, sir; not to the mid-area, but to National Potash, a very few miles to the West.

Q How many miles would you have to lay railroad track



then?

A Oh, approximately three and a half miles, I'm just guessing on that.

Q And what type of equipment would you have to use in order to mine this?

A We would probably use a continuous mining machine.

Q And would you have to construct an underground railroad?

A No, sir, with this type of machine, we would use carrier belt hauling.

Q Would you have diesel locomotives, or diesel engines?

A No, sir.

Q What would you use?

A We would use the conveyor from the continuous mining machine, to the shaft proper.

Q Can you give us any estimate as to the cost of installing your equipment?

A I can give you an estimate on what the continuous mining machine costs today.

Q What is that?

A \$245,000.00 apiece; we would have more than one.

Q Now, approximately how many would you need?

A That would depend upon the tonnage we anticipated securing from this mining operation. And, that in turn would depend on whether we would continue operations where we are now,

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or whether we would open up any other operation.

Q Well, how much do you expect you could recover --

A Per day?

Q What I am trying to find out is, how many of these units you would need.

A Oh, I suppose, it is very possible we would need six of them.

Q That would be approximately how much?

A Well, six times this quarter of a million dollars, a million and a half.

Q Then you would have your continuing costs, such as overhead, operating costs, and so on, wouldn't you?

A Yes, sir, that's right.

Q And can you give us any estimate of how much that might amount to?

A No, sir, I certainly can't, it is out of my field.

Q Then it would be a pretty expensive operation, would it not?

A Yes, sir, we would have a large capital investment, initial capital investment.

Q And this is marginal commercial ore, is it?

A No, sir, it isn't marginal it is very much lower grade than what we are now mining.

Q How thick is this potash deposit?

A Approximately five and a half feet.



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Q And what percent?

A 17.58 percent K₂O.

Q 17.58. Isn't it a fact that according to the United States Geological Survey, deposits of four and a half feet thick and only 14 percent, is about the cutoff.--

A Four feet --

Q -- as to the commercial?

A Yes, sir, four feet to 14.

Q And this is not what you would consider high grade?

A No, sir, it isn't.

Q Now, approximately how many men would you intend to employ to develop this deposit?

A That again, would depend upon the anticipated production. I would just have to make a very rough estimate here. And, you mean at the actual mine site?

Q Yes, within this potash, within the discovering area.

A Yes, sir, I would just roughly estimate a hundred men.

Q Is that underground?

A Yes, sir, mostly.

Q At one time?

A No, sir.

Q Well, how many at one time?

A Oh, probably thirty.

Q In other words, you would have to have three shafts then, is that correct?



A No, sir, two.

Q Two shafts?

A Yes, sir.

Q And that would be three million dollars apiece, per shaft?

A Possibly two; possibly it would not, depending on the size of our second shaft.

Q Now, what do you say the value of the potash deposit is, the gross value, just under the subject oil discovery?

A Just in that 40-acre tract?

Q Yes.

A Well, the value of that ore is \$78,000.00 an acre, so it would be forty times that. Now, that is assuming 90 percent recovery in the mill.

Q What depth are you carrying on your present mining operations?

A Approximately a thousand feet.

Q And what grade ore is that?

A I hesitate to say.

Q Can you give us any estimate?

A Yes, sir, it is in excess of this grade.

Q Would you say in excess of 25 percent?

A No, sir, it isn't. Well, not the whole mine, portions of it are, yes, sir. I will say it is between 20 and 25 percent.



Q And this was, you say, 17 percent?

A Seventeen and a half.

Q Now, what do you mean by a slight marginal profit?

A I mean, we don't make very much profit right now.

Q You don't make much profit right now?

A Yes, sir.

Q And it will give you less when you undertake to develop this?

A Yes, sir, that's correct.

Q And would you **deny** the statement that you have had this lease on this particular oil discovery, since 1936?

A No, sir, I would not **deny** it; I don't know.

Q And you have testified that you don't have any plans to develop it within the next five years?

A Not at the present time, no, sir.

Q Then, we can conclude from your testimony, that the net value of this ore is considerably less than the gross value?

A Yes, sir, that's correct.

MR. WHITE: That's all we have.

MR. PORTER: Are there any further questions of this witness?

REDIRECT EXAMINATION

BY MR. WALKER:

Q Mr. Gambill, referring to United States Borax and Chemical Corporation's Exhibit Number 1, assuming that at such



time as this area is developed, if it is developed, and a shaft was located at the extreme western portion of the present lease holding, is it correct that they would probably tunnel off the shaft and proceed then on up the lease area?

A West, yes, sir, we would extend our development drift to the farthest extent of the ore body of our lease holdings, before we started serious mining operations.

Q The same would be true if the shaft was located on the North end of your lease holding?

A Yes, sir, that's correct.

Q Now, assuming that R-111-A was not complied with, as to the salt protection string, that high pressure gases were encountered in drilling, and that the clay seams in the salt formation were contaminated, is it possible that in the mining operation of approaching it from either end, it would become impossible to proceed past the contaminated area?

A Yes, sir, that's possible.

Q This would result also in having to leave behind potash ores outside of this proposed pool, is that correct?

A Yes, sir, that is probably correct.

Q And these other potash ores that might possibly have to be left behind, are in no way considered in your estimate of values?

A No, sir, they are not.

MR. WALKER: That's all.



MR. PORTER: Any further questions?

RE-CROSS EXAMINATION

BY MR. WHITE:

Q Mr. Gambill, that hypothetical question based upon the fact that there is a high pressure gas or oil zone in that particular area, do you have any concrete evidence to establish the fact that there is any high pressure zones?

A No, sir; neither do I have concrete evidence that there isn't.

Q But you have nothing to establish your conclusion on, other than the basis upon which the hypothetical question was made?

A Yes, I have.

Q Within that particular area?

A Within that one thousand acres.

Q Very well. One other question. Let's assume that a shaft were sunk on the far western side of your leases, as was questioned to you, how many years would it take you to get over into the oil pool?

A Less than a year.

Q Less than a year?

A Yes, sir.

Q And there is no development at all under it at the present time?

A No, sir, there isn't.

Q Mr. Gambill, have you made a study of the Teas Pool?



A No, sir, I haven't.

Q Have you made a study of the Salt Lake Pool?

A No, sir, I haven't. Yes, well, I will retract that statement. I have inspected all of the well locations from the Salt Lake Pool.

Q Did you find any high pressure areas in that pool?

A I found no information on pressures at all.

MR. WHITE: That's all.

MR. PORTER: Any further questions?

(No response.)

MR. PORTER: The witness may be excused.

(Witness excused.)

MR. PORTER: Does that conclude your testimony?

MR. WALKER: That concludes our testimony.

MR. PORTER: Does anyone else desire to present testimony in this case?

MR. WALKER: If it please the Commission, I might add that in view of the fact that there has been previous testimony entered as to exceptions to R-111-A, on potash holdings held by other companies, I would like to advise the Commission that there are representatives of the major portion of the other potash companies from the Carlsbad area, who are present at this hearing, and who are available if the Commission desires to question them as to any matters relating to this hearing.

MR. PORTER: We intend to offer the opportunity for

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any interested parties to make a statement if they desire.

That concludes the testimony. Does anyone have a statement that they would like to make?

MR. ANDERSON: Anderson, John Anderson, of the Geological Survey. I think in considering this case, that it might be well for all of us to go back to about 1955, and consider the circumstances which surrounded the issuance of Order R-111-A.

Early in 1955, this Commission appointed a committee, composed of three members of the oil industry, who were operating in the Oil-Potash area, three members from the potash industry, and representatives of the Commission and the Geological Survey. The committee held several meetings, and reported two times to the Commission in open hearings. All of the matters that we thought could possibly arise in the drilling of oil and gas wells in the potash area, were seriously considered.

The provisions of R-111-A were arrived at after considerable wrangling and threshing around, and they represent the minimum requirements that the potash companies would accept, as being reasonable protection to their interest. As I recall, the potash companies insisted upon two things: One was to protect the salt section from introduction of any fluids from above, oil, gas, or water; that was to be taken care of by a water string in the top of the salt. Also, to protect the salt section from any possible introduction of fluids from below, and that was taken care of by

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the salt protection string.

In these committee hearings, and also before the Commission, we talked about, "Why can't we go ahead and drill into maybe the Yates and Seven Rivers, if we drill with rotary tools, with a good column of mud, and cement our pipe, selectively perforated, and produce it?" There were objections to this on the part of the potash industry. The committee considered them, and when the committee's final recommendation came up, the provisions of R-111-A, which are minimum provisions, are as they are set forth right to today, they haven't been changed.

I think all of it depends, that in most instances you can drill into an oil and gas bearing formation, and you can set pipe, and you can cement it, and perforate it, and be reasonably sure that you have a good cement job, and that oil and gas is not going to get out of its productive zone. At the same time, there are possibilities which were considered by the Commission, and also by the committee, where without a string of pipe, set below the pipe, before any productive formation was drilled into, that some accident could happen, the hole might be jammed we we might not be able to get into it to do the remedial work which has to be done, and that is the reason why that provision is in R-111-A.

Now, probably some of you were around here six or seven years ago, when about every time a well was proposed in the Oil and Potash area, or near it, there were objections by the potash people. We, in the Survey, have a lot of them, but since R-111-A

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has come up, which was agreed upon in committee meetings by representatives of the oil industry and the potash industry, and the regulatory bodies, and was set out in an order of the Commission, whenever a well is to be drilled, the potash companies have not made objections, except in a few cases. And, in all of those cases, the objections were found to be valid.

So, speaking for the Geological Survey, we are reluctant to see any particular deviations from R-111-A. In some cases, where we have definitely determined that there is no water, maybe except for the first three or four hundred feet above the top of the salt, the expensive requirement of setting maybe an additional several hundred feet of pipe to meet with the provisions of R-111-A, that provision has been waived by the Commission. And, I think that that is perfectly justified in those cases, where the potash companies did not object. But, in the present sense of objections from the potash company, I don't believe that we should deviate from the provisions of R-111-A.

MR. PORTER: Does anyone else wish to make a statement at this time?

MR. WHITE: I would like to make one statement, in regard to what Mr. Anderson said. I, too, had a part in the forming of this subject rule. It is true that the main purpose of R-111-A was to set forth stringent rules and regulations for the protection of the potash deposits, against the drilling of exploratory test wells. And the rule is directed to the drilling of



wildcat wells within the limits of the potash area. We are not asking the Commission to deviate from Rule R-111-A as to any wildcat or exploratory test wells.

The rule itself, as I said in my opening statement, it contemplates that upon the discovery of a new pool, that the land can then be put to multiple use, and it so reads, that, "Upon the discovery of oil or gas in the Potash area, the Oil Conservation Commission shall promulgate rules for the affected area, after due notice and hearing". And we respectfully submit that our proposed rules in no way would cause waste, and would conserve not only the potash interest, but also the oil and gas interest in the same area.

MR. WALKER: If the Commission please, with reference to just one portion of Mr. White's statement.

As I understood the portion of R-111-A that he read, I cannot infer, or see how it could be reasonably inferred that more lax rules are to be applied in these field rules. It can equally be argued that more strict rules should be applied.

MR. WHITE: The rule should be drafted to fit the pool conditions, and the pool characteristics, which we think we have done.

MR. PORTER: Anyone else have a statement to make?

MR. KELLY: William B. Kelly, appearing for Texaco and Company.

MR. PORTER: William B. Kelly.



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MR. KELLY: I, William B. Kelly, would like to read the following into the record, on behalf of the Texaco Company:

"Texaco concurs in Sinclair's application, insofar as it is a reasonable recommendation that any prudent operator would make, in that the proposed rules protect all interested parties."

MR. PORTER: Anyone else have a statement?

MR. PAYNE: Mr. Commissioner, we received communications from the Atlantic Refining Company, Cities Service Oil Company, and Richardson and Bass, urging approval of Sinclair's application.

Also, we received communications from Potash Company of America, Southwest Potash Corporation, National Potash Company, and Farm Chemical Resources Development Corporation, urging the denial of Sinclair's application.

These statements will be put in the record in their entirety:

THE ATLANTIC REFINING COMPANY: Midland, Texas,
January 12, 1960:

"Regard Case 1841: It is the recommendation of the Atlantic Refining Company that the casing program proposed by Sinclair Oil and Gas Company for the Potash Oil area be adopted. It is our opinion that Sinclair's proposed program will as adequately protect the potash deposits as do the rules provided for in R-111-A.

The Atlantic Refining Co., R. E. Howard,
Regional Petroleum Engineer."

CITIES SERVICE OIL COMPANY: Hobbs, New Mexico,
January 11, 1960:

"Cities Service Oil Company urges amendment of order R-111-A as proposed by Sinclair Oil and Gas Company



in Case 1841. It is our opinion that the proposed Rotary Tools Casing Program will not constitute a hazard in the production of oil, gas or potash but will prevent waste, assure maximum conservation, promote economy and permit the recovery of all oil, gas and potash deposits in the area.

D. D. Bodie, Division Superintendent,
Cities Service Oil Company."

RICHARDSON AND BASS, Fort Worth National Bank Building,

Fort Worth, Texas, January 8, 1960:

"Re: New Mexico Case No. 1841, Scheduled January 13, 1960:

"With reference to the subject Case concerning Sinclair Oil & Gas Company's application for casing rules in their oil field discovery in the Potash Oil Area, Lee County, New Mexico, Richardson & Bass, as an oil operator in the State of New Mexico and lease-holder of tracts in the vicinity of the subject area, concurs with Sinclair in their proposal.

"We have examined thoroughly the proposed rules to be offered by Sinclair and the current statewide Rule R-111-A. In our opinion, the proposed rules offer as adequate protection of the Potash formation as the existing state rule mentioned above, and we recommend that the Sinclair proposal be adopted.

Richardson & Bass, J. R. Vann."

POTASH COMPANY OF AMERICA, Santa Fe, New Mexico,

January 14, 1960:

"Potash Company of America concurs with US Borax and Chemical Company in OCC Case 1841 that OCC order R111A should be strictly adhered to in drilling oil wells in the Oil-Potash Area, and that no exceptions should be allowed in Sinclair Oil Co application.

Potash Co of America, Everitt C. Jourdan."

SOUTHWEST POTASH CORPORATION, Santa Fe, New Mexico,

January 14, 1960:

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"Gentlemen: This shall advise the Commission that undersigned company is opposed to any exceptions being made to Order R-111-A in connection with Sinclairs application Case 1841 heard this date.

Southwest Potash Corporation, By Iva A Herbert,
Chief Mine Engineer."

NATIONAL POTASH COMPANY, Santa Fe, New Mexico,

January 14, 1960:

"Gentlemen: The undersigned company respectfully advises that they are opposed to any exceptions being allowed as to Order R-111-A in Case No. 1841 and that Sinclairs application should be denied.

National Potash Co., R. E. Billman,
Chief Mine Engineer."

FARM CHEMICAL RESOURCES DEVELOPMENT CORPORATION,

Santa Fe, New Mexico, January 14, 1960:

"Re: Case #1841 - Sinclair applications - Hearing this date. We respectfully request no exceptions be allowed Sinclair to Order R-111-A.

Farm Chemical Resources Development Corp.
Charles W. Hicks, Geologist."

MR. PORTER: If nothing further to be argued in this case, we will take the case under advisement.



**BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO**

IN THE MATTER OF:

**CASE 1841: Application of Sinclair Oil and Gas Company
for the creation of a new pool in the Petash-
Oil Area and for the promulgation of special
rules and regulations pertaining thereto.**

TRANSCRIPT OF HEARING

JANUARY 6, 1960

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE 1841: Application of Sinclair Oil and Gas Company for the creation of a new pool in the Potash-Oil Area and for the promulgation of special rules and regulations pertaining thereto. Applicant, in the above-styled cause seeks an order creating a new pool for Yates production in the Potash-Oil Area as defined by Order R-111-A, said pool to comprise the SE/4 NW/4 of Section 16, Township 20 South, Range 33 East, Lea County, New Mexico, and such other acreage as may reasonably be proven productive from the same common source of supply. Applicant further seeks the promulgation of special rules and regulations for said pool as follows:

A. Cable Tool Casing Program

Same as Order R-1078 for Teas Pool.

B. Rotary Tool Casing Program

Surface casing set at 600 feet and cement circulated. No salt protection string. Production on casing to be set through pay from 3146 feet to 3232 feet (approximately) with cement circulated to at least 50 feet into surface casing.

BEFORE

Daniel S. Nutter, Examiner

TRANSCRIPT OF PROCEEDINGS

MR. NUTTER: We will take next Case 1841.

MR. FLINT: Case 1841. Application of Sinclair Oil

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& Gas Company for the creation of a new pool in the Potash-Oil Area and for the promulgation of special rules and regulations pertaining thereto.

Mr. Examiner, we have a telegram from Stagner and Walker of Carlsbad, attorneys for the U. S. Borax and Chemical Corporation which reads as follows:

"United States Borax and Chemical Corporation objects to hearing Case 1835 by an Examiner on January 6, 1960 and requests hearing by Commission next regular meeting February 17, 1960. Formal written objection mailed to you yesterday."

MR. NUTTER: We have received the formal written objection, and this case will be continued to the regular Commission hearing on February 17, 1960.

MR. WHITE: Is that February 17?

MR. NUTTER: February 17, yes, sir. Off the record.

(Discussion off the record.)

MR. NUTTER: We will amend the continuation of Case 1841 to the regular Commission hearing on January 13th.

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STATE OF NEW MEXICO)
)
COUNTY OF BERNALILLO)

I, J. A. Trujillo, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in Stenotype and reduced to typewritten transcript by me, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 12th day of January, 1960, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

J. A. Trujillo
NOTARY PUBLIC

My Commission Expires:

October 5, 1960

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1841 heard by me on 1-6, 1960.
[Signature], Examiner
New Mexico Oil Conservation Commission

