CASE 3743: Application of BENSON-MONTIN-GREER DRLG. CORP. FOR A PRESSURE MAINTENANCE PROJECT.

Case No.

3733

Application, Transcript,
Small Exhibits, Etc.

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
April 3, 1968
EXAMINER HEARING

IN THE MATTER OF:

Application of Benson-Montin-Greer Drilling Corporation for a pressure maintenance project, Rio Arriba County, New Mexico. Case 3743

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 3743.

MR. HATCH: Case 3743. Application of Benson-Montin-Greer Drilling Corporation for a pressure maintenance project, Rio Arriba County, New Mexico.

MR. COOLEY: William J. Cooley of Burr and Cooley, Farmington, New Mexico, appearing on behalf of the Applicant. We have one witness which we request to be sworn.

(Witness sworn)

(Whereupon, Applicant's Exhibit A marked for identification)

MR. UTZ: Other appearances? You may proceed.

ALBERT R. GREER

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

DIRECT EXAMINATION

BY MR. COOLEY:

Q State your full name, please.

A Albert R. Greer.

Q Mr. Greer, have you previously testified before a hearing officer of the New Mexico Oil Conservation Commission?

A Yes, I have.

MR. COOLEY: Does the Examiner accept the witness's

expert qualifications?

MR. UTZ: Yes, he is previously qualified.

Q Mr. Greer, have you prepared an exhibit in this case consisting of a cover sheet and six pages?

A Yes, sir.

Q I hand you what has been marked as Exhibit A in this case and ask you to identify the same and explain the various elements of it.

A Exhibit A has five parts. The first part is marked A-1 and it is the first page inside the title page.

Q Six parts.

A Six parts. The first part is marked A-1 and it is a plat showing the two Puerto Chiquito pools, the east Puerto Chiquito pool and the Puerto Chiquito pool. The west Puerto Chiquito pool is outlined in brown and within the west Puerto Chiquito pool is a Federal type unit, the Canada-Ojitos Unit, shown on this plat outlined in blue and within the Canada-Ojitos Unit is a participating area identified as the Niobrara-Greenhorn participating area, it is outlined in red, and it is this participating area within the Canada-Ojitos Unit in the West Puerto Chiquito pool in which we seek to inject gas.

Q Would you explain the meaning of Exhibit A-2,

second page of Exhibit A?

A A-2 is a larger scale plat of the participating area only, which shows the location of our proposed gas injection well in Section 13, Township 25 North, Range 1 West, located in Unit K of that section. The plat also shows an observation well in Section 23 being the A-23 located in Unit A of that section. It also shows six recovery wells which we will use to produce oil and which are currently producing oil and which we anticipate will continue as oil producers. These wells are colored in green.

Q Does Page 2 of Exhibit A show all wells within two miles of the proposed injection well which is completed in the West Puerto Chiquito pool?

A It shows all wells within two miles with the exception of a noncommercial well which is located in Unit B of Section 18 in 25 North, Range 1 West.

Q Is that also operated by the Applicant?

A Yes, sir, it is within the Canada-Ojitos unit. Correction on that description -- the well, the noncommercial well, which I mentioned is in Unit B of Section 18 of Township 25 North, Range 1 East.

Q And would you explain the significance of Page

second page of Exhibit A?

A A-2 is a larger scale plat of the participating area only, which shows the location of our proposed gas injection well in Section 13, Township 25 North, Range 1 West, located in Unit K of that section. The plat also shows an observation well in Section 23 being the A-23 located in Unit A of that section. It also shows six recovery wells which we will use to produce oil and which are currently producing oil and which we anticipate will continue as oil producers. These wells are colored in green.

Q Does Page 2 of Exhibit A show all wells within two miles of the proposed injection well which is completed in the West Puerto Chiquito pool?

A It shows all wells within two miles with the exception of a noncommercial well which is located in Unit B of Section 18 in 25 North, Range 1 West.

Q Is that also operated by the Applicant?

A Yes, sir, it is within the Canada-Ojitos unit. Correction on that description -- the well, the noncommercial well, which I mentioned is in Unit B of Section 18 of Township 25 North, Range 1 East.

Q And would you explain the significance of Page

3 of Exhibit A?

A Page 3 of Exhibit A is a continuation of records of bottom hole pressures which have been measured in one of the observation wells in the participating area, being the A-23, all the other pressures which have been measured in this well have previously been reported to the Commission, I believe in a hearing for Case 3455 which was held in November of 1966. This brings the Commission's records up to date with the pressures which have been taken in this observation well, which incidentally, has been shut in for about three years. The well was produced, I believe, just a few months after the completion and then shut in for all this period of time, produced for observation only.

Q Have you made a correction in the typed information shown on this exhibit?

A Yes, sir. There is a typographical error on -- as to the datum pressure taken March 28, 1967. It should be 1377.0 pounds.

Q Instead of --

A The typed information shows 1337.

Q Have you made this correction?

A I made it in ink, yes, sir.

Q Would you explain the significance of Page 4 of Exhibit A?

A Page 4 of Exhibit A shows how we computed the location of the bubble point pressure as it has moved down structure in the participating area. We have referred this bubble point pressure to contours and the contour marker is one we identified as the top of Zone A which we will later show how it is identified. We arrived at this -- at the location of this bubble point pressure which is 1,520 pounds in this pool, by the continuous pressures we have measured in the observation well in the A-23. The dates of these pressures and the pressures taken adjusted to a datum of plus 1,195 feet above sea level is shown in Columns 1 and 2 of this Exhibit A-4. The third column shows the pressure difference to the bubble point pressure of 1,520 pounds, for example, the first pressure shown here August 11, 1965, the datum pressure in this observation well was 1,506 pounds, which is fourteen pounds below the bubble point pressure of 1,520. This is shown in the third column. The fourth column then converts this pressure to depth of oil column in feet. The density of the oil column being, in this well, .312 pounds per square inch per foot, according to that

fourteen pounds represents forty-five feet. The bubble point pressure accordingly then will be forty- five feet lower than the datum of 1,195 feet, which in the next column is indicated to be 1,150 feet. Now, the contour marker which we have used on Zone A is 240 feet higher than the pay section in these wells, so we have referred this bubble point pressure then to the contour marker by adding 240 feet to the pay depth. The last column then shows this final figure which for the August 11, 1965 date had a datum of plus 1,390 feet for the 1,390 foot contour. As the pressure is dropped then this bubble point pressure is dropped down structure, and as shown on this schedule, it has dropped some 500 plus feet from August of '65 until March of '68, all the while this well has been shut in. Now, this drop in bubble point pressure down the structure has also been measured by dropping fluid level in this particular well. It has dropped -- the fluid level has dropped along with the pressure and we have been continuously measuring this fluid level also.

Q Explain the significance of Page 5 of Exhibit A.

A Page 5 is a plat showing the log of one of the wells in this area and we have identified some of the

zones within the Niobrara section of the Mancos Shale formation, to be Zones A and C,in the East Puerto Chiquito Pool, Zones A and B produced, so far in West Puerto Chiquito Pool we have had production only in Zone C which is colored in brown on this exhibit. We feel that the production is coming probably from all of Zone C as indicated here, although so far, in wells in which we have found natural production, has been encountered only in the little shaded area shown on this plat within the brown coloring at the bottom of it from approximately 5488 to 5506, the top of this little shaded area, 5488 is approximately 240 feet below the top of Zone A and the dashed line showing top of Zone A is our contour marker. This is why we have added 240 feet data to the bubble point pressure location in the pay to arrive at the location of it on our contour maps.

Q What does the plat on Page 6 of Exhibit A depict?

A This shows how the bubble point pressure has moved down structure as the pressure has dropped in the reservoir and as it's indicated in our observation wells. This is a contour map, the contours are on top of Zone A as previously identified, contour interval is 200 feet with

1,000 and 2,000 foot contours being heavily shaded. The little dotted lines which are better identified by the coloring shown indicates the location of this bubble point pressure at the date show, for instance, in the yellow colored area on the right hand side is the location of the bubble point pressure on August 11, 1965. Now pressures down dip, which would be to the left on this plat, at that date were all above the bubble point, in other words, pressures to the left of the righthand part of the shaded area in yellow would all have higher pressures, although that area would have pressures higher than the bubble point. As the pressure in the reservoir dropped as a result of production, this bubble point pressure then moved down dip, and in December of 1965 it was on the lefthand side of the yellow colored area.

In the spring of 1966 we think that the bubble point pressure moved considerable distance sort of bulging out as shown to the left down structure around the well in Section 11 identified as the L-11 and by January of '67 bubble point pressure was located as shown on the righthand side of the area colored in brown. As of March of this year, it is now as shown on the lefthand side of the area colored in brown. This means that three of the producing

wells are still down dip or still below the structurally below the location of the bubble point pressure, which means they still have pressures above the bubble point and accordingly these three wells, which are the E-10 in Section 10, A-16 in Section 16 and the L-33 in Section 33 are all producing in an area of undersaturated oil. The wells producing up dip, which is to the right of the area colored in brown, are producing from saturated oil. Pressures are below the bubble point.

Q Does the noncommercial well to the east that you earlier referred to in your testimony appear on this page of Exhibit A?

A Yes, sir, it's shown as the B-18 in Section 18.

Q Well, then to summarize, Mr. Greet, what has occurred with regard to migration of the bubble point pressures since your first pressure test in August of 1965?

A In general, the bubble point pressure has moved down dip and to the point now that most of the wells in number have pressures less than the bubble point. It has not yet reached a critical stage or rather the free gas saturation has not yet reached what we call a critical gas saturation and gas-oil ratios have not yet risen. Gas-oil ratios are still at the solution ratio; all wells

are producing at approximately the solution gas-oil ratio which is on the order of four to five hundred cubic feet per barrel.

Q What, in your opinion, has been the effect of the pressure decline which you have just described thus far on the producing characteristics of the reservoir in the west Puerto Chiquito pool and with particular regard to the productivity index?

A Well, as the pressure drops below the bubble point in a solution gas drive reservoir, as this primarily is, the productivity indexes of the wells will decline as the gas breaks out of solution and restricts the permeability to oil of the formation. We believe this has happened to a certain extent and the productivity indexes of the wells have declined.

Q Has actual production declined?

A Actual production has been restricted from some of the wells, we have voluntarily restricted production from some of the wells. The productivity index from the better wells has not yet dropped to the point that the wells which were once top allowable cannot make top allowable. They are still capable of it, although we have restricted production from two of them, anticipating this gas injection,

but in addition to the gas breaking out of solution and restricting the permeability to oil, we believe that the pressure drop has cuased the fractures to squeeze together; this is the reservoir whose void space is formed by fractures and we believe that this also has had an effect in reducing the productivity index. Accordingly, we hope by injecting gas to stop the squeezing together of the fractures, caused by reduction in pressure and also to prevent gas breaking out of solution and decreasing the relative permeability of the oil.

Q Mr. Greer, you have referred to voluntary restriction of production by the operator in this area, is that below -- has this production been restricted below authorized allowables established by the New Mexico Oil Conservation Commission?

A Yes, sir, primarily, well, we have, of course, restricted production in two wells which are observation wells, the K-13 and A-23 and of course, the K-13 we propose now for an injection well. These wells have just been shut in and used for observation so in a sense we have restricted production from them and in Section 11 both the P-11 and L-11 are wells which are capable of making top allowable but we have restricted production to

approximately 300 barrels a day in the P-11 and three to four hundred barrels per day in the L-11, and the reason for this is to have the minimum practical pressure grading established in the reservoir in the area of the injection well prior to putting it on injection.

Q What is the total allowable production authorized by the New Mexico Oil Conservation Commission for the participating area, the Canada-Ojitos unit?

A I don't have that exactly, but it's approximately 2,000 barrels a day.

Q What approximately are your current producing rates?

A We are producing approximately 1,000 to 1,200 barrels a day.

Q Mr. Greer, would you please state your opinion as to what the effect of continued production of the reservoir without institution of any pressure maintenance program would result in?

A If we didn't have pressure maintenance, the production history would then be the typical production history of a solution gas drive reservoir in which the gas-oil ratios will rise, the pressure will decline, the productivity index will decline and we will realize an

ultimate recovery which is normal for solution gas drive reservoirs on the order of probably one-sixth of the oil in place, with some addition perhaps to some gravity drainage and if the formation has a very good relative permeability characteristic it might even produce as much as twenty-five per cent of the oil in place. I think we should compare this, of course, with what we anticipate from gas injection which we feel from gas injection that we can realize the maximum benefit from gravity drainage and this is primarily what we seek to achieve by injecting gas. Gravity drainage recoveries have been as high as fifty and sixty per cent of the oil in place and although we do not have any other fractured shale reservoirs in which gas injection has been used, we have to regard this as primarily an experiment and nevertheless, it is certainly possible from the engineering analysis to recover at least in parts of the reservoir, the parts that have steep enough dip and high enough permeability to achieve this fifty to sixty per cent recovery of oil in place.

Q Would you explain how pressure maintenance through gas injection would enhance the chances and increase the probabilities of favorable gravity drainage?

A Yes, sir. Just in general, our approximate calculations indicate that we might anticipate a gravity drainage rate on the order of 200 to 1,000 barrels per day per linear mile along the strike in this formation. Now, these of course, are theoretical calculations and again, we have no other projects to refer to to confirm it but we believe that this is possible as long as the oil has the permeability that it had when the pressure was at the bubble point and if we do not permit the gas-oil ratios to rise. We believe that we have a producing interval along the strike, not interval, but zone, of some about five miles at this time. This means that we could anticipate from 1,000 barrels a day to 5,000 barrels a day or 6,000 barrels a day of gravity drainage in this pool. Now, that rate of gravity drainage will of course, decrease rapidly if the relative permeability to oil drops off or if the fractures squeeze together and reduce the productivity indexes. If it drops off as a result of pressure declining and gas-oil ratios rising then the oil in a sense, ceases to flow down dip fast enough to be recovered at commercial rates and accordingly, you would lose the benefit of gravity drainage.

Q Then as I understand it, it is your plan and

desire to maintain a higher pressure in order to preserve the favorable relative permeability to oil and keep the fracture system open rather than expecting gas to actually drive oil to the well bore?

A Well, this is true. We would anticipate very little additional recovery from the simple mechanism of the gas sweeping through the reservoir. This might recover some additional oil, but I think it would be small. The chief benefit to be realized is permitting or helping the gravity drainage to be effective and in this respect, we feel that when we inject the gas that it will tend to form a secondary gas cap and this is what we hope will result, and of course, it may channel to the nearest wells in a short time and it depends entirely on the fracture system, whether it will accommodate this gas injection or whether the gas will channel to the wells. We believe that from the high permeability that -- which must be the permeability of the average part of the reservoir that once the gas after being injected, reaches these zones of high permeability that it will cease channeling in the direction of producing wells and will start to form a secondary gas cap at that point. We are hopeful, of course, that this will be fairly high on the structure, but it

could, of course, take over three or four of the wells before it becomes effective. If this happens, of course, we will want to transfer allowables down dip to other wells in order to achieve the maximum gravity drainage effect. And in anticipation of this, we propose to restrict the production even more from the wells nearest the injection well at the outset so that there will be the least practical possibility of gas channeling to these nearest producers.

Q Will the institution of a pressure maintenance project through the injection of gas, in your opinion, enhance to any degree, the recovery as a result of the solution gas drive mechanism?

A Well, I think it will have very little effect on the solution gas drive mechanism itself. I would say that after we have completed our gas injection phase of the production of this reservoir and have recovered what appears to be all the oil economically practical to recover from gravity drainage, we will then, of course, open all the wells and market the gas and, of course, finish depletion of the reservoir then by solution gas drive and whatever then has not been produced by gravity drainage will then be recovered by solution gas drive, in

a sense then we are simply delaying the solution gas drive mechanism of recovery for a period of years until we finish our pressure maintenance.

Q What precise procedures and methods do you propose to use in accomplishing your gas injection through the K-13 well in Section 13?

A We have felt that until we can raise the pressure back up such that the bubble point pressure is again over on the east side of the pool that we should restrict production to something on the order of 1,000 to 1,200 barrels a day and we have accordingly, sized our injection plant or system to do this. We anticipate that it will take about 1,000 cubic feet per barrel of injected gas to maintain pressure and it will take something in excess of this to increase the pressure. Our plan is first to inject enough gas to maintain pressure for a period of months, perhaps a year before we try to inject enough gas to increase the pressure, and the reason for this is again to avoid channeling of gas to the producing wells. We realize if we try to inject it too fast we will have such large pressure differentials that channeling may result. If we can get a secondary gas cap started and increase the permeability to gas in the vicinity of the

injection well then in a few months or a year we can inject at higher rates with less danger of gas channeling; accordingly, we have designed our system to inject approximately 1,000,000 cubic feet per day which we think will just about balance production rate of 1,000 to 1,200 barrels per day of produced oil. The well we propose to inject in, K-13, produced approximately 100 barrels per day natural, or not natural, after frack, and accordingly, there is a question in my mind that this well will accommodate 1,000,000 cubic feet per day initially, at least until the permeability to gas is increased around the well bore without using high pressures and accordingly, we have designed our injection system to inject above fracturing pressure in case it's necessary to do this to get gas into the reservoir.

Q Would you describe in detail the casing and cementing program that is in effect for this proposed -- put in effect with respect to the proposed injection well?

A The injection well is already cased and tubed and ready for injection. The casing program was thirteen and three-eighths casing, surface casing, of forty-eight pound H-40, 293 feet, cemented with 350 sacks, circulated to the surface; intermediate casing is seven and five-eighths

inch, 26.4 pound J-55, set at 4,895 feet with 400 sacks and circulated to -- cement was not circulated. Top of the cement came to 3700 feet, which incidentally, puts the intermediate string through the Mesa Verde section and cement over the Mesa Verde section. Then five and a half inch casing was run from the surface, it's fifteen and a half pound J-55, set at 5,967 feet with 150 sacks and the top of that cement is 4,500 feet. This means that we have approximately 400 feet of cement above the bottom of the seven and five-eighths casing, in other words, the two are lapped together with 400 feet of cement. Then we propose to inject gas through two and three eighths inch tubing, set on a packer. The tubing is set at 5,864 feet with a Baker Model M packer. It's two and three eighths EUE J-55 tubing.

Q Mr. Greer, in your opinion --

A The annulus is filled with oil between the tubing and the five and a half inch casing.

Q In your opinion, is the casing and cementing program in the proposed injection well adequate to assure that there will be no escape of injected gas into other formations?

A Yes, sir, I think actually that we would have been

safe injecting gas with only the seven and five-eighths inch casing instead of 4,900 feet. The five and a half inch casing is, of course, an additional string which insures that the gas will be confined only to this part of the Mancos section, and even, of course, within the five and a half inch casing we have the tubing which will also confine the gas to the pay zone. This means that in order for the gas to get to any other zone it would have to first escape through the tubing inside the five and a half inch, go through the five and a half inch and also through the five and half inch through the seven and five-eighths to get at any other zone. It's rather securely confined, I would say.

Q Mr. Greer, has BMG secured an adequate supply of gas to be injected in this project?

A Yes, sir.

Q What is that source?

A Wells that are producing with the present solution ratio on the order of 400 to 500 cubic feet per barrel and at a production rate on the order of 1,000 barrels per day will produce then some approximately four hundred to five hundred thousand cubic feet of gas themselves. We propose to gather this gas through the

design of our gathering system and make up gas system at a point in the northeast part of Section 14 near the location of the A-14 well. Make up gas, which will approximate 7500 to 600,000 cubic feet per day, will come into this same system and the make up gas plus the produced gas will be compressed at this point, then in the north part of Section 14, and delivered at approximately four to five hundred pounds pressure to the location of the injection well, the K-13 in Section 13. At that point with high pressure compressors, the gas will be compressed to whatever pressure is required to inject it in the formation. Our compressors are designed to go to 3,000 pounds if necessary.

Q What is the source of the makeup gas?

A It will come from the general Pictured Cliffs gathering system, in this general part of the San Juan Basin, the pickup point is in the southwest part of the Puerto Chiquito pool. I do not have the exact section available at this time, but it is in that general area.

MR. UTZ: That's the West Puerto Chiquito?

A Southwest part of the West Puerto Chiquito pool, yes, sir.

Q Now, you have already testified, Mr. Greer, with

respect to the necessity for transfer of allowables, would you be specific as to the wells to which you feel that the transfer will be necessary from time to time?

A Yes, sir. We would like to transfer allowables down dip for the reasons previously stated, I mean, to wells located down dip, so we will probably want to transfer, of course, the allowable for the injection well and the observation well, which are the K-13 and A-23 Well. We will want to transfer their allowables to wells down dip. We will probably want to transfer a part of the allowables of the A-14 and the P-11 and depending on how bad the gas channels initially we may want to transfer part of the allowable of the L-11. Then as pressure is increased, the wells to which we will want to transfer allowables will be the E-10 in Section 10 and the L-11 would then be a well we would want to transfer allowable to when the pressure is increased high enough, and possibly a well in Section 2, which is at the present time a noncommercial well, but which we believe might become a good recovery well if we can successfully sand fracture it.

Q The well in Section 2, is that located in the northwest quarter designated as the C-2?

A Yes, sir, it's currently outside the participating area. We anticipate if we can successfully frack the well that the participating area will be expanded to include this well.

Q Is there also the possibility of drilling additional wells down dip to which allowable will be transferred at a later date?

A Yes, sir, it's entirely possible that we will want to drill a little additional recovery well depending on how successful the gas injection is.

Q Was Exhibit A prepared by you or under your supervision?

A Yes, sir.

MR. COOLEY: Mr. Examiner, we offer at this time Applicant's Exhibit A.

MR. UTZ: Without objection, Applicant's Exhibit A consisting of six parts will be entered into the record of this case.

(Whereupon, Applicant's Exhibit A was offered and admitted in evidence.)

MR. COOLEY: I have no further questions.

CROSS EXAMINATION

BY MR. UTZ:

Q You are going to purchase this makeup gas from El Paso?

A The unit operator will purchase it from the Brazos Gas Transmission Limited.

Q Who are they?

A Brazos Gas Transmission Limited is a limited partnership which owns a gas transmission system which serves the communities of Dulce and Chama and it originally had a contract with the Canada-Ojitos unit owners to purchase gas and in a sense have the gas transported by way of a complicated system of agreements and contracts with Southern Union and El Paso to a point west of Dulce where actually other gas is taken in lieu of it and transmitted to the communities, then, of Dulce and Chama, and where it is then resold again to Southern Union for distribution to these towns, so now instead of purchasing gas in the Canada-Ojitos Unit, the Canada-Ojitos unit owners have asked Brazos to sell them gas and Brazos has agreed to do that and so it will be handled in this fashion. The contractual arrangements are a little complicated, but they have been worked out.

Q How will they get gas on up to Dulce then from this line?

A By virtue of the original contract agreement with Southern Union in El Paso it was possible for Brazos to purchase more gas than it required so it is this purchase arrangement through which Brazos can now turn around and run gas the other direction through its system.

Q Again, what was the depth of the five and a half on your injection well?

A Five and a half inch is at 5,967 feet and I don't believe I stated the total depth, I believe it's 6,022 feet, approximately fifty feet of open hole.

Q Do you recall how we arranged to transfer allowables on your initial testing procedure? Was that by administrative approval?

A I believe it was administrative approval.

Q By request to the --

MR. COOLEY: We had one hearing to authorize transfer of allowables.

A We had a hearing to authorize transfer of allowables.

Q Yes, but the actual transfer was that by your recommendation and approval from them for the actual transfer?

A I believe so.

Q And the amounts of transfer?

A Actually, I think what happened was, about the time that we were ready to make up back allowable we began thinking about this gas injection and decided that we should not produce the wells that hard until we had injection started and so I don't believe we ever asked for any of that back allowable to be made up.

Q I see. I thought you had some of it.

A We had the right to produce it, but I don't think we ever exercised it.

MR. UTZ: You recall what was the case number of that or the order number? Do you happen to have it there?

MR. COOLEY: I will supply the Examiner with it.

MR. UTZ: We have got the information. I just thought maybe you had it on the end of your tongue.

A Incidentally, if I might add a little more regarding this transfer of allowable, although we are asking for the transfer of allowable, at this time I doubt seriously that for the same reasons stated earlier regarding gas channeling that we will actually ask for transfer of any allowable for quite some time, till the

pressures are built up. I have an idea we will not want to produce the area that hard until we have the pressure increased, but we would like to have the right to do it if and when injection turns out the way we hope it will.

MR. UTZ: Are there other questions of the witness? He may be excused.

(Witness excused)

MR. UTZ: Any statements? Case will be taken under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, KAY EMBREE, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge skill and ability.

Witness my Hand and Seal this 18th day of April, 1968.

Kay Embree
NOTARY PUBLIC

My Commission Expires:

November 19, 1971

I do hereby certify that the foregoing is
a full, true and correct record of the proceedings in
the hearing of Case No. 3743
heard by me on April 3, 1968
New Mexico Oil Conservation Commission

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE No. 3509
Order No. R-3181

APPLICATION OF PHILLIPS PETROLEUM
COMPANY FOR A PRESSURE MAINTENANCE
PROJECT, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on January 4, 1967, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 18th day of January, 1967, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Phillips Petroleum Company, seeks authority to institute a pressure maintenance project in its Vacuum Abo Unit Area, Vacuum-Abo Reef Pool, Lea County, New Mexico, by the injection of gas into the Abo Reef formation through the following wells in Lea County, New Mexico:

Shell Oil Company State "T" Well No. 6,
located 330 feet from the South line and
660 feet from the East line of Section 33,
Township 17 South, Range 35 East, NMPM, and

Standard of Texas Vac Edge Unit Well No. 11,
located 1650 feet from the North line and
1980 feet from the West line of Section 4,
Township 18 South, Range 35 East, NMPM.

(3) That initially the project area should comprise only the following-described area:

LEA COUNTY, NEW MEXICO

TOWNSHIP 17 SOUTH, RANGE 35 EAST, NMPM

Section 33: SW/4 SW/4, E/2 SW/4, and SE/4
Section 34: SW/4

TOWNSHIP 18 SOUTH, RANGE 35 EAST, NMPM

Section 3: N/2 NW/4 and SW/4 NW/4
Section 4: N/2, N/2 S/2, and S/2 SW/4
Section 5: NE/4 NE/4, S/2 NE/4, and SE/4

(4) That a pressure maintenance project comprising the above-described area is in the interest of conservation and should result in greater ultimate recovery of oil, thereby preventing waste.

(5) That the applicant further seeks the promulgation of special rules and regulations governing said pressure maintenance project, and the establishment of an administrative procedure whereby said project may be expanded for good cause shown and whereby additional wells in the project area may be converted to gas injection.

(6) That special rules and regulations for the operation of the Phillips Petroleum Company Vacuum Abo Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside the Vacuum Abo Unit Area producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the Vacuum-Abo Reef Pool until such time as the well has experienced a substantial response to gas injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the Vacuum-Abo Reef Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

IT IS THEREFORE ORDERED:

(1) That the applicant, Phillips Petroleum Company, is hereby authorized to institute a pressure maintenance project in its Vacuum Abo Unit Area, Vacuum-Abo Reef Pool, Lea County, New Mexico,

to be designated as the Phillips Petroleum Company Vacuum Abo Pressure Maintenance Project, by the injection of gas into the Abo Reef formation through the following-described wells in Lea County, New Mexico:

Shell Oil Company State "T" Well No. 6,
located 330 feet from the South line and
660 feet from the East line of Section 33,
Township 17 South, Range 35 East, NMPM, and

Standard of Texas Vac Edge Unit Well No. 11,
located 1650 feet from the North line and
1980 feet from the West line of Section 4,
Township 18 South, Range 35 East, NMPM.

(2) That Special Rules and Regulations governing the operation of the Phillips Petroleum Company Vacuum Abo Pressure Maintenance Project, Lea County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS
FOR THE
PHILLIPS PETROLEUM COMPANY
VACUUM ABO PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the Phillips Petroleum Company Vacuum Abo Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

LEA COUNTY, NEW MEXICO
TOWNSHIP 17 SOUTH, RANGE 35 EAST, NMPM
Section 33: SW/4 SW/4, E/2 SW/4, and SE/4
Section 34: SW/4

TOWNSHIP 18 SOUTH, RANGE 35 EAST, NMPM
Section 3: N/2 NW/4 and SW/4 NW/4
Section 4: N/2, N/2 S/2, and S/2 SW/4
Section 5: NE/4 NE/4, S/2 NE/4, and SE/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables

for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the Vacuum-Abo Reef Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the Vacuum-Abo Reef Pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the Vacuum-Abo Reef Pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the Vacuum Abo Unit Area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until such time as the well receives a substantial response to gas injection. When such a response has occurred, the well shall be permitted to produce up to two times top unit allowable for the pool. Production of such well at a higher rate shall be authorized only after notice and hearing. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the Vacuum-Abo Reef Pool, except that any well or wells within

the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the Vacuum-Abo Reef Pool within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2,000}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Each month the project operator shall, within three days after the normal unit allowable for Southeast New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 9. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 10. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection or gas will be confined to the Abo Reef formation.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

RULE 11. That the subject pressure maintenance project shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations insofar as said rules are not inconsistent with the rules prescribed by this order.

(3) That allowables to all wells in the Vacuum Abo Unit Area but outside the limits of t' Vacuum Abo Pressure Maintenance Project Area as defined herein shall be assigned and produced in accordance with the applicable Commission Rules and Regulations.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

esr/

Docket No. 10-68

DOCKET: EXAMINER HEARING - WEDNESDAY - APRIL 3, 1968

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING - SANTA FE, NEW MEXICO

The following cases will be heard before Elvis A. Utz, Examiner, of Daniel S. Nutter, Alternate Examiner:

CASE 3741: Application of Signal Oil and Gas Company to directionally drill, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to directionally drill the J. C. Williamson T.P. State Well No. 1 located 2126 feet from the South line and 1887 feet from the East line of Section 1, Township 16 South, Range 38 East, Lea County, New Mexico. Said well was drilled to a total depth of 13,140 feet and plugged back to 10,000 feet. Applicant proposes to set a whipstock at 10,310 feet and directionally drill to a depth of approximately 13,000 feet and to bottom said well in the Devonian formation at a point 2,160 feet from the South line and 1,250 feet from the East line of said Section 1.

CASE 3742: Application of Texaco Inc. for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Grayburg-San Andres formation through its State "C" NCT-2 Well No. 7 located in Unit G of Section 19, Township 20 South, Range 37 East, Eunice Pool, Lea County, New Mexico.

CASE 3743: Application of Benson-Montin-Greer Drilling Corporation for a pressure maintenance project, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a pressure maintenance project in the West Puerto Chiquito-Gallup Oil Pool by the injection of gas into the Niobrara member of the Mancos shale through one well located in Unit K of Section 13, Township 25 North, Range 1 West, Rio Arriba County, New Mexico. Applicant further seeks the promulgation of special rules for said project, including provision for future expansion, gas injection credit, and transfer of allowables.

CASE 3744: Application of Lloyd B. Taylor for pressure tests, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks authority to shut in his Vic Walker Well No. 1 located in Unit C of Section 6, Township 31 North, Range 13 West, La Plata-Gallup Oil Pool, San Juan County, New Mexico, to conduct pressure build-up tests, and to make up production lost during said tests at a later date.

CASE 3472: (Reopened)

In the matter of Case No. 3472 being reopened pursuant to the provisions of Order No. R-3136, which order established 80-acre spacing units for the Shoe Bar-Pennsylvanian Oil Pool, Lea County, New Mexico, for a period of eighteen months. All interested parties may appear and show cause why said pool should not be developed on 40-acre spacing units.

NEW MEXICO OIL CONSERVATION COMMISSION

Examiner Hearing

Santa Fe, NEW MEXICO

Hearing Date APRIL 3, 1968 TIME: 9 A.M.

NAME	REPRESENTING	LOCATION
Carl L. Whigham Jr.	Texaco Inc.	Midland Texas
Boots Kelly	Mobile Oil & Kelly	SF
Nina B. Dalsami	RW Byram & Co.	SF
D. J. Delaney	Signal Oil & Gas	Midland
C. M. Pederson	Signal Oil + Gas	Midland
P. T. McGrath	U. S. G. S.	Farmington
A L Green	R M G	Farmington
W. J. Cooley	Burr & Cooley	:
R. S Morris	MFAH&M	Santa Fe

BEFORE THE OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

'60 MAR 15 AM

IN RE: THE APPLICATION OF -

BENSON-MONTIN-GREER DRILLING CORP.

for an Order authorizing it to institute and carry on a Pressure Maintenance Project through the injection of gas into the West Puerto Chiquito Oil Pool in Rio Arriba County, New Mexico

Case 3743

APPLICATION

Comes now the applicant, Benson-Montin-Greer Drilling Corp., by and through its attorneys Burr & Cooley, 152 Petroleum Center Building, Farmington, New Mexico and respectfully makes application to the Commission as follows:

1. That applicant is the operator of the Canada Ojitos Unit located in the West Puerto Chiquito Oil Pool in Rio Arriba County, New Mexico.

2. That applicant desires to institute and carry on a Pressure Maintenance Project within the confines of the Canada Ojitos Unit, located in the West Puerto Chiquito Oil Pool in Rio Arriba County, New Mexico, by means of the injection of gas into the producing formation of said pool through the Canada Ojitos Unit well #2 (K-13) located in the SW/4 of Section 13, Township 25 North, Range 1 West, N.M.P.M.

3. Applicant also desires authority from the Commission to transfer the allowables that would otherwise be allocated to the above described injection well to other producing wells in the Canada Ojitos Unit.

DOCKET MAILED

Date 3-22-60

4. Applicant further desires authority from the Commission to transfer allowables from wells in the Canada Ojitos Unit which now have, or may hereafter have, high gas-oil ratios to other wells in the Unit in order to maximize the beneficial effect of the above referenced gas injection pressure maintenance project.

5. Applicant further desires authority from the Commission to allocate the total Unit allowable among the various producing wells in the Unit in such a manner as to obtain the optimum performance from the proposed pressure maintenance project.

6. That the relief requested above will result in the prevention of waste and an increase in the ultimate recovery of oil from the West Puerto Chiquito Oil Pool.

7. That the requested relief will not adversely affect the correlative rights of any offset operator, or other operator in the West Puerto Chiquito Oil Pool.

WHEREFORE, Applicant respectfully requests the Commission to set this Application down for hearing before an examiner at the earliest possible date and after having considered the evidence adduced at such hearing, that the relief requested above be granted in full, and that such other and further relief be granted as may seem just and proper to the Commission under the circumstances.

Respectfully submitted,

BURR & COOLEY

BY _____

William J. Cooley, Attorneys for
Benson-Montin-Greer Drilling Corp.
152 Petroleum Center Building
Farmington, New Mexico

Case 3743
Heard 4-3-68
Rec. 4-4-68

1. Grant Benson-Montin-Greer permission to establish a pressure maintenance project to be known as the B.M.G. West Puerto Chiquito Pressure Maintenance project in the West Puerto-Chiquito-Mancos oil pool.

Grant them permission to convert their Canada Ojito #2 (F-13) F-13-24N-1W. to a gas injection well.

Also set up an administrative procedure for the transfer of allowables from the injection well and high G.O.R. as well as additional injection wells.

Thos. Mabry

GOVERNOR
DAVID F. CARGO
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

P. O. BOX 2088
SANTA FE

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

April 11, 1968

Mr. William J. Cooley
Burr & Cooley
Attorneys at Law
152 Petroleum Center Building
Farmington, New Mexico

Re: Case No. 3743
Order No. R-3401
Applicant:
Benson-Montin-Greer

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC x
Other

BURR & COOLEY
ATTORNEYS AND COUNSELORS AT LAW
SUITE 152 PETROLEUM CENTER BUILDING
FARMINGTON, NEW MEXICO
87401

JOEL B. BURR, JR.
WM. J. COOLEY

April 10, 1968

TELEPHONE 325-1702
AREA CODE 505

Mr. Elvis A. Utz
New Mexico Oil Conservation Commission
Post Office Box 2088
Santa Fe, New Mexico

Dear Elvis:

Forwarded herewith is a log on Benson-Montin-Greer Drilling Corp.'s proposed injection well in the West Puerto Chiquito Pool which was the subject of NMOCC Case No. 3743. Also forwarded herewith are three copies of a diagrammatic sketch of the subject well. I would appreciate it if you would simply place the enclosures in the case file in order that they would be available in the event anyone should ever want to look at them.

When you receive this material, I would appreciate a collect telephone call in order that I might have some idea as to what the timing on this case would be.

Kindest personal regards,

Very truly yours,

BURR & COOLEY

By William J. Cooley

WJC-gp
Encl.

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE No. 3743
Order No. R-3401

APPLICATION OF BENSON-MONTIN-GREER
DRILLING CORPORATION FOR A PRESSURE
MAINTENANCE PROJECT, RIO ARRIBA
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on April 3, 1968, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 11th day of April, 1968, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction or this cause and the subject matter thereof.

(2) That the applicant, Benson-Montin-Greer Drilling Corporation, seeks authority to institute a pressure maintenance project in its Canada Ojitos Unit Area, West Puerto Chiquito-Mancos Oil Pool, Rio Arriba County, New Mexico, by the injection of gas into the Niobrara member of the Mancos shale through its Canada Ojitos Unit Well No. 2 (K-13), located in Unit K of Section 13, Township 25 North, Range 1 West, NMPM, Rio Arriba County, New Mexico.

(3) That initially the project area should comprise only the following-described area in Rio Arriba County, New Mexico:

TOWNSHIP 25 NORTH, RANGE 1 WEST, NMPM
Sections 10 and 11: All
Section 13: W/2
Sections 14 and 15: All
Section 16: E/2
Section 23: N/2
Section 24: NW/4

(4) That a pressure maintenance project comprising the above-described area is in the interest of conservation and should result in greater ultimate recovery of oil, thereby preventing waste.

(5) That the applicant further seeks the promulgation of special rules and regulations governing said pressure maintenance project, and the establishment of an administrative procedure whereby said project area may be expanded for good cause shown and whereby additional wells in the project area may be converted to gas injection.

(6) That Special rules and regulations for the operation of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project area in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside the Canada Ojitos Unit Area producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the West Puerto Chiquito-Mancos Oil Pool until such time as the well has experienced a substantial response to gas injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the West Puerto Chiquito-Mancos Oil Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

IT IS THEREFORE ORDERED:

(1) That the applicant, Benson-Montin-Greer Drilling Corporation, is hereby authorized to institute a pressure maintenance project in its Canada Ojitos Unit Area, West Puerto Chiquito-Mancos Oil Pool, Rio Arriba County, New Mexico, to be designated

as the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project, by the injection of gas into the Niobrara member of the Mancos shale through the following-described well in Rio Arriba County, New Mexico:

Canada Ojitos Unit Well No. 2 (K-13), located in Unit K of Section 13, Township 25 North, Range 1 West, NMPM.

(2) That Special Rules and Regulations governing the operation of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project, Rio Arriba County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS
FOR THE
BMG WEST PUERTO CHIQUITO-MANCOS PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area in Rio Arriba County, New Mexico, described as follows:

TOWNSHIP 25 NORTH, RANGE 1 WEST, NMPM
Sections 10 and 11: All
Section 13: W/2
Sections 14 and 15: All
Section 16: E/2
Section 23: N/2
Section 24: NW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 320-acre proration unit shall be top unit allowable for the West Puerto Chiquito-Mancos Oil Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the West Puerto Chiquito-Mancos Oil Pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the West Puerto Chiquito-Mancos Oil Pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the Canada Ojitos Unit Area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until such time as the well receives a substantial response to gas injection. When such a response has occurred, the well shall be permitted to produce up to two times top unit allowable for the pool. Production of such well at a higher rate shall be authorized only after notice and hearing. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the West Puerto Chiquito-Mancos Oil Pool except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected if any, into the West Puerto Chiquito-Mancos Oil Pool

within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2,000}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Each month the project operator shall, within three days after the normal unit allowable for Northwest New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 9. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 10. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas will be confined to the Niobrara member of the Mancos shale.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

RULE 11. That the subject pressure maintenance project shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations insofar as said rules are not inconsistent with the rules prescribed by this order.

(3) That allowables to all wells in the Canada Ojitos Unit Area but outside the limits of the BMG West Puerto Chiquito-Mancos Pressure Maintenance Project Area as defined herein shall be assigned and produced in accordance with the applicable Commission Rules and Regulations.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

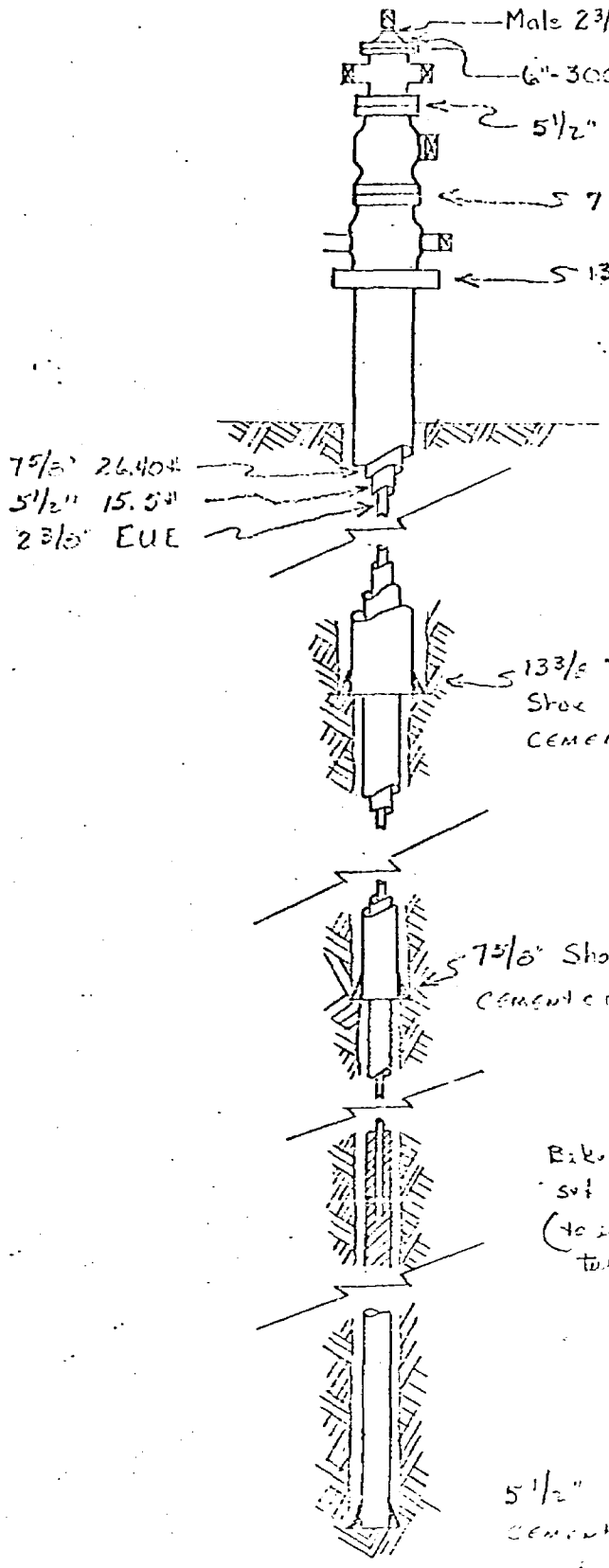
GURTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

esr/

PLATE 5-A

GAS INJECTION MAP



BENSON-MONTIN-GREER

C.O.U. # K-13

GAS INJECTION WELL

13 3/8" Surface Casing
Shoe at 305' RKB
CEMENTED WITH 350 SACKS - CIRCULATED.

7 5/8" Shoe at 4898' R.K.B.
CEMENTED WITH 400 SACKS - TOP CEMENT 3700'

Baker Model "N" Packer
set at 5865'
(to unlatch from Baker notch 12-15
turns to right and lift stinger out)

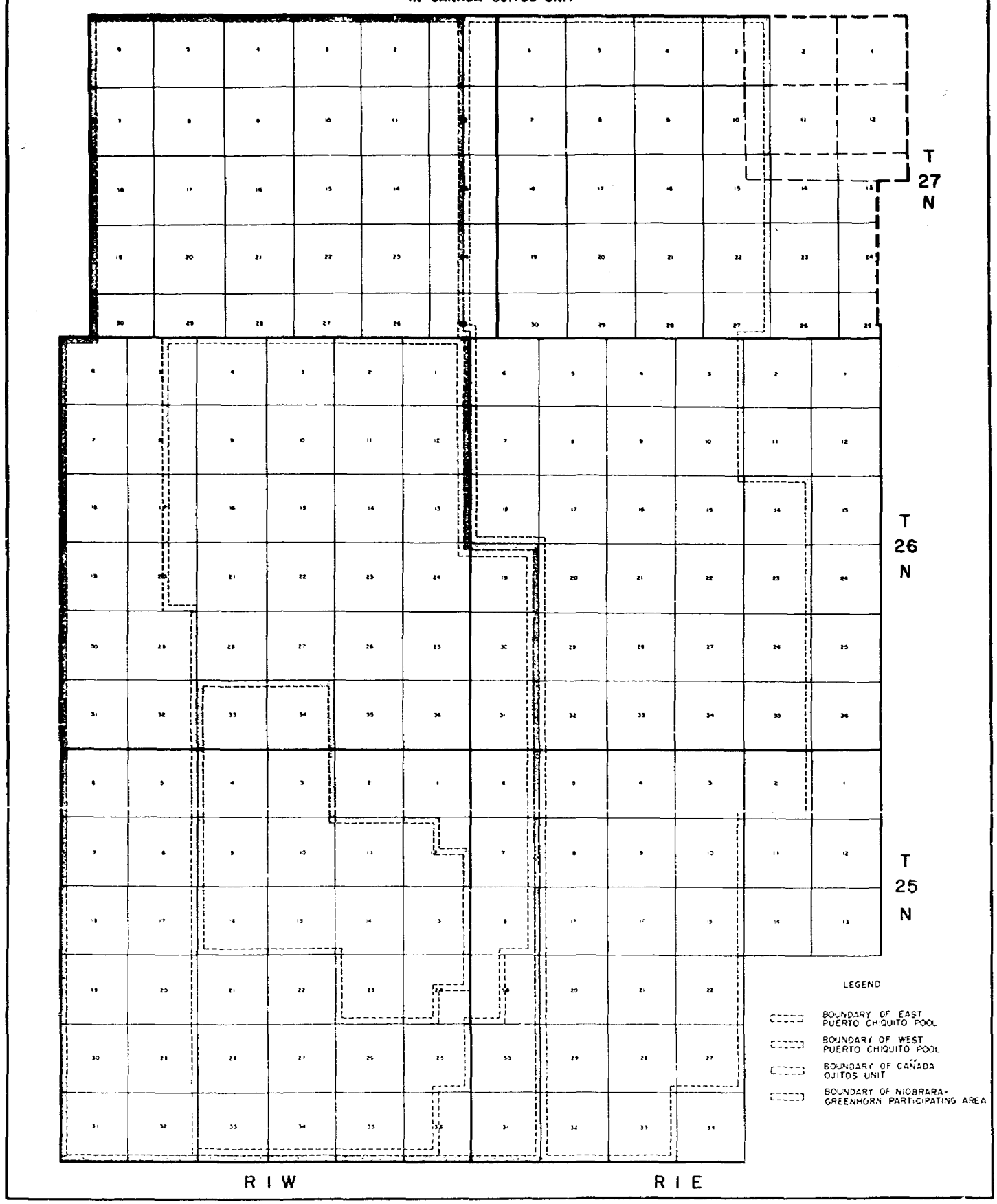
5 1/2" Shoe at 5976' R.K.B.
CEMENTED WITH 100 SACKS - TOP CEMENT 4500'

OPEN HOLE 5976' to 6072'

BENSON-MONTIN-GREER DRILLING CORP.
EXHIBITS IN CASE NO. 3743
BEFORE THE
NEW MEXICO OIL CONSERVATION
COMMISSION
APRIL 3, 1968

PLAT OF PUERTO CHIQUITO POOLS

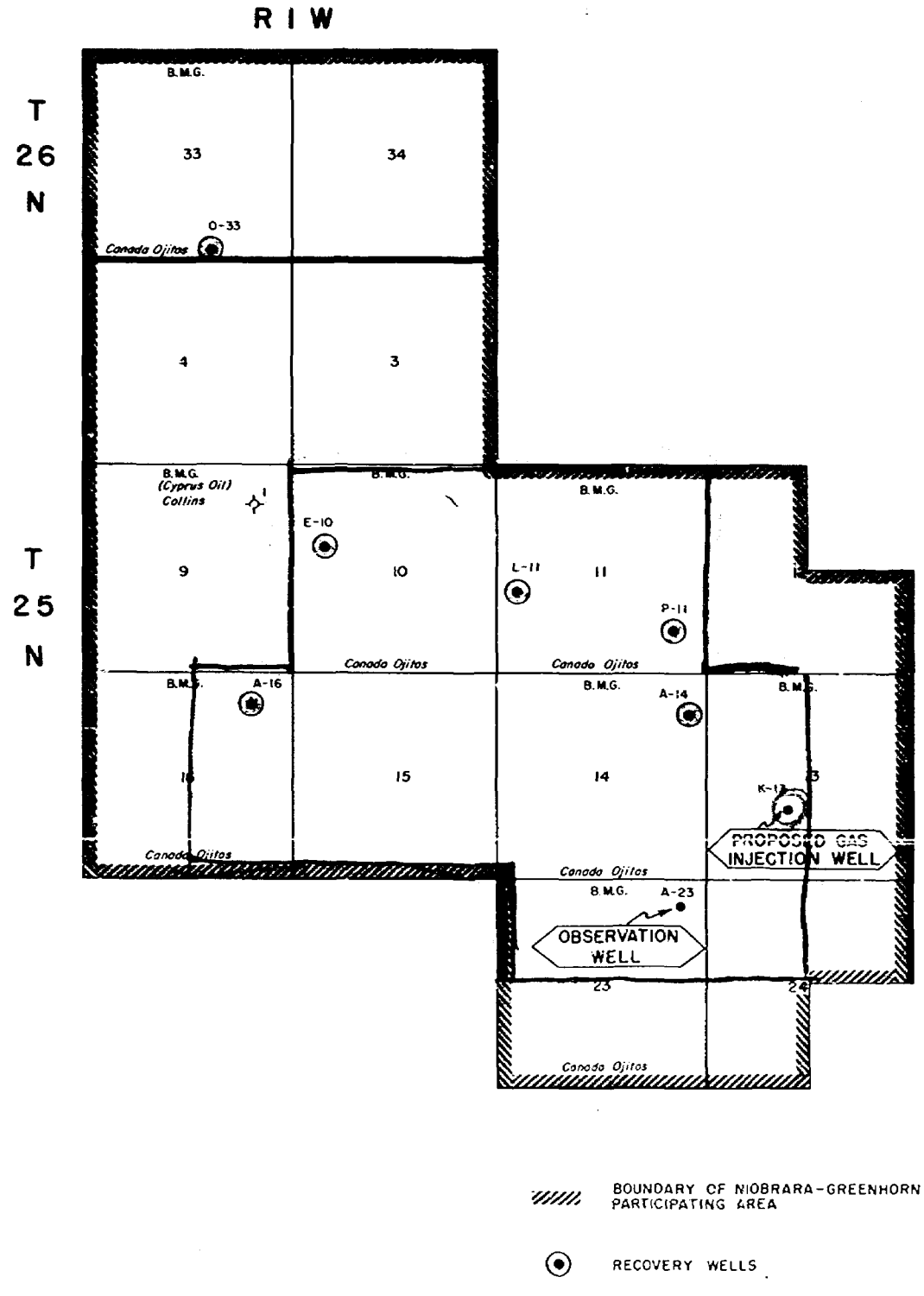
RIO ARRIBA COUNTY, NEW MEXICO
SHOWING LOCATION OF
NIOBRARA-GREENHORN PARTICIPATING AREA
IN CAÑADA OJITOS UNIT



PLAT OF NIOBRARA-GREENHORN PARTICIPATING AREA

IN CAÑADA OJITOS UNIT
WEST PUERTO CHIQUITO POOL

RIO ARRIBA COUNTY, NEW MEXICO



BOTTOM HOLE PRESSURE SURVEY
CANADA OJITOS UNIT NO. A-23

DATE	PRESSURE (PSIG) AT 6300' (RKB) FOR PRESSURE GAUGE INDICATED			AVERAGE PRESSURE ADJUSTED TO DATUM OF + 1195'
	Amerada #42	Amerada #43	Average	
3-28-67	1482.0	1480.0	1481.0	~~1337.0~~ 1327.0
3-20-68	1431.5	1432.9	1432.2	1328.2

LOCATION STRUCTURALLY OF BUBBLE POINT PRESSURE
CANADA OJITOS UNIT NIOBRARA-GREENHORN PARTICIPATING AREA

PRESSURE IN A-23 ADJUSTED TO DATUM OF + 1195' (from Section J)		PRESS. DIFF. TO BUBBLE POINT PRESS. OF 1520 (psig)	DEPTH DIFF. AT .312#/in^2/ft. (feet)	DATUM OF BUBBLE POINT PRESS. (1195 - depth diff.)	EQUI-VALENT DEPTH OF CONTOUR MARKER ZONE "A" (240' higher than pay)
Date	Press. (psig)	(psig)	(feet)		
8-11-65	1506.3	14	45	1150	+ 1390
10-14-65	1483.1	37	119	1076	1316
12-21-65	1455.3	65	208	987	1227
5-13-66	1419.3	101	322	873	1113
8-30-66	1406.0	114	366	829	1069
1- 1-67	1391 (est)	129	415	780	1029
3-28-67	1377	147	470	725	965
7- 1-67	(est)*				926 *
3-20-68	1328.2	192	615	580	820
3- 1-68	(est)**				834 **

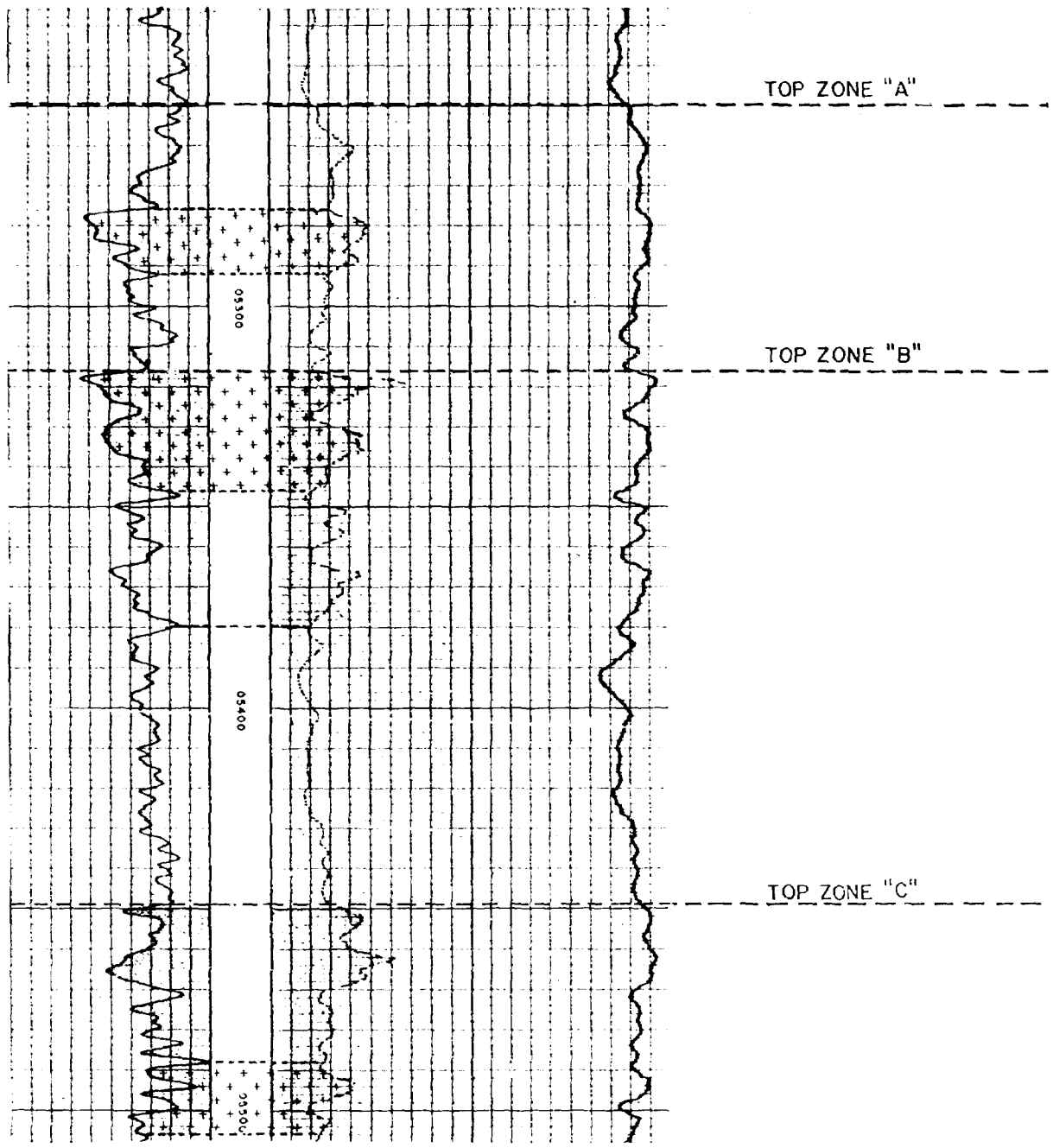
* From drop in fluid in A-23 of 39 feet March 28 to July 1, 1967.

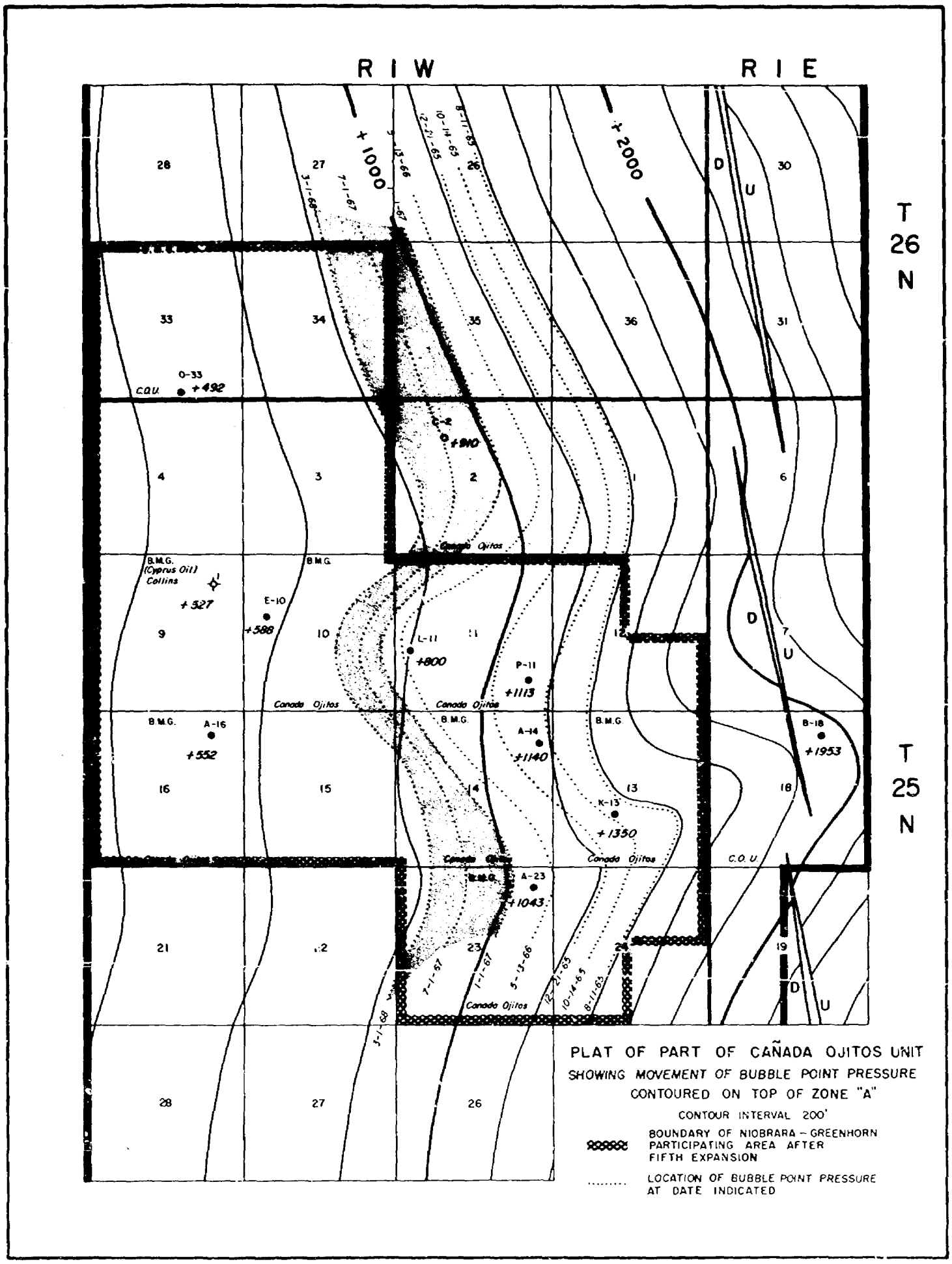
** From drop in fluid level in A-23 of 14 feet from March 1 to March 20, 1968.

IDENTIFICATION OF MAIN PRODUCING ZONES
NORTHEAST PUERTO CHIQUITO
AND
SOUTHWEST PUERTO CHIQUITO

BENSON-MONTIN-GREER DRLG. CORP.

CAÑADA OJITOS UNIT NO. B-18





PLAT OF PART OF CAÑADA OJITOS UNIT

SHOWING MOVEMENT OF BUBBLE POINT PRESSURE CONTOURED ON TOP OF ZONE "A"

CONTOUR INTERVAL 200'

BOUNDARY OF NIOBRARA – GREENHORN PARTICIPATING AREA AFTER FIFTH EXPANSION

LOCATION OF BUBBLE POINT PRESSURE AT DATE INDICATED