

CASE 2546: Application of THE  
BRITISH AMER OIL PROD. CO. for a  
waterflood project in JALMAT POOL.

and for water flood project  
in Jalmat Pool, and  
waterflood project.

5-110.

2546

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fiction, Transcript,  
// Exhibits, Etc.

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BEFORE THE  
OIL CONSERVATION COMMISSION  
SANTA FE, NEW MEXICO  
April 25, 1962

IN THE MATTER OF:

Application of the British American Oil  
Producing Company for a unit agreement  
Lea County, New Mexico. Applicant, in  
the above-styled cause seeks approval  
of the Jalmat Field-Yates Sand Unit  
Agreement embracing 2,760 acres, more  
or less, of State and fee lands in  
Township 22 South, Range 35 East,  
Lea County, New Mexico.

CASE

2545

Application of The British American  
Oil Producing Company for a waterflood  
project, Lea County, New Mexico.  
Applicant, in the above-styled cause  
seeks permission to institute a water-  
flood project in the Yates formation in  
the Jalmat Pool in an area underlying its  
proposed Jalmat Field-Yates Sand Unit  
Area, comprising 2,760 acres, more or  
less, in Township 22 South, Range 35  
East, Lea County, New Mexico, with  
injection of water initially to be  
through 16 wells located within said unit  
area, the project to be governed by the  
provisions of Rule 701.

CASE

2546

BEFORE:

Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: Case 2545.

MR. MORRIS: Application of the British American Oil  
Producing Company for a unit agreement, Lea County, New Mexico



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MR. SPERLING: James E. Sperling, Modrall, Seymour Sperling, Roehl & Harris, Albuquerque, appearing for the applicant. Associated with me is Frank Allen of our office.

MR. UTZ: Mr. Sperling, would you like to consolidate these two cases for purpose of testimony?

MR. SPERLING: Yes, sir, I was going to request that that be done for the purpose of the testimony. There will be testimony relating to both applications. There will be one exhibit which is the unit exhibit or the unit agreement which will be applicable, of course, to 2545. The other exhibits will be applicable to 2546 and have been so marked.

MR. UTZ: For the purposes of testimony, cases 2545 and 2546 will be consolidated. Are there other appearances in this case?

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe. I would like to enter an appearance in both cases in behalf of Amerada Petroleum Corporation.

MR. UTZ: Are there other appearances? You may proceed.

(Whereupon, Applicant's Exhibit  
1 Marked for Identification)

MR. SPERLING: Mr. Examiner, we have three witnesses, George Judd, Mr. L G. Fearing and Glenn Rader.

MR. UTZ: Will you all three stand and be sworn at once?



(Witnesses sworn)

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

DIRECT EXAMINATION

BY MR. SPERLING:

Q Mr. Judd, state your name and your employer, your occupation and your place of residence.

A George B. Judd, The British American Oil Producing Company is my employer; I live in Dallas, Texas.

Q What is your capacity with British American?

A I have the position of Unit expediter.

Q Have you previously testified before this commission?

A I have not.

Q Mr. Judd, would you briefly give a resume of your educational and professional experience and background?

A I was graduated from the University of Minnesota with a Bachelor's Degree in Petroleum Engineering in 1951. I worked for six and a half years with Pan American Petroleum Corporation in Wyoming as a production and reservoir engineer. For the past four years, approximately, I worked with The British American Oil Producing Company as a production and reservoir engineer and the last three of which have been as Unit Expediter.

MR. SPERLING: Are Mr. Judd's qualifications accep-

table?

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MR. UTZ: Yes, sir, they are.

Q (by Mr. Sperling) Mr. Tudd, you are familiar with the application which has been filed in Case 2545, are you not, relating to the unit agreement, proposed unit agreement?

A I am.

Q I will refer you to what has been marked as Exhibit 1 in Case 2545, and ask you if that is the proposed unit agreement for this area as designated in the application?

A Exhibit 1 is the executed draft of the unit agreement. There's been some revisions made to the unit agreement from the agreement that was attached to our application.

Q And the Exhibit marked for identification as Number 1 is the proposed final copy of the unit agreement?

A That's correct.

Q Would you state briefly what those changes are, that is as between the unit agreement submitted with the application and Exhibit 1?

A Changes are located on Page 13, Paragraph 9, Point 1, Point 2; Page 15, Paragraph 12, Point 1; Page 19, Paragraph 13, Point 1; and also on Page 19, Paragraph 16, Point 3.

Q State in substance what language has been added or deleted so far as these changes are concerned.

A The revision of Paragraph 9, Point 1, Point 2, on Page 13, we added language which would require that the Commissioner of Public Lands of the State of New Mexico would approve. I

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...that's inclusion of ...  
the addition of Page 13 is to Paragraph 9, Point A, ...  
and the actual addition is to require that the Commissioner of  
Public Lands approve any revised exhibits before they'd become  
effective. On Page 15, Paragraph 12, Point 1, the revision  
is to require approval by the Commissioner of Public Lands and  
the Commission, the Oil Conservation Commission, for enlargement  
to the unit area. Page 19, this is Paragraph 13, Point 1, which  
begins on Page 18, the revision is on 19 and it has to do with  
the extension of time between cessation of unit operations and  
the automatic termination of the unit agreement from 90 to 180  
days. Also on Page 19, Paragraph 18, Point 3, on the execution  
form, everything after the first sentence has been deleted from  
the form which was originally submitted with the application.

Q Does that conclude the changes?

A One minor change on the execution papers, the Phillips  
Petroleum Company has been deleted on Page 21.

Q Were the changes which you have just enumerated  
suggested largely from the unit division of the office of  
Commissioner of Public Lands?

A They were.

Q And the revised addition, which is Exhibit Number 1  
in 2545, has been submitted to the office of the Commissioner  
of Public Lands?

A It has.



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Q Mr. Judd, there are appended to Exhibit Number 1 two exhibits. Would you refer to those, please, and tell us what they are and what, if any, changes have occurred with reference to the unit area as reflected on the two exhibits referred to?

A Exhibit A to the unit agreement is the tabulation which includes the description of the land within and unit area, the number of acres in each tract or lease, the lessee of record, the State Land Department lease number, and the division of ownership of each lease plus the primary and secondary participation of each unit tract. Changes from Exhibit A or Exhibit 1 from the originally submitted unit agreement are a result of the deletion of the Phillips Petroleum Company lease from the unit area.

Q Where is that tract located?

A The tract is located, or described, or can be described as the South half of the Northeast quarter of Section 10 or 22 South, 35 East.

Q Referring to Exhibit B of the unit agreement, Exhibit 1 in this case, does that designate the unit area and the presently producing wells within the unit area?

A It does.

Q Any other information contained on Exhibit B that should be referred to, is it self explanatory?

A I believe it's self explanatory. The numbers, of





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course, refer to the tract numbers as numbered on exhibit A.

Q Now, it would appear from Exhibit A to the unit agreement that 2,640 acres out of 2,680 acres is land under which the State of New Mexico owns the minerals, is that correct?

A That's correct.

Q And there is only one fee tract which contains forty acres?

A That's correct.

Q What percentage of the royalty interest has been committed to this unit agreement, assuming approval by the Commission, of course?

A The Commissioner of Public Lands has approved the unit agreement as to form and content. Assuming that they will also approve the unit agreement, we can say one hundred percent of the royalty has approved, or will ratify, the unit agreement.

Q Have you been furnished with a letter from the office of the Commissioner of Public Lands indicating their approval as to form and content of the agreement?

A Yes, I have.

Q And you have that in your possession?

A Yes.

Q What percentage of the working interest within the unit area has been committed, and what is the status of



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execution?

A Currently 58.2 percent of the working interest on a primary participation basis have ratified the unit agreement and unit operating agreement; on a secondary participation basis the percentage is, 73.6 have ratified for the working interest.

Q What is the status of execution of outstanding working interest?

A There are three outstanding working interest owners who have not ratified, and all of them have indicated that they would in the near future.

Q Has the revised unit agreement been submitted or circulated among these working interest owners?

A It has.

Q And coincident therewith, I assume, operating agreement has been circulated?

A That's correct.

Q Does the operating agreement designate British American Producing Company as the operator?

A Yes.

Q Of the unit area?

A Yes.

MR. SPERLING: That's all the questions I have of this witness at this time.

MR. UTZ: Are there questions of the witness?

MR. MORRIS: Yes, sir, I have a question.



MR. UZZ: Mr. Morris.

CROSS EXAMINATION

BY MR. MORRIS:

Q Mr. Judd, is there any good reason for having taken in only such acreage in this area within the unit as has been done here? I'm particularly concerned with, say, the South half of 13 and all of Section 24 and the Southeast quarter of Section 23.

A The unit area, as shown on Exhibit B to the unit agreement, has been agreed to mutually by all the operators within the field. The operators in the area to which you made reference are in the process now of forming a second unit.

Q I see.

A Does that answer it?

Q Does the acreage within the unit conform in some way to a separate geological structure or --

A From the acreage in Section 24?

Q Yes.

A No, it doesn't; it's the same reservoir.

Q There's no discontinuity along the lines of the unit?

A No, sir.

Q I notice that there is a well up in the Northwest of the Southwest of Section 2, that's immediately adjacent to your unit boundary. Could you tell me whether the owner or that well was given an opportunity to join the unit?

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A The owner as yet has not been given an opportunity to join because as stated in Exhibit I here, the participation in the unit is based on certain parameters, production and reserves. The operators within the unit have decided to extend to the operator of this well the opportunity to join at such time that we can determine the equity for the well. It's recently been completed and as yet I'm positive that we can't make a realistic reserve determination for it.

Q Who is the operator of that well?

A Ross, William G. Ross; he's in Midland, Texas.

Q Does your unit have the usual provisions with respect to subsequent joinder within the unit area as now defined?

A Yes, sir.

MR. MORRIS: I believe that's all. Thank you.

MR. UTZ: Are there other questions: The witness may be excused.

(Witness excused)

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

DIRECT EXAMINATION

BY MR. SPERLING:

Q State your name, place of residence, employer, and occupation.

A My name is Louis G. Fearing. I live in Midland,



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Texas and am employed by British American Oil Producing Company as a geologist.

Q Have you testified before the Commission on previous occasions?

A No, sir.

Q Would you give us a brief resume of your educational and professional experience, Mr. Fearing?

A I was graduated with a B. S. in geology from the University of Oklahoma in 1950 and spent nine years with Pan American which five years was spent in Oklahoma as a geophysicist and four years in West Texas and central Texas as a geologist. At that time I took a job with British American, I have been with them almost three years working New Mexico exclusively.

Q In the course of the performance of your duties with British American, have you had occasion to make a geological study of the area designated as the Jalmat field in Lea County, New Mexico?

A Yes, and in addition to that, I have studied areas similar to it, relative to the Capitan Reef facies.

(Whereupon, Applicant's Exhibits 2 and 3 marked for identification)

Q I want to call your attention to the exhibit which has been marked Exhibit 2 in this matter, and ask you to explain to the Commission, by reference to the exhibit on the



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well, if you choose to do so, that information is shown thereon and that information is pertinent from the standpoint of the geology of the unit area and the surrounding area with which we are concerned in this case.

A Well, Exhibit Number 2 is a structure map which is contoured on top of the first Yates Sand member of which we are dealing with. The contour interval is fifty feet. The unit area is the hashed line right here. As far as dip is concerned, there is one area in which the dip may exceed three hundred feet per mile, but in most --

Q Excuse me, Mr. Fearing, for interrupting, but before we get into your analysis of the geological features of this particular area, would you refer to the legend and indicate what information is shown thereon and its relevancy so far as this matter is concerned?

A All right. According to the legend within the unit we have proposed injection wells, and proposed injection wells in the future, both of these will be discussed by the engineer subsequently. Also, on this map we have designated wells which are producing from the Jalmat, Yates, Seven Rivers, and wells in purple producing from the Seven Rivers, Queen. Then the orange lines are the east-west structural cross section and a north-south stratigraphic cross section through the unit.

Q If I may interrupt you again, I assume that the lines of cross section that you have indicated on Exhibit 2 are the



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cross sections which appear as Exhibit 3 which has been so marked and which we have distributed?

A That is correct. The east-west structural cross section is the bottom half of Exhibit Number 3 and the north-south stratigraphic section is the upper half of Exhibit Number 3.

Q Now, the information, that is the wells indicated on Exhibit Number 2, show the location of wells producing from all formations within a radius in excess of two miles from the unit area, is that correct?

A That is correct, and the interpretation has been extended to that point also.

Q Continue, Mr. Fearing, with your geological explanation of your findings as a result of the study that you have made.

A The reservoirs that we're dealing with are the various Yates Sand members of that formation which is upper Guadalupe in age. In order to explain the contours of these sand members, I would like to refer you to this small diagram down at the bottom in the enclosure in Exhibit Number 3 which is a simplified schematic diagram of how these formations were deposited. Briefly, as the Capitan Reef, which is well known in geological circles here in New Mexico, as the Capitan Reef built to a certain level, it's my interpretation that a



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lagoon area shoreward was built behind this reef and there was subsequent sorting of these sandstones into a suitable reservoir type sand, and as we approached the Capitan Reef proper, these sands are slightly more dolomitic and consequently less permeable, and as we approach this shelf area, or we'll say the pinch out zone on the east side of the field, the sands become tight by virtue of the cementing material within the sand grain such as red clay and so forth. This is a cyclic thing. At the termination of any one sand body there came a deposition of dense impermeable dolomite and then the cycle was repeated over and over again until we have the various sand bodies laid down. Then the entire system was tilted such that we have this structural configuration now tight, and in doing so we have trapping of hydrocarbons up to this point, which I have shown as the purple line on Exhibit Number 2. It is there that the oil and gas of these Yates Sand members have been trapped and that is why this line is shown such as it is.

Now, if you will refer to Exhibit Number 3, which is the north-south stratigraphic section through the unit, this was constructed to demonstrate the good continuity between each of the sand members of the Yates formation and also shows the continuity of the dolomite beds which are tight and very impermeable between the sand bodies. It is this reason that I think that each of the sand bodies must be treated separately





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in this water-flood system. The bottom half of Exhibit Number 3, as has been stated before, is the structural cross section and it shows also the continuity in the other dimension of the sand bodies and the intervening dolomite beds and also shows the deterioration in reservoir properties as we move towards the East and to this Skelly dry hole which sits right ere.

Q What other information did you have available, beside the logs that are shown in cross section north and south and east and west, for the purpose of correlation of these logs?

A As far as understanding the rock characteristics within this unit British American has cored 15 wells. These are not exhibits which I present, but I have with me samples of detailed core description plotted against the gamma ray neutron logs and that is the way we determined exactly what each one of these kicks, as we say in logging, what it actually means. We went from this type of study on to the cross sections and interpreted, of course, in areas which we did not log, what the formation would be. As far as the rock characteristics go, we are dealing with a grain sandstone in each one of these sand bodies. The first two zones have permeabilities which are not outstanding and probably are the cause of low primary recovery. The third sand member has fair to good permeabilities, but the type sand we're dealing with is practically the same in each sand body. Now this is what I see in summarizing this thing. The sand bodies have good continuity



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over the proposed unit. I can see no reason why an effective waterflood cannot be accomplished in this area.

Q Do you have anything else to add, Mr. Fearing?

A Well, I would like to know if there are any questions.

Q Yes, we'll get to that. You may resume your seat and I will ask you if exhibit 2 and 3 were prepared by your or under your supervision?

A They were prepared by me.

MR. SPERLING: That's all I have at this time.

MR. UTZ: Are there questions of Mr. Fearing?

MR. MORRIS: Yes, sir.

MR. UTZ: Mr. Morris.

CROSS EXAMINATION

BY MR. MORRIS:

Q First I would like to make sure I have your name right, Fearing?

A F-e-a-r-i-n-g.

Q Mr. Fearing, I believe that you said in this waterflood project each of these sand bodies should be treated separately. Do you mean by that as sort of a separate waterflood project in its own sense?

A No, sir. In fact I think that this explanation should be left up to our engineer. Let me explain what I mean in geologic terms. There is nothing we can do to one sand



body that would influence the other because we have intervening tight zones between them.

Q Do you have the information with respect to the porosities and permeabilities of each of these zones or does your engineering witness have those too?

A He has that.

MR. MORRIS: I believe that's all I have. Thank you.

BY MR. UTZ:

Q Mr. Fearing, am I to understand that the water injection in these proposed injection wells will be only in the sand members of the Yates formation?

A Yes, sir.

Q And that all production to the Northeast from the wells shown on your Exhibit Number 2 are producing from members lower than the Yates-Seven Rivers, for example?

A The wells which are colored yellow, to the right of that purple line, I interpret to be producing from the Seven-Rivers formation and from zones which are lower than those which are proposed to be flooded. The reason, I believe that if you will look to the West of those wells, you'll notice that Carper and Skelly and Roach and others have drilled dry holes between that production, and in talking to these people and getting information from them, the Yates formation was thinning in those zones, and also the character of the rock was such that that is what created the trap. They were

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holding the same in front of him. He then said he saw evidence that there is a needle in the middle which is colored yellow on the right side of the needle and blue on the left side.

Q I presume your engineering education will enable you as to the exact point of injection?

A Yes, sir.

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

(Witness removed)

L. GLENN RADER, called as a witness, testified on direct, sworn, was examined and testified on the stand.

DIRECT EXAMINATION

BY MR. SPERLING:

Q State your name, place of residence, where employed and in what capacity.

A L. Glenn Rader, Junior. Reside in Indiana, employed by British American Oil Producing Company as district engineer.

MR. UTZ: Would you spell your name, please?

A R-a-d-e-r.

Q Have you previously testified before the Commission?

A No, I have not.

Q Would you give us a resume of your educational and experience background, professionally?

A I have a B. S. Degree in petroleum engineering and



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Mechanical Engineering. I was employed for five years in Colorado, Kansas, Nebraska, with British American in various engineering capacities; two years in South Louisiana and; I have been in the present capacity for the past two years in Midland.

Q In your capacity as district engineer for British American Oil Producing Company, have you had occasion to do a study of the Jalmat Yates Field in Lea County, New Mexico?

A Yes, sir, I have.

Q And that is the area which is depicted in Exhibit Number 2 which you have before you and to which you are referring?

A That is correct.

(Whereupon, Applicant's Exhibit 4 Marked for Identification.)

Q From the standpoint of reservoir characteristics, which you have found to be present in this field, I would like to refer you to Exhibit Number 4 and ask you to explain the information which is contained on that exhibit and expand upon it in those areas where you feel it necessary and with relation to the area as shown on Exhibit 2.

A The Yates Sand in this area has an average thickness of approximately forty feet with an average porosity of 21½ percent, an average permeability of 18 percent, as determined by core analysis. Permeabilities ranging from 1/10 of a



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millidarcy up to and greater than 200 millidarcies. This variation in permeability is more of a variation between the various sand members rather than a wide variation within any given sand member. However, it should be pointed out that there certainly are variations within each sand member. The original bottom hole pressure of this reservoir was 1400 PSI, the current bottom hole pressure is estimated to be approximately 500 PSI. This reservoir is in the advanced stripper stage of completion, it's a solution gas-drive reservoir. The average production from the 45 wells within the unit area is 10.7 barrels per day, accumulative production to April 1, '62 is one million five hundred seventy thousand barrels. It's estimated from decline curve analysis that ultimate primary recovery from this reservoir will be 1.9 million barrels, or remaining primary reserves of four hundred thousand barrels. It is planned that we will inject water into the upper two sand members simultaneously, be isolated from the water injected into the lower sand member. The water source is yet to be determined, but from the geologic control in the general area, as well as the Capitan Reef section encountered in the Hall State D 1, in Section 23, it is believed that the 1600 feet of Capitan Reef section will be more than adequate to meet out water needs.

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



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Q Before we get to Exhibit Number 2, Mr. Rader, referring now to Exhibit Number 2, would you point out that initially the area of injection appears to be in the, what we might call the Northwestern section of the unit area, and possibly into the middle section?

A That is correct. The purpose of this, of course, is to prevent migration and drainage by the wells to the Southeast. The presently proposed, or the initial injection wells are shown in solid triangle on Exhibit Number 2, and the future injection wells are shown in a dashed triangle on the same exhibit. At such time as the operators to the southeast commence a waterflood project of their own, it is anticipated that we will expand our injection system to the southeast and form some type of cooperative agreement with these operators.

Q Now, Mr. Rader, is there any further explanation you want to make at this time of the data contained on Exhibit Number 4 with reference to the proposed injection plan?

A Well, as shown on Exhibit Number 2, we are proposing an 80 acre five spot pattern and it is anticipated that the initial injection rates will be 350 barrels per day per well, and that the increased ultimate recovery from this reservoir, as a result of this waterflood, will be approximately two million barrels.

Q I assume that the 350 barrels per day initial water



Injection rate will be divided between the first and second member and the third member, is that correct?

A That is correct.

Q In what proportion?

A Approximately equally.

Q Before I interrupted you, you were talking about the source of water supply for injection purposes. I will ask you now to refer to Exhibit Number 5 and ask you to explain the information contained on that exhibit.

A That is a schematic diagram of a typical water supply well. To date we have not drilled a water supply well although we anticipate commencing the well in the near future to test the Capitan Reef in our unit area. We plan to set 24 inch conductor pipe approximately thirty feet, cement it to the surface, 13 and 33 inch casing at 21 hundred feet, cement it to the surface and have 8 and 5/8 liner run from the top of the reef into the 13 and 3/8 casing. It is anticipated that due to the bottom hole pressure of the Capitan Reef in this area, we'll have a high working fluid level and that we should be able to obtain an adequate source somewhere in the range of 700 to a thousand feet.

Q What is the location of your proposed water supply well?

A Our proposed location would be in the center of the West half of the Northeast of the Northwest of Section 14

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which is on our Merchant's Livestock Lease. This well will be approximately 350 feet from our Merchant's Livestock Company Number 1 well.

Q I believe you made reference previously to the Hall State 1 Well --

A That is correct.

Q -- as indicative of the sufficiency of water supply?

A That is correct. We do not have an exhibit present --

Q Would you identify that well specifically, please?

A That well is located on the Northeast, Northeast of Section 23.

Q And your conclusions are based upon the electric logs run on that well as to that of water source?

A That is correct, as well as subsurface control of other wells in the general area.

Q Do you wish to add anything else with reference to Exhibit 5?

A No, I don't believe so.

(Whereupon, Applicant's Exhibit 5 marked for identification)

Q I will direct your attention now to Exhibit Number 6, and ask you to explain the information shown thereon and what it is.

A This is a schematic diagram of a typical producing well. This shows that we have approximately 350 feet of



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8 and 5/8 surface casing cemented to the surface, and that casing has been set through the Yates Sand in all cases and the cement has been circulated up to above the rustler section.

Q Is the rustler a salt section?

A It has some salt in it.

Q Is this exhibit typical of the casing program which has been followed on all of the wells in the proposed unit

A This is typical. This exhibit shows five and a half casing, however, some wells do have four and a half casing, but other than that it is typical of well in the unit area.

Q Does any other significant information appear on this exhibit, other than already touched on by you?

A No, sir.

(Whereupon, Applicant's Exhibit 7 marked for identification)

Q I will refer you, Mr. Rader, to Exhibit Number 7, and ask you to explain what that is and what information is contained on it.

A This is a typical injection well. At this time I want to point out, of course, that we do not anticipate drilling any injection wells, but currently producing wells will be converted to injection wells in this project and this is a schematic diagram of a typical installation after conversion from a producing well to an injection well. This diagram shows that water will be injected down two inch tubing below



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in water into the well. The water is injected into the upper two zones, and the lower zone. Water will be injected into the annulus between the tubing and the casing into the upper two zones, and the water measured into each.

Q As indicated, I assume that this diagram will be typical of the procedure to be followed on all of the wells to be converted to injection wells.

A That is correct.

(Whereupon, Applicant's Exhibit 3 marked for identification)

Q While on the subject of injection wells, Mr. Rader, I will refer you to what's been marked as Exhibit Number 8, and ask you to state what that is.

A This is a log of our new H B Number 9 Well which is the log of a typical injection well in the proposed unit area. This indicates the first, second and third sand members and the fact that they are isolated by the dolomite zone between as well as indicating the perforation therein.

Q There is information contained on these logs, that is, that has been supplied other than the log information itself, isn't that right?

A That is correct.

Q As to perforations and designation of zones?

A That is correct.



(Continued, Additional Exhibit  
Number for Identification)

Q Mr. Utz, would you like to refer to what's been marked as Exhibit Number 2 which relates to the completion and production data, and explain to the witness the information as contained thereon, and make such enlarged explanation sufficiently to be appropriate.

A This is nothing more than a tabulation of statistical information relative to each individual well in the proposed unit area. This lists the completion date and the overall zone which has been perforated in each well. It should be pointed out that the individual perforations in each well are not listed but that each well has been selectively perforated within the interval indicated. The initial potential for each well listed on a daily rate as well as the monthly production during March of 1962. It may be readily seen that the reservoir is in an advanced stripper stage of depletion by comparing the two.

MR. UTZ: This is actually on a monthly rate, isn't it?

A The initial potentials are on daily rates, but the March '62 production is a monthly rate as shown.

Q Have you made a, possibly you testified to this before, but have you made a computation of the average daily production of the wells within the unit area?

A That is correct. It is 10.7 barrels per day currently

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or during March of 1962.

Q Have the list, or wells listed on Exhibit 9, with the intervals of perforation indicated thereon been uniformly perforated in all three members into which you propose to inject?

A In the majority of the cases they have been, however, there are certain isolated wells in the unit area which have not been perforated in all three members. It is our intention that all wells will be perforated, in all three members, prior to commencement of this project.

Q Will it be necessary to treat these formations again, that is by fracture?

A It is possible that it will be necessary.

Q And you are prepared to do that?

A If necessary.

Q Do you care to make any further explanation of Exhibit 9?

A No, sir, I don't believe any further explanation is necessary.

MR. SPERLING: That's all I have at this time.

MR. UTZ: Any questions of the witness?

MR. MORRIS: Yes, sir.

MR. UTZ: Mr. Morris.

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CROSS EXAMINATION

BY MR. MORRIS:

Q Mr. Rader, what considerations lead you to selectively inject and install a packer to separate your two injection zones in the injection wells?

A Due to the permeability variation between the lower member and upper two members. It was felt that the majority of the primary production has been obtained from the lower sand member, or the third zone, and that a more effective flood could be obtained, without premature watering out, but selectively injecting.

Q The information that you have given us with respect to permeabilities have not been broken down between the three zones; do you have any information that you could present with respect to, say, an average permeability for each of the three zones?

A I'm not prepared to give you an average permeability for the three zones; however, the average porosity for the upper zones is 21 percent and the lower zone is 22.4 percent. An engineering committee proposed, or composed of operators, representatives of all operators in the unit area prepared a detailed study of the possibilities of water flooding the subject area and the Commission has been previously furnished a copy of this report.

Q Do I understand, though, that there is a substantial

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difference in the permeability between the first and second zones, on the one hand, and the third zone on the other?

A Yes, there is a variation.

Q And the permeability in the first and second zones are less than in the third zone?

A That is correct. We feel that the first and second zones will probably contribute larger units of secondary oil than the lower zone will.

Q Now, Mr. Rader, were you present in the room this morning when Mr. Ralph Gray testified in Case 2535?

A Which was Case 2535?

Q That was the application of Hudson and Hudson for a secondary --

A No, I was not.

Q Are you familiar, Mr. Rader, with some of the problems that might be involved in setting a packer and injecting in two separate areas with respect to the inability to back flow the well and clean the face of the sand into which the water is being injected?

A Would you elaborate on that? I'm not sure I understand what you are trying to get at.

Q I'm not sure I am either. I understand that one objection to setting a packer in an injection well is because the operator may want to clean the face of the sand into which



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the water is being injected by injecting water down the annulus and back up through the tubing and bring it back up from the tubing, from time to time to clean the well out.

A No, I don't agree with you there. That's not our intention at all.

Q I know it's not your intention.

A As pointed out by the geological witness, these various sand members are isolated by dense dolomite zones between and they are not connected outside of the well bore. It is not anticipated that we will inject in the upper zone and circulate it through the casing and up through the tubing.

Q It will be impossible with the situation that you have here with the packer there?

A Right.

Q At least with respect to that particular problem you don't think that the installation of a packer is going to cause you any particular problem?

A No, we do not.

MR. MORRIS: I believe that's all.

BY MR. UTZ:

Q With respect to Mr. Morris' question do you anticipate that any foreign materials will get into your injection water in such quantities that they will cause certain blockage in the case of the formation or the well bore?

A No, sir, we do not.





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Q Necessitating cleaning?

A We do not anticipate that from the analysis we have available on the Capitan Reef water, some forty miles to the southwest. We are not really in a position to say definitely that this will not be a factor as the water source is yet to be determined.

Q Referring to your Exhibit Number 9, in scanning your March production, I notice that there's probably only one well that is capable of producing much, if any, over twenty barrels per day and that happens to be your Hall State F Number 5. Would you locate that well on Exhibit Number 2 for me?

A Hall State F Number 5 is located in the Southeast quarter of the Southwest quarter of Section 11.

Q That will be an injection well?

A That will be an injection well. There is another well which is capable of producing allowable which is Merchant's Livestock Number 1, which is a south offset to this well which is a producing well.

Q Oh, yes. Can you say that those two wells are in the stripper stage?

A I think that we can say that this portion of the reservoir, which is within our proposed unit area, on an average basis is in the stripper stages.

Q In other words, your contention is that the other wells are probably below 20 barrels a day and these two wells



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are anomalous.

A I'm sorry, I didn't understand your last question.

Q I say, your contention is, in other words, that all the other wells can produce only approximately 10 barrels per day and these two wells are probably anomalous?

A Right, that is correct, however, I would say rather than twenty barrels a day, it's much lower than that.

Q Well, there are quite a number that produce twenty barrels, are there not?

A Right.

Q In regard to your 15 injection wells, and I believe you are just requesting 15 wells at this time --

A Yes, sir, we are.

Q -- to serve as injection wells. Are there any of those injection wells completed any lower than the third zone in the Yates?

A There are some wells on Gulf's tracts which have been completed in the fourth zone, on Gulf's Janda K. Lease.

Q What do you propose to do about those wells?

A We propose to inject water into those wells. There will be, four of the six wells on that lease will be injection wells.

Q Into the fourth zone also?

A Yes, sir.

Q That fourth zone is a zone in the Yates formation?



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A Yes, sir.

Q Now the Jalmat formation in this area is part of the horizontal limb of the Jalmat gas pool?

A Would our geological witness care to answer that?

MR. JUDD: I'll try. What do you define as the Jalmat Yates Pool?

MR. UTZ: Well, we have a Jalmat gas pool. My question is, is this unit a part or wholly within the limits of that pool, if you know?

MR. JUDD: I feel that there can be as many as five Yates sand members to the south and west of the purple line. I'm trying to lead up to a conclusion here. The fifth zone has never shown any producing capabilities and the fourth only at the Gulf Janda location. We have never seen wells of producing capabilities in the fourth zone in other wells that were drilled. However, I feel that all five of these zones are fairly continuous. Let me say it this way. I think that the sand zones themselves are continuous, whether or not they have reservoir properties I cannot say for sure. All five zones are present up to the purple line there. Does that answer the question?

MR. UTZ: No, sir. I'm referring to the Jalmat gas pool. Perhaps I can get at it this way. Are there any gas wells within the confines of this unit that you are requesting?



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A No, sir, there are none.

MR. JUDD: No, sir.

Q (By Mr. Utz) So if there are any wells in the horizontal limits of the Jalmat gas pool, they would be oil wells in the Jalmat gas pool?

A Right.

Q In regard to the producing wells, within this unit, are there any of those wells that's completed lower than the third member or the lower member of the Yates?

A As I previously mentioned, there are several wells on Gulf's Janda K wells.

Q That's all the Gulf wells on the Janda K lease?

A Yes.

Q Are they completed any lower than the fourth member?

A No, sir.

Q With reference to your Exhibit 4, are all the data on this exhibit calculated on the basis of, well, I'll say within the limits of the unit requested here?

A Yes, sir.

MR. UTZ: Are there other questions of the witness?

MR. IRBY: Yes, sir.

MR. UTZ: Mr. Irby.

MR. IRBY: Frank Irby, State Engineers Office.



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BY MR. URBY:

Q Your Exhibit Number 5, Mr. Rader, may I see it, please?

A Yes, sir.

Q This shows 13 and 3/8 casing set at 2,100, with the cement circulated, correct?

A Yes, sir.

Q You stated that this water supply well would be in the center of the West half of the Northeast, Northwest, Section 14, is that correct?

A Yes, sir.

Q What Township and Range?

A 22 South, 35 East.

Q On your Exhibit 7, if I may see it please?

A Yes.

Q Thank you. You call this a typical injection well?

A Yes, sir.

Q You have twelve and a quarter surface casing?

A No, sir. That's the surface hole.

Q 8 and 5/8?

A Right.

Q Cemented at 350 feet. I presume that's circulated?

A Yes, sir.

Q Then your next string of casing goes all the way to the bottom of the hole, is that correct?

A Yes, sir.



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Q What is that T. D.?

A T. D. is approximately 7,000 feet.

Q What's the cement behind that string?

A The cement is up above the Rustler, above the top of the Rustler, somewhere between 700 and 1500 feet in various wells in the proposed area.

Q Is there an anhydrite bed just above the Rustler in this area? Let me put the question this way, in what formation is the top of your cement?

MR. JUDD: In making the study, Mr. Irb, I confined my investigation from the top of the Rustler anhydrite on down. I'm not prepared to testify as to the continuity of any anhydrite bed up above.

A Well, the cement is in the red beds. The top of the cement is in the red bed.

MR. JUDD: I think his question was, is there an anhydrite bed above the top of the Rustler.

Q I'm sure the water isn't going to penetrate the anhydrite bed if it is continuous. If your cement is up at the top and it is continuous at the top of the Rustler, then I'm satisfied with your cement program.

MR. JUDD: Yes, sir.

A I think there is one continuous throughout the area.

Q The thought alone is not going to satisfy me, Mr.

Rader.



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A All right, I'm not prepared to say conclusively on that, Mr. Irby.

MR. UTZ: Mr. Lader, can you make this determination and send the information to Mr. Irby at the Engineers Office with a copy to us?

A Yes, sir, we certainly can.

Q (By Mr. Irby) Thank you. You stated that your source of water is the Capitan Reef?

A Yes, sir.

Q In these injection wells, is the casing fairly new and in good condition?

A Yes, sir.

Q The ones that will be converted to injection wells?

A Yes, sir, I'd say there is no casing in the area in excess of, well casing was new when the wells were drilled and the first well was drilled in our proposed unit area in April of '55. We feel that the casing is in very good condition.

Q Do you have an analysis of the water in the Capitan Reef at this location, or near this location?

A No, sir, we do not have any near. The only analysis we have was obtained from Pure Oil Company on one of their source wells to be used in their Dollar Hyde Unit, approximately forty miles to the South.

Q You no doubt will analyze prior to use?



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A Yes, sir.

Q Will you furnish me with a copy of that analysis, please?

A Yes, sir.

MR. IRBY: That's all the questions I have, thank you. Mr. Sperling, if I may, I would like to copy these two exhibits, 5 and 7, and I would like also to have copies of Exhibit B of the unit agreement and Exhibit 2.

MR. SPERLING: Yes, sir.

MR. IRBY: Exhibit 2 is the first one on the wall.

MR. SPERLING: Mr. Rader will furnish them to you at the conclusion of the hearing.

MR. IRBY: Thank you.

MR. UTZ: Mr. Irby, the information you wanted was reference to the formation above the cement job?

MR. IRBY: Yes, sir, at the top of the cement job on the production string.

MR. MORRIS: One further question, Mr. Examiner.

MR. UTZ: Mr. Morris.

BY MR. MORRIS:

Q Mr. Rader, do you see any reason why you cannot live and operate within the allowable provision of Rule 701 in carrying out this waterflood project?

A No, sir, I do not.





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MR. MORRIS: That's all thank you.

MR. URZ: Mr. Rader, I don't believe that you have furnished us with a list of the names, locations, either by units or by footage, of the section line of the sixteen proposed injection wells.

A No, sir, we have not, other than designated on Exhibit Number 2.

MR. UTZ: Does Exhibit Number 9 include all sixteen of those wells?

A Yes, it does.

MR. UTZ: You may, if you care to, put that information on Exhibit 9 and send us a copy of it.

A All right, we certainly will.

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

(Witness excused)

Are there any statements in this case?

MR. MORRIS: Mr. Examiner, the Commission has received two telegrams, one from the Atlantic Refining Company, the other from Gulf Oil Corporation, both concurring in British American in their application these two cases.

MR. KELLAHIN: Mr. Examiner, Amerada Petroleum Corporation, the owner and operator of properties both within and offsetting the unit, and they concur in the application of



British American in the unit application and the waterflood project.

MR. UTZ: Are there other statements?

MR. STORM: L. O. Storm, representing J. R. Cohen, independent operator of Lubbock, Texas. Mr. Cohen has been furnished all of the information presented here. We are in essential concurrence with the applications under his tutelage we are attempting to form a unit adjacent to the British American unit as proposed to you. We would prefer at this time to leave those as separate activities. We hope that we will reach a stage soon enough in our operations that we can in proper time execute barrier agreements with the British American unit so that the wells that they present on their exhibits in dashed form, the injection wells can be included in their system, but until that time, we would request the Commission to restrict the injection wells as they request them at this time to protect the common area from movement of oil.

MR. UTZ: Your proposed unit will be immediately to the Southeast of this unit?

MR. STORM: Immediately to the Southeast.

MR. UTZ: Are there other statements? This case will be taken under advisement.

MR. NORRIS: Mr. Examiner, I move that we re-open Case 2545 and 2546.

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MR. JAZ: Without objections Case 2543 and 2544 will be re-opened.

MR. MORRIS: Mr. Examiner, on behalf of Mr. Seeding, and attorney for the applicant, those those two cases, I wish to offer the exhibit in both of those cases into evidence.

MR. JAZ: Without objection the exhibit in Cases 2543 and 2544 will be entered into the record of those cases.

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PHONE 325-1182ALBUQUERQUE, N. M.  
PHONE 243-6691STATE OF NEW MEXICO )  
COUNTY OF BERNALILLO ) ss.

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing was reported by me in Stenotype and that the same was reduced to typewritten transcript under my personal supervision and contains a true and correct record of said proceedings, to the best of my knowledge, skill and ability.

DATED this 25th day of April, 1962, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

*Ada Dearnley*  
NOTARY PUBLIC

My Commission Expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the hearing of Case No. 2545, heard by me on Apr. 25, 1962.

*John A. Giff*, Examiner,  
New Mexico Oil Conservation Commission



Inject into all sands  
Then one string of tubing  
under a packer

or  
Inject <sup>selectively</sup> down two strings  
of tubing under a packer

or  
provided however than in  
cases of wells equipped  
w/ less than 5 1/2 inch  
pipe, <sup>selective</sup> injection may be  
made down one string  
of tubing under a  
packer & down the casing tubing  
as provided that the  
casing has been perforated & secured  
until from TD to the shot burst

Provided further  
that B-A shall  
notify the ace of the  
time the perf is  
squares will  
be made taken  
of the CCC  
acting at its  
option within  
same

31	32	33	34	35	36
21	22	23	24	25	26
11	12	13	14	15	16
01	02	03	04	05	06
31	32	33	34	35	36
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01	02	03	04	05	06
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01	02	03	04	05	06
31	32	33	34	35	36
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11	12	13	14	15	16
01	02	03	04	05	06

County \_\_\_\_\_ Pool \_\_\_\_\_  
NEW MEXICO PRINCIPAL ADDRESS

May 9, 1962

Mr. L. Glenn Rader, Jr.  
District Engineer  
The British-American Oil Producing Company  
Box 474  
Midland, Texas

Dear Mr. Rader:

After reading your letter of May 3, 1962 concerning your application to water flood the Jalmat Yates Sand Unit, I have discussed the matter with our hydrologists and geo-hydrologists and have reviewed the geology and the ground water conditions in southern Lea County. After the discussions and the review above mentioned, I have reached the conclusion that the single casing wall, which will be the only protection afforded between the bottom of the surface casing at approximately 350 feet and the top of the cement surrounding the 5½ inch casing at 1800 feet (from your exhibit No. 7), is not sufficient. Therefore, this office ~~cannot~~ <sup>is unable</sup> to the granting of your application until such time as ~~sufficient~~ <sup>adequate</sup> protection for the Chinle and Santa Rosa formations can be provided.

EEL/mc  
cc-Oil Conservation Commission ✓  
J. E. Sperling

By: Frank E. Raby  
Chief  
Water Rights Division

C  
O  
P  
Y



STATE OF NEW MEXICO

STATE ENGINEER OFFICE

SANTA FE

May 9, 1962

S. E. REYNOLDS  
STATE ENGINEER

ADDRESS CORRESPONDENCE TO:  
STATE CAPITOL  
SANTA FE, N. M.

Mr. A. L. Porter, Jr.  
Secretary-Director  
Oil Conservation Commission  
Santa Fe, New Mexico

Attn. Mr. Elvis Utz

Dear Mr. Utz:

Reference is made to the application of British-American Oil Producing Company which seeks permission to institute a water flood project in the Yates formation in the Jalmat pool in Township 22 South, Range 35 East, Lea County, New Mexico, which is Oil Conservation Commission Case No. 2546. Further reference is made to their letter to me under date of May 3, 1962 and to my reply dated May 9, 1962. A copy of their letter was forwarded to you and I submit herewith a copy of my letter to them.

As stated in my letter to British-American, after careful review of the available information and discussion with the hydrologists and geohydrologists on our staff, I have concluded that the protection between the bottom of the surface casing at approximately 350 feet and the top of the cement surrounding the 5½ inch casing at 1800 feet (as shown on their Exhibit No. 7) is inadequate. Therefore, this office objects to the granting of the application until such time as adequate protection for the Chinle and Santa Rosa formations can be provided.

Yours truly,

S. E. Reynolds  
State Engineer

By: *Frank E. Irby*  
Frank E. Irby  
Chief  
Water Rights Division

FEI/ma  
encl.  
cc-British-American Oil Producing Co.  
James E. Sperling



CLASS OF SERVICE  
This is a fast message  
unless its deferred char-  
acter is indicated by the  
proper symbol.

# WESTERN UNION TELEGRAM

1201 (4-80)

SYMBOLS  
DL=Day Letter  
NL=Night Letter  
LT=International  
Letter Telegram

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is LOCAL TIME at point of destination.

LA 164 SSF272

W. P. MARSHALL

1962 APR 24 AM 9

1962 APR 23 PM 8

L RWA118 PD=ROSWELL NMEX 23 407P MST=

NEW MEXICO OIL CONSERVATION COMMISSION=

STATE LAND OFFICE BLDG SANTA FE NMEX=

ATTN A L PORTER JR RE APPLICATION OF BRITISH AMERICAN  
OIL PRODUCING COMPANY FOR APPROVAL OF THE JALMAT FIELD  
YATES UNITES AGREEMENT AND WATERFLOOD PROJECT IN CASES  
NO 2545 AND NO 2546 SCHEDULED FOR EXAMINER HEARING ON  
APRIL 25 1962 GULF OIL CORPORATION WILL IN THE NEXT FEWS  
DAYS EXECUTE THE JALMAT FIELD YATES UNIT AGREEMENT  
THEREFORE CONCURS WITH BRITISH AMERICAN IN THEIR  
APPLICATION IN THE ABOVE CASES=

GULF OIL CORPORATION W A SHELLSHEAR==

-----

GOVERNOR  
EDWIN L. MECHEM  
CHAIRMAN

State of New Mexico  
**Oil Conservation Commission**

LAND COMMISSIONER  
E. S. JOHNNY WALKER  
MEMBER



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

P. O. BOX 871  
SANTA FE

May 28, 1962

Mr. James Sperling  
Modrall, Seymour, Sperling, Roehl  
& Harris  
Simas Building  
P. O. Box 466  
Albuquerque, New Mexico

Re: Case No. 2546  
Order No. R-2243  
Applicant:  
British American Oil Producing Co.

Dear Sir:

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

Very truly yours,

A handwritten signature in cursive script that reads "A. L. Porter, Jr.".

A. L. PORTER, Jr.  
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x

Artesia OCC           

Aztec OCC           

OTHER            Mr. Jason Kellahin (Amerasia)

           Mr. Geo. Judd - British American - Dallas 21, Texas

Case 2546

Heard. 4-25-62

Rec. 5-1-62

1. Grant. British Am. request for a waterflood under Rule 261 for an area within the Boundary of the Jalmat-yates sand unit.

2. The injection wells to be approved are:

Amerada-~~the~~ WE-J #2, <sup>unit section</sup> D, A 11, - 22, 35

Ayres - ~~the~~ #1, P-10 " "

British American - ~~the~~ #1, P-11-22-35

" " - " " #4, H 11 " "

" " - " " #5, " " " "

" " - " " #7, J " " "

" " - " " #10, F " " "

" " - " " #13, B " " "

" " - " " #8, B 14 " "

<sup>Drilling Company</sup>  
Carson-Randel "A" #5, N-2- " "

" " "C" #3, N-12 " "

" " " " #4, L-12- " "

Luf-Janda "K" #2, F-14 " "

" " " " #3, N- " " "

" " " " #5, D- " " "

" " " " #6, L " " "

3. The Project Area shall be:

225-35E

Sec. 2, SE 1/4 SW 1/4

" 3, SE 1/4 SE 1/4

" 10, NW 1/4 NW 1/4

" 11, A 11

" 12, NW 1/4 SW 1/4

" 13, NW 1/4 NW 1/4

" 14, N 1/2, SW 1/4, SE 1/4

" 23, NW 1/4 NE 1/4

ppm

(2)

4. Hold this order until confirmation is received for location of injection wells & a copy of a letter to the State Engineer as to the cement protection of the formations above the Reservoir & H<sub>2</sub>O analysis.
5. Standard waterflood order otherwise.

Wm. A. R.

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. 2546  
Order No. R-2243

APPLICATION OF THE BRITISH AMERICAN  
OIL PRODUCING COMPANY FOR A WATER-  
FLOOD PROJECT, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on April 25, 1962, at Santa Fe, New Mexico, before Elvis A. Utz, Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.

NOW, on this 28th day of May, 1962, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Elvis A. Utz, 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 Jalmat Field-Yates Sand Unit has heretofore been approved by the Commission by Order No. R-2235; that the Jalmat Field-Yates Sand Unit Area comprises 2,680 acres in Township 22 South, Range 35 East, NMPM, Lea County, New Mexico, as more fully described in said order.

(3) That the applicant, The British American Oil Producing Company, seeks permission to institute a waterflood project in the Jalmat Field-Yates Sand Unit Area by the injection of water into the Yates formation of the Jalmat Pool initially through 16 wells located within said unit area.

(4) That the wells in the subject waterflood project are properly classified as "stripper" wells.

(5) That the subject application should be approved and should be made subject to the provisions of Rule 701.

(6) That restrictions should be imposed upon the method used to inject water in order to protect fresh water-bearing formations in the area.

-2-

CASE No. 2546  
Order No. R-2243

IT IS THEREFORE ORDERED:

(1) That The British American Oil Producing Company is hereby authorized to institute a waterflood project in the Jalmat Field-Yates Sand Unit Area, located in Township 22 South, Range 35 East, NMPM, Lea County, New Mexico, by the injection of water initially through the following-described wells:

Amerada-State WE-J Well No. 2, Unit D, Section 11;  
Aztec-State J-10 Well No. 1, Unit P, Section 10;  
British American-Hull State "F" Well No. 1, Unit P, Section 11;  
British American-Hull State "F" Well No. 4, Unit H, Section 11;  
British American-Hull State "F" Well No. 5, Unit O, Section 11;  
British American-Hull State "F" Well No. 7, Unit J, Section 11;  
British American-Hull State "F" Well No. 10, Unit F, Section 11;  
British American-Hull State "F" Well No. 13, Unit B, Section 11;  
British American-New Mexico "B" Well No. 8, Unit B, Section 14;  
Carper Drilling Company-Randel "A" Well No. 5, Unit N, Section 2;  
Carper Drilling Company-Randel "C" Well No. 3, Unit N, Section 12;  
Carper Drilling Company-Randel "C" Well No. 4, Unit L, Section 12;  
Gulf-Janda "K" Well No. 2, Unit F, Section 14;  
Gulf-Janda "K" Well No. 3, Unit N, Section 14;  
Gulf-Janda "K" Well No. 5, Unit D, Section 14; and  
Gulf-Janda "K" Well No. 6, Unit L, Section 14.

(2) That the subject waterflood project shall be governed by the provisions of Rule 701.

(3) That water injection shall be accomplished either by injecting into all sands through one string of tubing under a packer or by injecting selectively through two strings of tubing under a packer; provided, however, that in the case of selective injection wells which are equipped with less than 5 1/2-inch pipe, selective injections may be made through one string of tubing under a packer and through the casing-tubing annulus in which case the casing must have been perforated and squeeze-cemented from total depth to the shoe of the surface string of casing.

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

-3-

CASE No. 2546

Order No. R-2243

DONE at Santa Fe, New Mexico, on the day and year herein-  
above designated.

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION



*E L Mechem*

EDWIN L. MECHEM, Chairman

*E S Walker*

E. S. WALKER, Member

*A L Porter, Jr.*

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

esr/

DOCKET: EXAMINER HEARING - WEDNESDAY - APRIL 25, 1962

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

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The following cases will be heard before Elvis A. Utz, Examiner, or Daniel S. Nutter, as alternate Examiner:

- CASE 2532: Application of Zapata Petroleum Corporation for two additional injection wells, Maljamar Pool, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to convert its Phillips 8-B Wells No. 3 and 5 located respectively in Units H and B, Section 19, Township 17 South, Range 33 East, Lea County, New Mexico, to water injection wells in its pilot waterflood project in the Maljamar (Grayburg-San Andres) Pool authorized by Order No. R-2157.
- CASE 2533: Application of Amerada Petroleum Corporation for a pressure maintenance project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a pressure maintenance project in that portion of the Saunders Permo-Pennsylvanian Pool underlying the S/2 S/2 of Section 3 and N/2 of Section 10, Township 15 South, Range 33 East, Lea County, New Mexico, with the injection of water into the Pennsylvanian formation initially to be through one well located in the NE/4 NW/4 of said Section 10.
- CASE 2534: Application of Amerada Petroleum Corporation for a quadruple completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its State NJ "A" Well No. 3 located in Unit A of Section 2, Township 25 South, Range 37 East, Lea County, New Mexico, as a quadruple completion (combination) in the San Andres, Blinbry, Drinkard and Devonian formations in the North Justis Field with the production of oil from the Devonian and Drinkard formations to be through separate strings of 1 1/2-inch tubing set within parallel strings of 3 1/2-inch casing, and the production of oil from the Blinbry formation through a parallel string of 2 7/8-inch casing; applicant proposes to dispose of salt water into the San Andres formation through a parallel string of 2 3/8-inch casing.
- CASE 2535: Application of Amerada Petroleum Corporation for a quadruple completion and a non-standard gas proration unit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its L. G. Warlick "A" Well No. 1, located in Unit I of Section 19, Township 21 South, Range 37 East, Lea County, New Mexico, as a quadruple completion



(combination) in the Eumont Gas, Blinebry Oil, Penrose-Skelly Oil and Drinkard Oil Pools with the production of oil from the Drinkard and Penrose-Skelly formations to be through parallel strings of 2 7/8-inch casing, the production of oil from the Blinebry formation through a string of 1 1/4-inch tubing set within another parallel string of 2 7/8-inch casing and the production of gas from the Eumont formation through the casing-tubing annulus. Applicant further seeks the establishment of a 160-acre non-standard gas proration unit in the Eumont Gas Pool comprising the S/2 NE/4 and the N/2 SE/4 of said Section 19, said unit to be dedicated to said L. G. Warlick "A" Well No. 1.

CASE 2536:

Application of William A. & Edward R. Hudson for a secondary recovery project, Maljamar Pool, Eddy County, New Mexico. Applicants, in the above-styled cause, seek permission to institute a secondary recovery project in the Maljamar Pool in an area underlying their Puckett "A" and "B" Leases located in Section 24, Township 17 South, Range 31 East, Eddy County, New Mexico, with the injection of water into the Grayburg-San Andres formation initially to be through six wells, said project to be governed by the provisions of Rule 701.

CASE 2537:

Application of J. C. Williamson for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its Westates-Federal Well No. 8 located in Unit E of Section 1, Township 25 South, Range 37 East, Lea County, New Mexico, as a dual completion (conventional) in the North Justis-McKee Pool and an undesignated Montoya pool with the production of oil from both zones to be through parallel strings of tubing.

CASE 2538:

Application of Southwest Production Company for a non-standard oil proration unit, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks the establishment of a 73.89-acre non-standard oil proration unit in the Cha Cha-Gallup Oil Pool comprising the NE/4 SE/4 and that portion of the NW/4 SE/4 lying North of the mid-channel of the San Juan River, of Section 16, Township 29 North, Range 14 West, San Juan County, New Mexico, said unit to be dedicated to the Foutz-State Well No. 1, located 1912 feet from the South line and 2310 feet from the East line of said Section 16.

- CASE 2539: Application of Pan American Petroleum Corporation for an exception to Order No. R-333-E, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Order No. R-333-E to permit the extension of the terminal date for the 1961 deliverability test period from December 15, 1961, to March 1, 1962, for ten wells located in Townships 27 and 28 North, Ranges 10 and 11 West, San Juan County, New Mexico.
- CASE 2540: Application of Pan American Petroleum Corporation for a triple completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its State "CK" Well No. 2, located in the NE/4 SW/4 of Section 19, Township 21 South, Range 37 East, Lea County, New Mexico, as a triple completion in the Drinkard, Blinebry and Paddock Oil Pools with the production of oil from the Blinebry and Drinkard formations and the production of undetermined hydrocarbons from the Paddock formation.
- CASE 2541: Application of J. Glenn Turner for a dual completion, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its Ballard Well No. 11-15 located in Unit D of Section 15, Township 26 North, Range 9 West, San Juan County, New Mexico, as a dual completion (conventional) in the Basin-Dakota Gas Pool and an undesignated Gallup oil pool with the production of gas from the Dakota formation and the production of oil from the Gallup formation to be through parallel strings of 2 1/16-inch tubing.
- CASE 2542: Application of La Plata Gathering System, Inc. for a dual completion, a non-standard gas proration unit, and an unorthodox gas well location, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete a gas well to be located at an unorthodox gas well location 1980 feet from the South line and 734 feet from the East and West lines of Section 19, Township 32 North, Range 5 West, Rio Arriba County, as a dual completion (conventional) in the Blanco-Mesaverde and Basin-Dakota Gas Pools with the production of gas from the Dakota formation to be through a string of 2 1/16-inch tubing and the production of gas from the Mesaverde formation to be through a parallel string of 1 1/2-inch tubing. Applicant further seeks the establishment of a 355.25-acre non-standard gas proration unit in the aforesaid pools comprising all of Sections 18 and 19, in said township to be dedicated to the above-described well.

CASE 2543:

Application of G. W. Strake for a dual completion, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its LeBow-Federal Well No. 6 located in Unit I of Section 25, Township 19 South, Range 30 East, Eddy County, New Mexico, as a dual completion (conventional) in the North Hackberry-Yates and Hackberry-Seven Rivers Pools with the production of oil from both formations to be through parallel strings of 2 1/16-inch tubing.

CASE 2544:

Application of Perry R. Bass for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Plains Unit Agreement embracing 7,198.01 acres, more or less, of federal lands in Township 19 South, Range 32 East, Lea County, New Mexico.

CASE 2545:

Application of The British American Oil Producing Company for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Jalmat Field-Yates Sand Unit Agreement embracing 2,760 acres, more or less, of State and fee lands in Township 22 South, Range 35 East, Lea County, New Mexico.

CASE 2546:

Application of The British American Oil Producing Company for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a waterflood project in the Yates formation in the Jalmat Pool in an area underlying its proposed Jalmat Field-Yates Sand Unit Area, comprising 2,760 acres, more or less, in Township 22 South, Range 35 East, Lea County, New Mexico, with injection of water initially to be through 16 wells located within said unit area, the project to be governed by the provisions of Rule 701.

CLASS OF SERVICE  
This is a fast message  
unless its deferred char-  
acter is indicated by the  
proper symbol.

# WESTERN UNION TELEGRAM

W. P. MARSHALL, PRESIDENT

1201 (4-60)

SYMBOLS  
DL=Day Letter  
NL=Night Letter  
LT=International  
Letter Telegram

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is LOCAL TIME at point of destination

LA149 SSF241

1952 APR 23 PM 3 57  
APR 23 PM 4:10

L RWA113 PD=ROSWELL NMEX 23 339P MST=

THE NEW MEXICO OIL CONVERSATION COMMISSION=

SANTA FE NMEX=

REGARDING CASE NUMBER 2546 ATLANTIC HAS ONE WELL IN  
SECTION TWENTY THREE TOWNSHIP TWENTY ONE SOUTH RANGE  
THIRTY FIVE EAST OFF SETTING THE PROPOSED BRITISH  
AMERICAN WATER FLOOD IN SECTION TWENTY THREE TOWNSHIP  
TWENTY ONE SOUTH RANGE THIRTY FIVE EAST WE DO NOT OBJECT  
TO THEIR PLANS. WE HAVE TENATIVE PLANS TO INCLUDE OUR  
WELL IN A UNIT WHICH WILL COMPRIZE PORTIONS OF SECTIONS  
THIRTEEN AND TWENTY FOUR AND SECTIONS TWENTY FOUR AND  
TWENTY FIVE TOWNSHIP TWENTY ONE SOUTH RANGE THIRTY FIVE  
EAST= — THE ATLANTIC REFINING COMPANY W P TOMLINSON...

**THE BRITISH-AMERICAN OIL PRODUCING COMPANY**

Box 474  
Midland, Texas  
1962 MAY 3 PM 1 32, 1962

Re: Case No. 2546  
Application of The British-American  
Oil Producing Company for Permission  
to Waterflood Jalmat Yates Sand Unit  
Lea County, New Mexico

New Mexico Oil Conservation Commission  
P. O. Box 871  
Santa Fe, New Mexico

Gentlemen:

During the hearing for the subject case held on April 25, 1962, the Examiner requested that we submit revised copy of our Exhibit No. 9 designating the initial sixteen wells to be used for injection.

The injection wells are marked in red on the attached three copies of Exhibit No. 9.

If any additional information is required please advise.

Yours very truly,



L. Glenn Rader, Jr.  
District Engineer

LGR/jm

Attachments (3)

cc: Mr. James E. Sperling

LAW OFFICES OF  
MODRALL, SEYMOUR, SPERLING, ROEHL & HARRIS

SIMMS BUILDING

P. O. BOX 486

ALBUQUERQUE, NEW MEXICO

TELEPHONE CHAPEL 3-4511

J. R. MODRALL  
AUGUSTUS T. SEYMOUR  
JAMES E. SPERLING  
JOSEPH E. ROEHL  
GEORGE T. HARRIS  
DANIEL A. SISK

LELAND S. SEDBERRY  
BURNS H. ERREBO  
ALLEN C. DEWEY  
FRANK H. ALLEN  
JAMES A. BORLAND  
JAMES P. SAUNDERS

JOHN F. SIMMS (1885-1954)

April 5, 1962

*Copy 2546*

New Mexico Oil Conservation Commission  
Box 871  
Santa Fe, New Mexico

Re: British American Oil Producing  
Company application for authority  
to inject fluid into the Yates Sand  
Formation in the Jalmat Field, Lea  
County, New Mexico

Gentlemen:

Enclosed herewith you will find the above captioned  
Application for filing with your office on behalf of British-  
American.

Very truly yours,

*James E. Sperling*  
James E. Sperling

JES/rs

Encl.

*Revised  
Mailed  
4/17/62  
JR*

BEFORE THE NEW MEXICO OIL CONSERVATION COMMISSION

IN THE MATTER OF THE APPLICATION ) CASE NO. 55976  
OF THE BRITISH-AMERICAN OIL PRODUCING )  
COMPANY FOR AUTHORITY TO INJECT FLUID ) FILED \_\_\_\_\_  
INTO THE YATES SAND FORMATION IN THE )  
JALMAT FIELD, LEA COUNTY, NEW MEXICO. ) HEARING \_\_\_\_\_

A P P L I C A T I O N

Comes now The British-American Oil Producing Company, on behalf of itself and others and respectfully states, as follows:

1. That it is the owner and operator of oil and gas wells in the Jalmat Field, Lea County, New Mexico.
2. That it desires to conduct water flood operations in this pool by injecting fluids into the Yates Sand Formation, which sand shall be construed to mean the sand and reservoir encountered in the drilling of The British-American Oil State D-#1 Well, between the depths of 3,812 feet KB and 4,018 feet KB, as shown by the Radiation Log of said well, which well is located 660 feet from the North line and 660 feet from the East line of Section 23, Township 22 South, Range 35 East, Lea County, New Mexico.
3. That applicant proposes to conduct water flood operations by injection of fluids into the Yates Sand above described in an area known as the Jalmat Field-Yates Sand Unit, which unit consists of a portion of Township 22 South, Range 35 East, Lea County, New Mexico, the unit area containing 2,760 acres, more or less, as more specifically set out on a map entitled Exhibit "A" attached hereto and made a part hereof by reference.
4. That initially, applicant proposes to inject fluid into wells located and identified on plat attached hereto marked Exhibit "A", which said plat, in addition to showing the location of proposed injection wells, shows the location of all other wells within a radius of two miles from said proposed injection wells and the formation from which said wells

are producing or have produced and further indicating the lessees, working interest owners or operators within said two mile radius.

5. That attached hereto marked Exhibit "B" and made a part hereof is the log of one of the proposed injection wells, which is representative of the logs of the injection wells which applicant proposes to use in said project, the log being that of The British-American New Mexico B-#6 Well located 1980 feet from the South line and 1650 feet from the East line of Section 14, Township 22 South, Range 35 East, NMPM.

6. Attached hereto and made a part hereof is Exhibit "C" which contains a description of the casing program of the proposed injection wells.

7. That applicant proposes to inject fresh water from the Capitan Reef found at approximately a depth of 4100 feet from the surface and proposes to inject, initially, between 5000 and 6000 barrels of water per day through sixteen (16) presently producing wells to be converted to injection wells. Applicant proposes to convert additional wells to an ultimate injection rate of a total of approximately 8000 barrels of water per day. Average injection rate per well per day will be approximately 350 barrels of water.

8. That applicant makes this application pursuant to the provisions of Rule 701(E) of the Rules of this Commission and seeks an Order granting approval for the conducting of water flood operations in the designated area in accordance with said Rule, including administrative approval for the conversion of additional injection wells, within the unit area designated on Exhibit "A" attached hereto.

9. That the applicant and other parties have entered into, or will enter into, Unit Agreement, application for approval of which has been filed simultaneously herewith and have also entered into Operating Agreement wherein this applicant is named unit operator.



WHEREFORE, applicant prays that this matter be set for hearing and notice be given as required by law and that upon such hearing applicant be granted approval of its proposed water injection program as herein set forth and that applicant be granted such other relief as may be appropriate to the circumstances.

Respectfully submitted,

THE BRITISH-AMERICAN OIL PRODUCING COMPANY

By

  
MORRILL SEYMOUR SPERLING ROEHL & HARRIS  
Its Attorneys  
Post Office Box 466 - 1200 Simms Building  
Albuquerque, New Mexico

TYPICAL INJECTION WELL  
CASING PROGRAM

<u>DEPTH</u>	<u>CASING</u>	<u>HOLE SIZE</u>
350 ft. (Red Beds)	8-5/8" OD, 24#/ft J-55, 8rd. thd. ST&C Surface casing cemented to surface.	12-1/4"
4000 ft. (Bottom of Yates) (Top of Seven Rivers)	5-1/2" OD, 11#/ft J-55, 8rd. thd. ST&C Production casing cemented from total depth to 1800'	7-5/8"

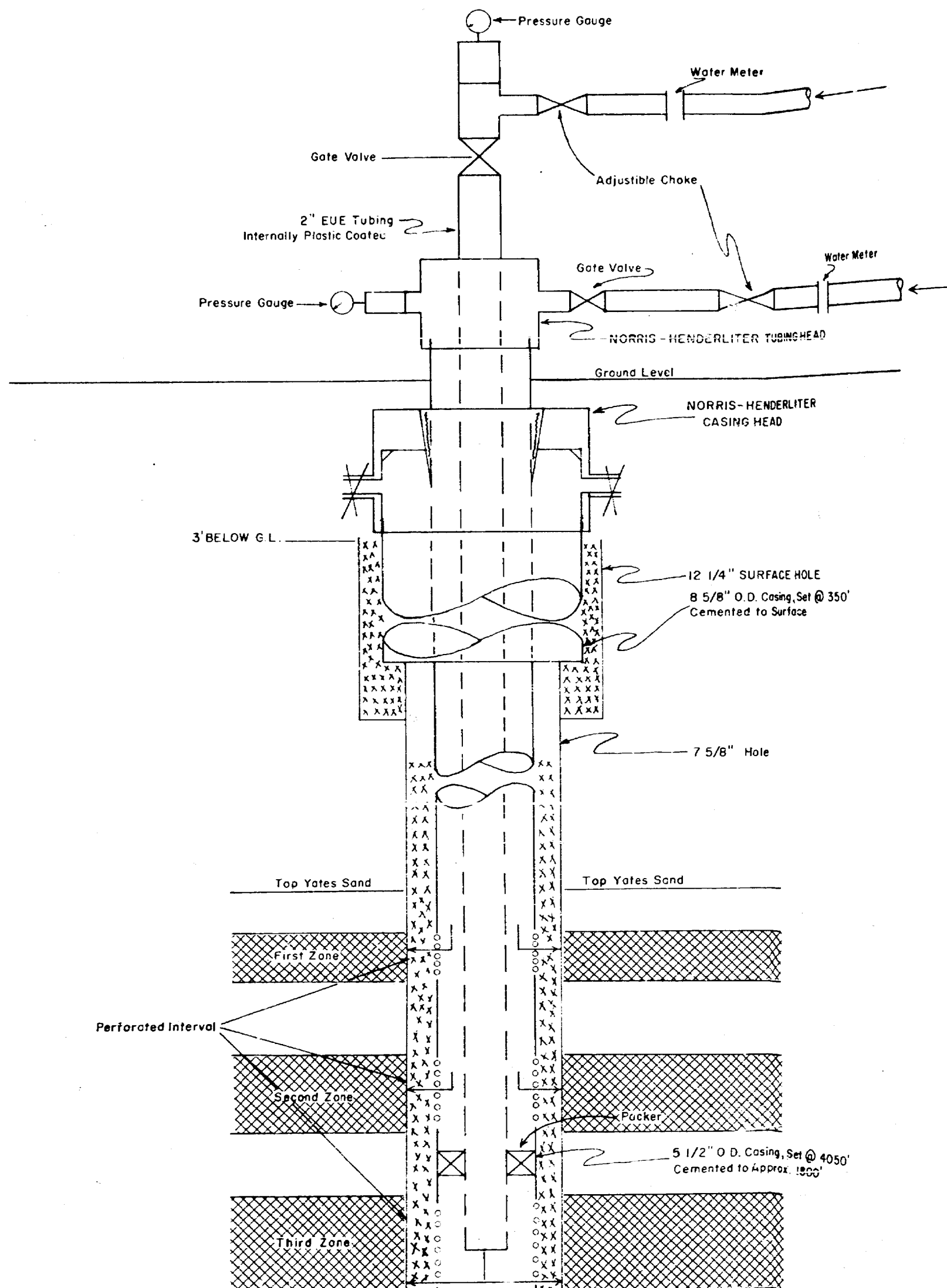
Note: See attached schematic of typical injection well.

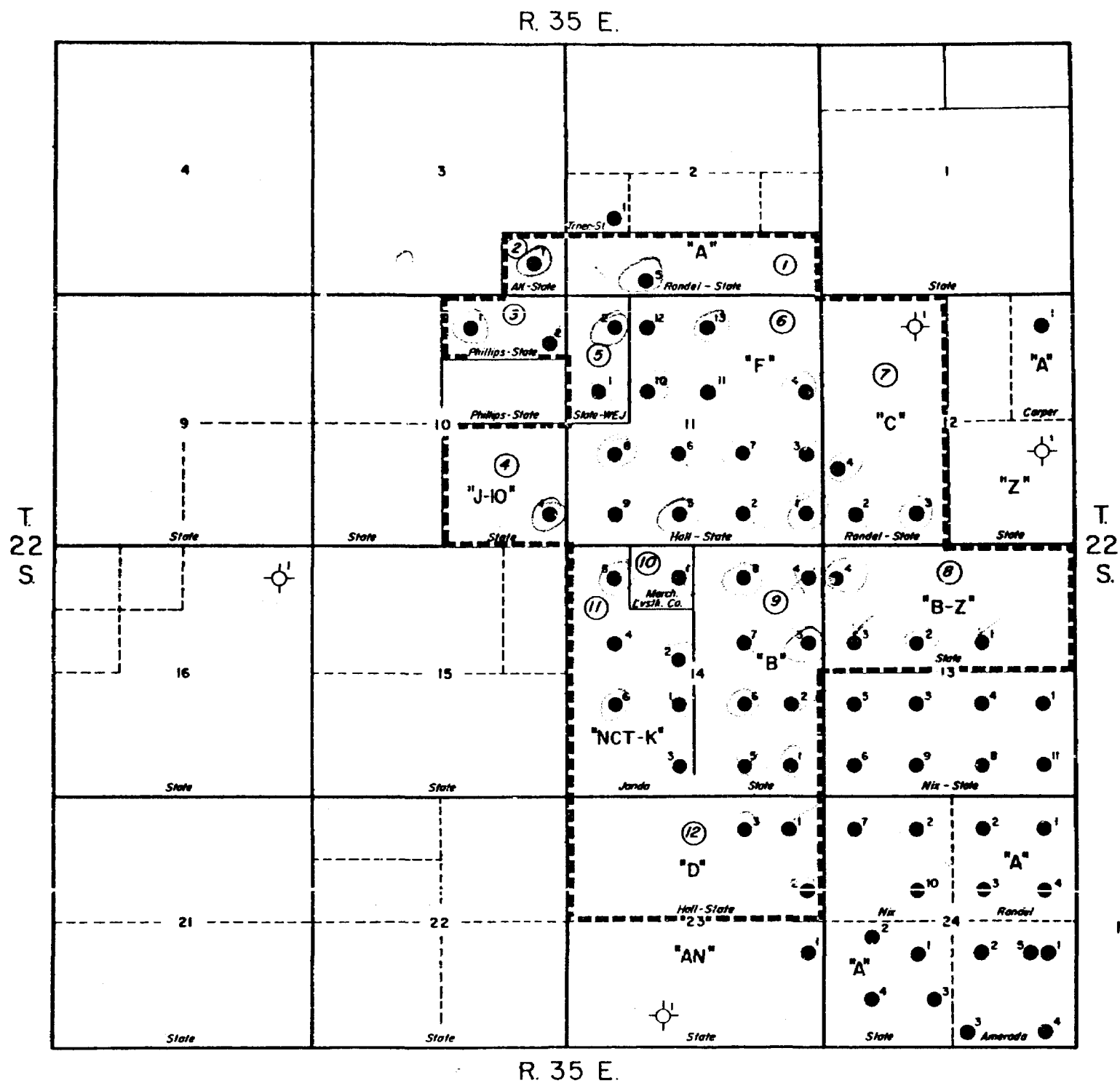
EXHIBIT "C"  
OF THE APPLICATION OF THE BRITISH-  
AMERICAN OIL PRODUCING COMPANY FOR  
AUTHORITY TO INJECT FLUID INTO THE  
YATES SAND FORMATION IN THE JALMAT  
FIELD, LEA COUNTY, NEW MEXICO.

Case 2546

# JALMAT (YATES SAND) UNIT

## SCHEMATIC OF TYPICAL INJECTION WELL





- - - - - Unit Area  
 ——— Tract Boundary  
 (7) Tract Number  
 ● Producing Well, Yates Sand

SCALE  
1000' 0 1000' 2000' 3000'

EXHIBIT "B"  
 to the  
 UNIT AGREEMENT  
 JALMAT FIELD YATES SAND UNIT  
 LEA COUNTY, NEW MEXICO  
 4-1-62

UNIT AGREEMENT  
for the  
JALMAT FIELD  
YATES SAND UNIT  
LEA COUNTY, NEW MEXICO

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UNIT AGREEMENT  
JALMAT FIELD YATES SAND UNIT  
LEA COUNTY, NEW MEXICO

THIS AGREEMENT, entered into as of the first day of April, 1962, by the parties who have signed the original of this instrument, a counterpart thereof, or other instrument agreeing to be bound by the provisions hereof;

WITNESSETH:

WHEREAS, In the interest of the public welfare and to promote conservation and increase the ultimate recovery of oil, gas, and associated minerals from the Jalmat Field, in Lea County, State of New Mexico, and to protect the rights of the owners of interests therein, it is deemed necessary and desirable to enter into this agreement to unitize the Oil and Gas Rights in and to the Unitized Formation in order to conduct a secondary recovery, pressure maintenance, or other recovery program as herein provided; and

WHEREAS, the Commissioner of Public Lands of the State of New Mexico is authorized by an Act of the Legislature (Chap. 88, Laws 1943, as amended, Laws 1961 ch 176 #1) to consent to or approve this agreement on behalf of the State of New Mexico, insofar as it covers and includes lands and mineral interests of the State of New Mexico; and

WHEREAS, the Oil Conservation Commission of the State of New Mexico is authorized by law (Chap. 72, Laws of 1935, as amended by Chap. 193, Laws of 1937, Chap. 166, Laws of 1941, and Chap. 168, Laws of 1949) to approve this agreement and the conservation provisions hereof;

NOW, THEREFORE, In consideration of the premises and of the mutual agreements herein contained, it is agreed as follows:

ARTICLE 1

DEFINITIONS

As used in this agreement, the terms herein contained shall have the following meaning:

1.1 Unit Area means the lands described by Tracts in Exhibit A and shown on Exhibit B as to which this agreement becomes effective or to which it may be extended as herein provided.

1.2 Unitized Formation means that subsurface portion of the Unit Area commonly known or described as follows: The Yates Sand Formation encountered in

the drilling of the British-American Hall State "D" No. 1 Well between the depths of Three Thousand Eight Hundred Twelve (3,812) feet KB and Four Thousand and Eighteen (4,018) feet KB as shown by the Radiation Log of said well, which well is located Six Hundred Sixty (660) feet from the north line and Six Hundred Sixty (660) feet from the east line of Section 23, Township 22 South, Range 35 East, Lea County, New Mexico.

1.3 Unitized Substances means all oil, gas, gaseous substances, sulphur contained in gas, condensate, distillate, and all associated and constituent liquid or liquefiable hydrocarbons within or produced from the Unitized Formation.

1.4 Working Interest means an interest in Unitized Substances by virtue of a lease, operating agreement, fee title, or otherwise, including a carried interest, which interest is chargeable with and obligated to pay or bear, either in cash or out of production or otherwise, all or a portion of the cost of drilling, developing, producing, and operating the Unitized Formation. Any interest in Unitized Substances which is a Working Interest as of the date the owner thereof executes or ratifies this Agreement shall thereafter be treated as a Working Interest for all purposes of this Agreement.

1.5 Royalty Interest means a right to or interest in any portion of the Unitized Substances or proceeds thereof other than a Working Interest.

1.6 Royalty Owner means a party hereto who owns a Royalty Interest.

1.7 Working Interest Owner means a party hereto who owns a Working Interest. The owner of oil and gas rights that are free of lease or other instrument conveying the Working Interest to another shall be regarded as a Working Interest Owner to the extent of seven-eighths ( $7/8$ ) of his interest in Unitized Substances, and as a Royalty Owner with respect to his remaining one-eighth ( $1/8$ ) interest therein.

1.8 Tract means each parcel of land described as such and given a Tract number in Exhibit A.

1.9 Unit Operating Agreement means the agreement entitled "Unit Operating Agreement, Jalmat Field Yates Sand Unit, Lea County, New Mexico," of the same effective date as the effective date of this agreement, and which is entered into by Working Interest Owners.

1.10 Unit Operator means the Working Interest Owner designated by Working Interest Owners under the Unit Operating Agreement to develop and operate the Unitized Formation, acting as operator and not as a Working Interest Owner.

1.11 Tract Participation means the percentage shown on Exhibit A for allocating Unitized Substances to a Tract under this agreement.

1.12 Unit Participation of each Working Interest Owner means the sum of the percentages obtained by multiplying the Working Interest of such Working Interest Owner in each Tract by the Tract Participation of such Tract.

1.13 Outside Substances means all substances obtained from any source other than the Unitized Formation and which are injected into the Unitized Formation.

1.14 Total Tract Remaining Primary Reserves Subsequent to May 31, 1961 means the estimated volume of oil that would be produced after May 31, 1961 from the Unitized Formation under each Unit Tract if the current method of oil producing operations were continued until oil production from each Tract declined to a rate which would not compensate for continued operation of the wells on each Tract.

1.15 Total Unit Area Remaining Primary Reserves Subsequent to May 31, 1961 means the summation of reserves defined in Paragraph 1.14 of all Tracts in the Unit Area.

1.16 Total Tract Producing Rate for the Six (6) Months Prior to June, 1961 means the total oil production from the Unitized Formation under each Unit Tract from December 1, 1960 to May 31, 1961, inclusive, as reported to the Oil Conservation Commission of the State of New Mexico by Operators of the individual Tracts.

1.17 Total Unit Area Producing Rate for the Six (6) Months Prior to June, 1961 means the summation of the oil production defined in Paragraph 1.16 of all Tracts in the Unit Area.

1.18 Total Tract Productive Acreage means the surface area, in acres, of each Tract in the Unit Area which is located within the estimated producing limits of the Unitized Formation.

1.19 Total Unit Area Productive Acreage means the summation of the Tract productive acreage of all tracts in the Unit Area as defined in Paragraph 1.18.

1.20 Total Tract Ultimate Primary Reserves means the summation of the oil production from the Unitized Formation from the date of first production through May 31, 1961 as reported to the Oil Conservation Commission of the State of New Mexico by Operators of the individual Tracts and the reserves defined in Paragraph 1.14, for each Tract in the Unit Area.

1.21 Total Unit Area Ultimate Primary Reserves means the summation of the reserves defined in Paragraph 1.20 of all Tracts in the Unit Area.

1.22 Oil and Gas Rights means the right to explore, develop, and operate lands within the Unit Area for the production of Unitized Substances, or to share in the production so obtained or the proceeds thereof.



1.23 Unit Operations means all operations conducted by Working Interest Owners or Unit Operator pursuant to this agreement and the Unit Operating Agreement for or on account of the development and operation of the Unitized Formation for the production of Unitized Substances.

1.24 Unit Equipment means all personal property, lease and well equipment, plants, and other facilities and equipment taken over or otherwise acquired for the joint account for use in Unit Operations.

1.25 Unit Expense means all cost, expense, or indebtedness incurred by Working Interest Owners or Unit Operator pursuant to this agreement and the Unit Operating Agreement for or on account of Unit Operations.

1.26 Unless the context otherwise clearly indicates, words used in the singular include the plural, the plural include the singular, and the neuter gender include the masculine and the feminine.

## ARTICLE 2

### EXHIBITS

2.1 Exhibits. Attached hereto are the following exhibits which are incorporated herein by reference:

2.1.1 Exhibit A, which is a schedule that describes each Tract in the Unit Area and shows its Tract Participation.

2.1.2 Exhibit B, which is a map that shows the boundary lines of the Unit Area and the Tracts therein.

2.2 Reference to Exhibits. When reference herein is made to an exhibit, the reference is to the Exhibit as originally attached or, if revised, to the latest revision.

2.3 Exhibits Considered Correct. An exhibit shall be considered to be correct until revised as herein provided.

2.4 Correcting Errors. The shapes and descriptions of the respective Tracts have been established by using the best information available. If it subsequently appears that any Tract, because of diverse royalty or working interest ownership on the effective date hereof, should be divided into more than one Tract, or that any mechanical miscalculation has been made, Unit Operator, with the approval of Working Interest Owners, may correct the mistake by revising the exhibits to conform to the facts. The revision shall not include any re-evaluation of engineering

or geological interpretations used in determining Tract Participation. Each such revision of an exhibit shall be effective at 7:00 a.m. on the first day of the calendar month next following the filing for record of the revised exhibit or on such other date as may be determined by Working Interest Owners and set forth in the revised exhibit.

2.5 Filing Revised Exhibits. If an exhibit is revised pursuant to this agreement, Unit Operator shall certify and file the revised exhibit with the Commissioner of Public Lands of the State of New Mexico and for record in the County or Counties in which this agreement is filed.

### ARTICLE 3

#### CREATION AND EFFECT OF UNIT

3.1 Oil and Gas Rights Unitized. Subject to the provisions of this agreement, all Oil and Gas Rights of Royalty Owners in and to the lands described in Exhibit A, and all Oil and Gas Rights of Working Interest Owners in and to said lands, are hereby unitized insofar as the respective Oil and Gas Rights pertain to the Unitized Formation, so that operations may be conducted as if the Unitized Formation had been included in a single lease executed by all Royalty Owners, as lessors, in favor of all Working Interest Owners, as lessees, and as if the lease had been subject to all of the provisions of this agreement.

3.2 Personal Property Excepted. All lease and well equipment, materials, and other facilities heretofore or hereafter placed by any of the Working Interest Owners on the lands covered hereby shall be deemed to be and shall remain personal property belonging to and may be removed by the Working Interest Owners. The rights and interests therein as among Working Interest Owners are covered by the Unit Operating Agreement.

3.3 Amendment of Leases and Other Agreements. The provisions of the various leases, agreements, division and transfer orders, or other instruments covering the respective Tracts or the production therefrom are amended to the extent necessary to make them conform to the provisions of this agreement, but otherwise shall remain in effect.

3.4 Continuation of Leases and Term Royalties. Unit Operations conducted on any part of the Unit Area shall be considered with respect to leases and term royalties as follows:

3.4.1 Operations, including drilling operations, conducted with respect to the Unitized Formation on any part of the Unit Area, or production from any part of the Unitized Formation, except for the purpose of determining payments to Royalty Owners, shall be considered as operations upon or production from each Tract, and such operations or production shall continue in effect each lease or term royalty interest as to all lands covered thereby just as if such operations had been conducted and a well had been drilled on and was producing from each Tract.

3.4.2 Any lease embracing lands of the State of New Mexico which is made subject to this Agreement shall continue in force beyond the term provided therein as to the lands committed hereto until the termination hereof.

3.4.3 Any lease embracing lands of the State of New Mexico having only a portion of its land committed hereto, shall be segregated as to the portion committed and that portion not committed, and the terms of such lease shall apply separately as to such segregated portions commencing as of the effective date hereof. Notwithstanding any of the provisions of this agreement to the contrary, any lease embracing lands of the State of New Mexico having only a portion of its land committed hereto shall continue in full force and effect beyond the term provided therein as to all lands embraced in such lease (whether within or without the Unit Area), (i) if, and for so long as Unitized Substances are capable of being produced in paying quantities from some part of the lands embraced in such lease committed to this agreement, or (ii) if, and for so long as some part of the lands embraced in such State lease are allocated Unitized Substances; or (iii) if, at the expiration of the secondary term, the lessee or the Unit Operator is then engaged in bona fide drilling or reworking operations on some part of the lands embraced therein and for so long as such operations are being diligently prosecuted, and if they result in the production of Unitized Substances, said lease shall continue in full force and effect as to all of the lands embraced therein, as provided in (i) or (ii) above.

3.5 Titles Unaffected by Unitization. Nothing herein shall be construed to result in the transfer of title to the Oil and Gas Rights by any party hereto to any other party or to Unit Operator. The intention is to provide for the cooperative

development and operation of the Tracts and for the sharing of Unitized Substances as herein provided.

3.6 Injection Rights. Royalty Owners hereby grant unto Working Interest Owners the right to inject into the Unitized Formation any substances in whatever amounts Working Interest Owners deem expedient for Unit Operations, including the right to drill and maintain injection wells on the Unit Area and to use producing or abandoned oil or gas wells for such purposes.

3.7 Development Obligation. Nothing herein shall relieve Working Interest Owners from the obligation to develop reasonably as a whole the lands and leases committed hereto.

#### ARTICLE 4

##### PLAN OF OPERATIONS

4.1 Unit Operator. Working Interest Owners are, as of the effective date of this agreement, entering into the Unit Operating Agreement, designating The British-American Oil Producing Company as Unit Operator. Unit Operator shall have the exclusive right to conduct Unit Operations. The operations shall conform to the provisions of this agreement and the Unit Operating Agreement. If there is any conflict between such agreements, this agreement shall govern.

4.2 Operating Methods. To the end that the quantity of Unitized Substances ultimately recoverable may be increased and waste prevented, Working Interest Owners shall, with diligence and in accordance with good engineering and production practices, engage in methods of operation of the Unit Area which from time to time will in their judgment be conducive to that end within practicable economic limits, including water flooding operations and such other pressure maintenance, repressuring and secondary recovery operations as may be deemed by them to be necessary or proper to achieve that end.

4.3 Change of Operating Methods. Nothing herein shall prevent Working Interest Owners from discontinuing or changing in whole or in part any method of operation which, in their opinion, is no longer in accord with good engineering or production practices. Other methods of operation may be conducted or changes may be made by Working Interest Owners from time to time if determined by them to be feasible, necessary, or desirable to increase the ultimate recovery of Unitized Substances.

# ARTICLE 5

## TRACT PARTICIPATION

5.1 Tract Participation. The Tract Participation of each Tract is shown in Exhibit A. Upon the effective date hereof, the Tract Participation of each Tract shall be the Primary Percentage Participation shown in Exhibit "A" for each Tract, which shall continue to be the Tract Participation for each Tract until there has been produced subsequent to May 31, 1961, from the formation herein referred to as the Unitized Formation underlying the Unit Area as initially described in Exhibit A a total volume of oil of five hundred thousand three hundred thirty nine (500,339) barrels and until 7:00 A.M. on the first day of the calendar month next following the month in which such total oil production is reached. Thereafter the Tract Participation of each Tract shall be the Secondary Percentage Participation for such Tract shown in Exhibit "A". The volume of oil to be produced from the Unitized Formation referred to in this Paragraph 5.1 shall be determined from New Mexico Oil Conservation Commission Form C-115 as required by and submitted to said Commission.

5.1.1 The Primary and Secondary Participation Percentages shown in Exhibit A were determined in accordance with the following formulas:

(a) Primary Participation formula:

$$\frac{\text{Total Tract Remaining Primary Reserves Subsequent to May 31, 1961}}{\text{Total Unit Area Remaining Primary Reserves Subsequent to May 31, 1961}} \times 60$$

Plus

$$\frac{\text{Total Tract Producing Rate for the six (6) Months prior to June, 1961}}{\text{Total Unit Area Producing Rate for the six (6) months prior to June, 1961}} \times 30$$

Plus

$$\frac{\text{Total Tract Productive Acreage}}{\text{Total Unit Area Productive Acreage}} \times 10$$

= Tract Primary Percentage Participation.

(b) Secondary Participation formula:

$$\frac{\text{Total Tract Ultimate Primary Reserves}}{\text{Total Unit Area Ultimate Primary Reserves}} \times 75$$

Plus

Total Tract Producing Rate for the Six (6) Months prior to June, 1961		
Total Unit Area Producing Rate for the Six (6) Months prior to June, 1961	X	10

Plus

Total Tract Productive Acreage		
Total Unit Area Productive Acreage	X	15

= Tract Secondary Percentage Participation

5.2 Relative Tract Participations. If the Unit Area is enlarged or reduced, the revised Tract Participations of the Tracts remaining in the Unit Area and which were within the Unit Area prior to the enlargement or reduction shall remain in the same ratio one to another.

## ARTICLE 6

### ALLOCATION OF UNITIZED SUBSTANCES

6.1 Allocation to Tracts. All Unitized Substances produced and saved shall be allocated to the several Tracts in accordance with the respective Tract Participations effective during the period that the Unitized Substances were produced. The amount of Unitized Substances allocated to each Tract, regardless of whether it is more or less than the actual production of Unitized Substances from the well or wells, if any, on such Tract, shall be deemed for all purposes to have been produced from such Tract.

6.2 Distribution Within Tracts. The Unitized Substances allocated to each Tract shall be distributed among, or accounted for to, the parties entitled to share in the production from such Tract in the same manner, in the same proportions, and upon the same conditions as they would have participated and shared in the production from such Tract, in the proceeds thereof, had this agreement not been entered into, and with the same legal effect. If any Oil and Gas Rights in a Tract hereafter become divided and owned in severalty as to different parts of the Tract, the owners of the divided interests, in the absence of an agreement providing for a different division, shall share in the Unitized Substances allocated to the Tract, or in the proceeds thereof, in proportion to the surface acreage of their respective parts of the Tract.

6.3 Taking Unitized Substances in Kind. The Unitized Substances allocated to each Tract shall be delivered in kind to the respective parties entitled thereto by virtue of the ownership of Oil and Gas Rights therein or by purchase from such owners. Such parties shall have the right to construct, maintain, and operate

within the Unit Area all necessary facilities for that purpose, provided that they are so constructed, maintained, and operated as not to interfere with Unit Operations. Any extra expenditures incurred by Unit Operator by reason of the delivery in kind of any portion of the Unitized Substances shall be borne by the receiving party. If a Royalty Owner has the right to take in kind a share of Unitized Substances and fails to do so, the Working Interest Owner whose Working Interest is subject to such Royalty Interest shall be entitled to take in kind such share of the Unitized Substances.

6.4 Failure to Take in Kind. If any party fails to take in kind or separately dispose of its share of Unitized Substances, Unit Operator shall have the right, for the time being and subject to revocation at will by the party owning the share, but not the obligation, to purchase for its own account or sell to others such share at not less than the average market price for all such sales from the Unitized Formation; provided that, all contracts of sale by Unit Operator of any other party's share of Unitized Substances shall be only for such reasonable periods of time as are consistent with the minimum needs of the industry under the circumstances, but in no event shall any such contract be for a period in excess of one year. The proceeds of the Unitized Substances so disposed of by Unit Operator shall be paid to the party entitled thereto. If, under the provisions of this paragraph, Unit Operator contracts to sell in interstate commerce any gas not taken in kind or separately disposed of by the owning party, Unit Operator shall give such owning party ninety (90) days notice of such sale.

6.5 Responsibility for Royalty Settlements. Any party receiving in kind or separately disposing of all or part of the Unitized Substances allocated to any Tract or receiving the proceeds therefrom shall be responsible for the payment thereof to the persons entitled thereto, and shall indemnify all parties hereto, including Unit Operator, against any liability for all royalties, overriding royalties, production payments, and all other payments chargeable against or payable out of such Unitized Substances or the proceeds therefrom.

6.6 Royalty On Outside Substances. If any Outside Substances, consisting of natural gases, are injected into the Unitized Formation, fifty percent (50%) of any like substances contained in Unitized Substances subsequently produced and sold, or used for other than operations hereunder, shall be deemed to be Outside Substances until the aggregate of said fifty percent (50%) equals the accumulated

volume of such natural gases injected into the Unitized Formation. If the Outside Substances injected be liquefied petroleum gases, or other liquid hydrocarbons, as distinguished from natural gases then, beginning one (1) year after injection of such liquefied petroleum gases or other liquid hydrocarbons is commenced, ten percent (10%) of all Unitized Substances produced and sold from the Unitized Formation shall be deemed to be Outside Substances until the aggregate value of said ten percent (10%) equals the entire accumulated cost to the Working Interest Owners of such liquefied petroleum gases or other liquid hydrocarbons injected. No payments shall be due or payable to Royalty Owners on any substance which is classified hereby as an Outside Substance.

#### ARTICLE 7

##### PRODUCTION AS OF THE EFFECTIVE DATE

7.1 Oil in Lease Tanks. Unit Operator shall gauge all lease and other tanks within the Unit Area to ascertain the amount of merchantable oil produced from the Unitized Formation in such tanks, above the pipe line connections, as of 7:00 a.m. on the effective date hereof. The oil that is a part of the prior allowable of the wells from which it was produced shall remain the property of the parties entitled thereto the same as if the Unit had not been formed. Any such oil not promptly removed may be sold by the Unit Operator for the account of the parties entitled thereto, subject to the payment of all royalties, overriding royalties, production payments, and all other payments under the provisions of the applicable lease or other contracts. The oil that is in excess of the prior allowable of the wells from which it was produced shall be regarded as Unitized Substances produced after the effective date hereof.

7.2 Overproduction. If, as of the effective date hereof, any Tract is overproduced with respect to the allowable of the wells on that Tract and the amount of overproduction has been sold or otherwise disposed of, such overproduction shall be regarded as a part of the Unitized Substances produced after the effective date hereof and shall be charged to such Tract as having been delivered to the parties entitled to Unitized Substances allocated to such Tract.

#### ARTICLE 8

##### USE OR LOSS OF UNITIZED SUBSTANCES

8.1 Use of Unitized Substances. Working Interest Owners may use as much of the Unitized Substances as they deem necessary for Unit Operations, including but not limited to the injection thereof into the Unitized Formation.



8.2 Royalty Payments. No royalty, overriding royalty, production, or other payments shall be payable upon, or with respect to, Unitized Substances used or consumed in Unit Operations, or which otherwise may be lost or consumed in the production, handling, treating, transportation, or storing of Unitized Substances.

#### ARTICLE 9

##### TRACTS TO BE INCLUDED IN UNIT

9.1 Qualification of Tracts. On and after the effective date hereof and until the enlargement or reduction thereof, the Unit Area shall be composed of the Tracts listed in Exhibit A that corner or have a common boundary (Tracts separated only by a public highway or a railroad right of way shall be considered to have a common boundary), and that otherwise qualify as follows:

9.1.1 Each Tract as to which Working Interest Owners owning one hundred percent (100%) of the Working Interest have become parties to this agreement and as to which Royalty Owners owning eighty five percent (85%) or more of the Royalty Interest have become parties to this agreement.

9.1.2 Each Tract as to which Working Interest Owners owning one hundred percent (100%) of the Working Interest have become parties to this agreement, and as to which Royalty Owners owning less than eighty five percent (85%) of the Royalty Interest have become parties to this agreement, and as to which (a) all Working Interest Owners in such Tract have joined in a request for the inclusion of such Tract in the Unit Area, and as to which (b) eighty five percent (85%) of the combined voting interests of Working Interest Owners in all Tracts that meet the requirements of Section 9.1.1 have voted in favor of the inclusion of such Tract. For the purpose of this Section 9.1.2, the voting interest of a Working Interest Owner shall be equal to the ratio that its Unit Secondary Percentage Participation attributable to Tracts that qualify under Section 9.1.1 bears to the total Unit Secondary Percentage Participation of all Working Interest Owners attributable to all Tracts that qualify under Section 9.1.1.

9.1.3 Each Tract as to which Working Interest Owners owning less than one hundred percent (100%) of the Working Interest have become parties to this agreement, regardless of the percentage of Royalty Interest therein that is committed hereto; and as to which (a) the Working Interest Owner who operates the Tract and all of the other Working Interest Owners in such Tract who have

become parties to this agreement have joined in a request for inclusion of such Tract in the Unit Area, and have executed and delivered an indemnity agreement agreeing to indemnify and hold harmless the other Working Interest Owners in the Unit Area, their successors and assigns, against all claims and demands that may be made by the owners of Working Interests in such Tract who are not parties to this agreement, and which arise out of the inclusion of the Tract in the Unit Area; and as to which (b) eighty five percent (85%) of the combined voting interest of Working Interest Owners in all Tracts that meet the requirements of Section 9.1.1 and 9.1.2 have voted in favor of the inclusion of such Tract and to accept the indemnity agreement. For the purpose of this Section 9.1.3, the voting interest of each Working Interest Owner shall be equal to the ratio that its Unit Secondary Percentage Participation attributable to Tracts that qualify under Sections 9.1.1 and 9.1.2 bears to the total Unit Secondary Percentage Participation of all Working Interest Owners attributable to all Tracts that qualify under Sections 9.1.1 and 9.1.2. Upon the inclusion of such a Tract in the Unit Area, the Unit Participation that would have been attributed to the nonsubscribing owners of the Working Interest in such Tract, had they become parties to this agreement and the Unit Operating Agreement, shall be attributed to the Working Interest Owners in such Tract who have become parties to such agreements, in proportion to their respective Working Interests in the Tract.

9.2 Subsequent Commitment of Interest to Unit. After the effective date hereof, the commitment of any interest in any Tract within the Unit Area shall be upon such terms as may be negotiated by Working Interest Owners and the owner of such interest, but not more favorable to the owner of such interest than the basis upon which Tracts were admitted on the effective date of this agreement.

9.3 Revision of Exhibits. If any of the Tracts in Exhibit A fail to qualify for inclusion in the Unit Area on the effective date hereof Unit Operator shall recompute, using the original basis of computation, the Tract Participation of each of the qualifying Tracts and shall revise Exhibit A and B accordingly, to be effective as of the effective date hereof upon approval by the Commissioner of Public Lands of the State of New Mexico.

## ARTICLE 10

### TITLES

10.1 Removal of Tract from Unit Area. If a Tract ceases to have sufficient Working Interest Owners or Royalty Owners committed to this agreement to meet the conditions of Article 9 because of failure of title of any party hereto, such Tract shall be removed from the Unit Area effective as of the first day of the calendar month in which the failure of title is finally determined; however, the Tract shall not be removed from the Unit Area if, within ninety (90) days of the date of final determination of the failure of title, the Tract requalifies under a Section of Article 9.

10.2 Revision of Exhibits. If a Tract is removed from the Unit Area because of the failure of title, Unit Operator, subject to Section 5.2, shall recompute the Tract Participation of each of the Tracts remaining in the Unit Area and shall revise Exhibits A and B accordingly. The revised exhibits shall be effective as of the first day of the calendar month in which such failure of title is finally determined.

10.3 Working Interest Titles. If title to a Working Interest fails, the rights and obligations of Working Interest Owners by reason of the failure of title shall be governed by the Unit Operating Agreement.

10.4 Royalty Owner Titles. If title to a Royalty Interest fails, but the Tract to which it relates is not removed from the Unit Area, the party whose title failed shall not be entitled to share hereunder with respect to such interest.

10.5 Production Where Title is in Dispute. If the title or right of any party claiming the right to receive in kind all or any portion of the Unitized Substances allocated to a Tract is in dispute, Unit Operator at the discretion of Working Interest Owners shall either:

(a) require that the party to whom such Unitized Substances are delivered or to whom the proceeds thereof are paid, furnish security for the proper accounting therefor to the rightful owner if the title or right of such party fails in whole or in part, or

(b) withhold and market the portion of Unitized Substances with respect to which title or right is in dispute, and impound the proceeds thereof until such time as the title or right thereto is established by a final judgment of a court of competent jurisdiction or otherwise to the satisfaction of Working Interest Owners, whereupon the proceeds so impounded shall be paid to the party rightfully entitled thereto.

#### ARTICLE 11

##### EASEMENTS OR USE OF SURFACE

11.1 Grant of Easements. The parties hereto, to the extent of their rights and interests, hereby grant to Working Interest Owners the right to use as much of the surface of the land within the Unit Area as may reasonably be necessary for Unit Operations; provided that, nothing herein shall be construed as leasing or otherwise conveying to Working Interest Owners a site for a water, gas injection, processing or other plant, or camp site.

11.2 Use of Water. Working Interest Owners shall have free use of water from the Unit Area for Unit Operations, except water from any well, lake, pond, or irrigation ditch of a Royalty Owner.

11.3 Surface Damages. Working Interest Owners shall pay the owner for damages to growing crops, timber, fences, improvements, and structures on the Unit Area that result from Unit Operations.

#### ARTICLE 12

##### ENLARGEMENTS OF UNIT AREA

12.1 Enlargements of Unit Area. The Unit Area may be enlarged to include acreage reasonably proved to be productive, upon such terms as may be determined by Working Interest Owners and upon approval by the Commissioner of Public Lands of the State of New Mexico and the Oil Conservation Commission of the State of New Mexico, including but not limited to, the following:

12.1.1 The acreage shall qualify under a Section of Article 9.

(a) require that the party to whom such Unitized Substances are delivered or to whom the proceeds thereof are paid, furnish security for the proper accounting therefor to the rightful owner if the title or right of such party fails in whole or in part, or

(b) withhold and market the portion of Unitized Substances with respect to which title or right is in dispute, and impound the proceeds thereof until such time as the title or right thereto is established by a final judgment of a court of competent jurisdiction or otherwise to the satisfaction of Working Interest Owners, whereupon the proceeds so impounded shall be paid to the party rightfully entitled thereto.

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12.1.1 The acreage shall qualify under a Section of Article 9.

12.1.2 The participation to be allocated to the acreage shall be reasonable, fair, and based on all available information.

12.1.3 There shall be no retroactive allocation or adjustment of Unit Expense or of interests in the Unitized Substances produced, or proceeds thereof; however, this limitation shall not prevent an adjustment of investment by reason of the enlargement.

12.2 Determination of Tract Participation. Unit Operator, subject to Section 5.2, shall determine the Tract Participation of each Tract within the Unit Area as enlarged, and shall revise Exhibits A and B accordingly.

12.3 Effective Date. The effective date of any enlargement of the Unit Area shall be 7:00 a.m. on the first day of the calendar month following compliance with conditions for enlargement as specified by Working Interest Owners, approval of the enlargement by the appropriate governmental authority, if required, and the filing for record of revised Exhibits A and B in the records of the County or Counties in which this agreement is recorded.

#### ARTICLE 13

##### CHANGE OF TITLE

13.1 Covenant Running With the Land. This agreement shall extend to, be binding upon, and inure to the benefit of, the respective heirs, devisees, legal representatives, successors, and assigns of the parties hereto, and shall constitute a covenant running with the lands, leases, and interests covered hereby.

13.2 Notice of Transfer. Any conveyance of all or any part of any interest owned by any party hereto with respect to any Tract shall be made expressly subject to this agreement. No change of title shall be binding on the Unit Operator, or upon any party hereto other than the party so transferring, until the first day of the calendar month next succeeding the date of receipt by Unit Operator of a photocopy or a certified copy of the recorded instrument evidencing such change in ownership.

13.3 Waiver of Rights to Partition. Each party hereto covenants that, during the existence of this agreement, it will not resort to any action to partition the Unit Area or the Unit Equipment, and to that extent waives the benefits of all laws authorizing such partition.

#### ARTICLE 14

##### RELATIONSHIP OF PARTIES

14.1 No Partnership. The duties, obligations, and liabilities of the parties

hereto are intended to be several and not joint or collective. This agreement is not intended to create, and shall not be construed to create, an association or trust, or to impose a partnership duty, obligation, or liability with regard to any one or more of the parties hereto. Each party hereto shall be individually responsible for its own obligations as herein provided.

14.2 No Sharing of Market. This agreement is not intended to provide, and shall not be construed to provide, directly or indirectly, for any cooperative refining, joint sale, or marketing of Unitized Substances.

14.3 Royalty Owners Free of Costs. This agreement is not intended to impose, and shall not be construed to impose, upon any Royalty Owner any obligation to pay for Unit Expense unless such Royalty Owner is otherwise so obligated.

14.4 Information to Royalty Owners. Each Royalty Owner upon written request therefor shall be entitled to all information in possession of Unit Operator to which such Royalty Owner is entitled by an existing agreement with any Working Interest Owner.

#### ARTICLE 15

##### LAWS AND REGULATIONS

15.1 Laws and Regulations. This agreement shall be subject to the conservation laws of the State of New Mexico; to the valid rules, regulations, and orders of the Oil Conservation Commission of New Mexico; and to all other applicable federal, state, and municipal laws, rules, regulations, and orders.

#### ARTICLE 16

##### FORCE MAJEURE

16.1 Force Majeure. All obligations imposed by this agreement on each party, except for the payment of money, shall be suspended while compliance is prevented, in whole or in part, by a strike, fire, war, civil disturbance, act of God; by federal, state, or municipal laws; by any rule, regulation, or order of a governmental agency; by inability to secure materials; or by any other cause or causes beyond reasonable control of the party. No party shall be required against its will to adjust or settle any labor dispute. Neither this agreement nor any lease or other instrument subject hereto shall be terminated by reason of suspension of Unit Operations due to any one or more of the causes set forth in this Article.

#### ARTICLE 17

##### EFFECTIVE DATE

17.1 Effective Date. This agreement shall become binding upon each party as

of the date such party signs the instrument by which it becomes a party hereto, and, unless sooner terminated as provided in Section 17.2, shall become effective as to qualified Tracts at the time and date as determined by the Working Interest Owners in all the qualified Tracts, and set forth in a certificate filed for record by Unit Operator in Lea County, New Mexico. The certificate shall also recite the percentage of the Unit Area represented by the Tracts qualified under Article 9, the book and page in which a counterpart of this agreement has been recorded, and the case number and order number of the order of approval by Governmental authority, if obtained. The certificate shall not be filed until after the following requirements have been met:

17.1.1 Tracts comprising eighty five percent (85%) or more of the Unit Area as shown on the original Exhibit B have qualified under the provisions of Article 9.

17.1.2 At least one counterpart of this agreement has been filed for record by Unit Operator in Lea County, New Mexico.

17.1.3 This agreement has been approved by the Oil Conservation Commission of the State of New Mexico.

17.1.4 This agreement has been **approved** by the Commissioner of Public Lands of the State of New Mexico.

17.2 Ipsa Facto Termination. If the requirements of Section 17.1 are not accomplished on or before July 1, 1962, this agreement shall ipso facto terminate on that date (hereinafter called "termination date") and thereafter be of no further effect, unless prior thereto Working Interest Owners owning a combined Unit Secondary Percentage Participation of at least eighty five percent (85%) have become parties to this agreement and have decided to extend the termination date for a period not to exceed six (6) months. If the termination date is so extended and the requirements of Section 17.1 are not accomplished on or before the extended termination date, this agreement shall ipso facto terminate on the extended termination date and thereafter be of no further effect. For the purpose of this section, Unit Participation shall be as shown on the original Exhibit C attached to the Unit Operating Agreement.

#### ARTICLE 18

##### TERM

18.1 Term. The term of this agreement shall be for the time that Unitized Substances are produced in paying quantities and as long thereafter as Unit



Operations are conducted without a cessation of more than one hundred eighty (180) consecutive days, unless sooner terminated by Working Interest Owners in the manner herein provided.

18.2 Termination by Working Interest Owners. This agreement may be terminated by Working Interest Owners having a combined Unit Secondary Percentage Participation of at least eighty five percent (85%) whenever such Working Interest Owners determine that Unit Operations are no longer profitable or feasible.

18.3 Effect of Termination. Upon termination of this agreement, the further development and operation of the Unitized Formation as a unit shall be abandoned, Unit Operations shall cease, and thereafter the parties shall be governed by the provisions of the leases and other instruments affecting the separate Tracts.

18.4 Salvaging Equipment Upon Termination. If not otherwise granted by the leases or other instruments affecting each Tract unitized under this agreement, Royalty Owners hereby grant Working Interest Owners a period of six (6) months after the date of termination of this agreement within which to salvage and remove Unit Equipment.

## ARTICLE 19

### EXECUTION

19.1 Original, Counterpart, or Other Instrument. A person may become a party to this agreement by signing the original of this instrument, a counterpart thereof, or other instrument agreeing to be bound by the provisions hereof. The signing of any such instrument shall have the same effect as if all the parties had signed the same instrument.

19.2 Joinder in Dual Capacity. Execution as herein provided by any party as either a Working Interest Owner or a Royalty Owner shall commit all interests that may be owned or controlled by such party.

## ARTICLE 20

### GENERAL

20.1 Amendments Affecting Working Interest Owners. Amendments hereto relating

wholly to Working Interest Owners may be made if signed by all Working Interest Owners.

20.2 Action by Working Interest Owners. Any action or approval required by Working Interest Owners hereunder shall be in accordance with the provisions of the Unit Operating Agreement.

20.3 Lien of Unit Operator. Unit Operator shall have a lien upon the interests of Working Interest Owners in the Unit Area to the extent provided in the Unit Operating Agreement.

IN WITNESS WHEREOF, The parties hereto have executed this agreement on the dates opposite their respective signatures.

WORKING INTEREST OWNERS

DATE: \_\_\_\_\_

ATTEST:

By \_\_\_\_\_

Its \_\_\_\_\_

THE BRITISH-AMERICAN OIL PRODUCING COMPANY

By \_\_\_\_\_

Its \_\_\_\_\_

DATE: \_\_\_\_\_

ATTEST:

By \_\_\_\_\_

Its \_\_\_\_\_

AMERADA PETROLEUM CORPORATION

By \_\_\_\_\_

Its \_\_\_\_\_

DATE: \_\_\_\_\_

ATTEST:

By \_\_\_\_\_

Its \_\_\_\_\_

AZTEC OIL & GAS COMPANY

By \_\_\_\_\_

Its \_\_\_\_\_

DATE: \_\_\_\_\_

ATTEST:

By \_\_\_\_\_

Its \_\_\_\_\_

CARPER DRILLING COMPANY, INC.

By \_\_\_\_\_

Its \_\_\_\_\_

DATE: \_\_\_\_\_

ATTEST:

By \_\_\_\_\_

Its \_\_\_\_\_

DIXILYN CORPORATION

By \_\_\_\_\_

Its \_\_\_\_\_

DATE: \_\_\_\_\_

ATTEST:

By \_\_\_\_\_

Its \_\_\_\_\_

GULF OIL CORPORATION

By \_\_\_\_\_

Its \_\_\_\_\_

DATE: \_\_\_\_\_

ATTEST:

By \_\_\_\_\_

Its \_\_\_\_\_

TEXACO, INC.

By \_\_\_\_\_

Its \_\_\_\_\_

ROYALTY OWNERS

DATE: \_\_\_\_\_

\_\_\_\_\_

DATE: \_\_\_\_\_

\_\_\_\_\_

DATE: \_\_\_\_\_

\_\_\_\_\_

DATE: \_\_\_\_\_

\_\_\_\_\_

STATE OF  
County of

Before me, the undersigned authority, on this day personally appeared \_\_\_\_\_, President of \_\_\_\_\_, known to me to be the person and officer whose name is subscribed to the foregoing instrument, and acknowledged to me that the same was the free act and deed of the said \_\_\_\_\_, a corporation, and that he having been duly authorized by the Board of Directors of said corporation, executed the same as his free and voluntary act and deed, and as the free and voluntary act and deed of such corporation, for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office at \_\_\_\_\_, this  
the \_\_\_\_\_ day of \_\_\_\_\_, A.D., 19\_\_\_\_.

My commission expires:

\_\_\_\_\_  
Notary Public

STATE OF  
County of

Before me, the undersigned authority, on this day personally appeared \_\_\_\_\_, President of \_\_\_\_\_, known to me to be the person and officer whose name is subscribed to the foregoing instrument, and acknowledged to me that the same was the free act and deed of the said \_\_\_\_\_, a corporation, and that he having been duly authorized by the Board of Directors of said corporation, executed the same as his free and voluntary act and deed, and as the free and voluntary act and deed of such corporation, for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office at \_\_\_\_\_, this  
the \_\_\_\_\_ day of \_\_\_\_\_, A.D., 19\_\_\_\_.

My commission expires:

\_\_\_\_\_  
Notary Public

STATE OF  
County of

ss.

Before me, the undersigned, a Notary Public, in and for said County and State, on this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, personally appeared \_\_\_\_\_, to me known to be the identical person who executed the within and foregoing instrument, and acknowledged to me that he executed the same as his free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and seal of office the day and year last above written.

My commission expires:

\_\_\_\_\_  
Notary Public

STATE OF                    }  
County of                    } ss.

Before me, the undersigned, a Notary Public, in and for said County and State, on this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, personally appeared \_\_\_\_\_, to me known to be the identical person who executed the within and foregoing instrument, and acknowledged to me that he executed the same as his free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and seal of office the day and year last above written.

My commission expires:

\_\_\_\_\_  
Notary Public

STATE OF                    }  
County of                    } ss.

Before me, the undersigned, a Notary Public, in and for said County and State, on this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, personally appeared \_\_\_\_\_, to me known to be the identical person who executed the within and foregoing instrument, and acknowledged to me that he executed the same as his free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and seal of office the day and year last above written.

My commission expires:

\_\_\_\_\_  
Notary Public

STATE OF                    }  
County of                    } ss.

Before me, the undersigned, a Notary Public, in and for said County and State, on this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, personally appeared \_\_\_\_\_, to me known to be the identical person who executed the within and foregoing instrument, and acknowledged to me that he executed the same as his free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and seal of office the day and year last above written.

My commission expires:

\_\_\_\_\_  
Notary Public

## EXHIBIT A

TO

## UNIT AGREEMENT

JALMAT FIELD YATES SAND UNIT

LEA COUNTY, NEW MEXICO

TRACT DESCRIPTION, TRACT OWNERSHIP  
AND TRACT PARTICIPATION PERCENTAGE

4-1-62

Tract No. (Lease Name)	*Tract Description	No. Acres	Lessees of Record	State Lease No. and Date of Lease	Royalty Interest Ownership and Percentage	Working Interest Ownership and Percentage	Tract Participation Percentage	
							Primary	Secondary
1 (Pandel-A)	S/2 S/2 Sec. 2	160	Carper Drilling Company, Inc.	E-266 4-10-44	State of New Mexico 12.500000 L. A. Crancer 1.562500 Morris Mizel 0.781250 Sam Mizel 0.781250 O. H. Randel 3.125000 Robert E. Boling 1.000000	Carper Drilling Company, Inc. 100.000000	3.36558	2.19415
2 (Atlantic-State)	SE/4 SE/4 Sec. 3	40	The Atlantic Refining Company	E-8322 7-20-54	State of New Mexico 12.500000 The Atlantic Refining Company 5.468750	Dixilyn Corporation 100.000000 After Payout Dixilyn Corporation 75.000000 John F. Younger et ux 25.000000	0.52222	0.61222
3 (Phillips-State)	N/2 NE/4 Sec. 10	80	Phillips Petroleum Company	E-1932 6-10-48	State of New Mexico 12.500000 Phillips Petroleum Company 9.375000	Dixilyn Corporation 100.000000 After Payout Dixilyn Corporation 75.000000 John F. Younger et ux 25.000000	2.71190	2.10605

## EXHIBIT A

TO

## UNIT AGREEMENT

JALMAT FIELD YATES SAND UNIT

LEA COUNTY, NEW MEXICO

TRACT DESCRIPTION, TRACT OWNERSHIP  
AND TRACT PARTICIPATION PERCENTAGE

4-1-62

Tract No. (Lease Name)	Tract Description	No. Acres	Lessee of Record	State Lease No. and Date of Lease	Royalty Interest Ownership and Percentage	Working Interest Ownership and Percentage	Tract Participation Percentage	
							Primary	Secondary
4 (State-J-10)	SE/4 Sec. 10	160	Aztec Oil and Gas Company	E-6019-1 2-11-52	State of New Mexico 12.500000	Aztec Oil and Gas Company 100.000000	0.75019	1.111111
5 (State-WEJ)	W/2 NW/4 Sec. 11	80	Amerada Petroleum Corporation	E-1625 12-10-47	State of New Mexico 12.500000	Amerada Petroleum Corporation 100.000000	2.77286	2.56652
6 (Hall-State F)	E/2 NW/4, NE/4 & S/2 Sec. 11	560	The British-American Oil Producing Company	E-8244 6-15-54	State of New Mexico 12.500000	The British-American Oil Producing Company 100.000000	26.36584	28.36652
7 (Randel-C)	W/2 Sec. 12	320	Carper Drilling Company, Inc.	E-268 4-10-44	State of New Mexico 12.500000 L. A. Crancer 1.562500 Morris Mizel 0.781250 Sam Mizel 0.781250 O. H. Randel 3.125000 Robert E. Boling 1.000000	Carper Drilling Company, Inc. 100.000000	2.59299	3.52852
8 (State-BZ)	N/2 Sec. 13	320	Texaco, Inc.	B-158-3 8-14-31	State of New Mexico 12.500000	Texaco, Inc. 100.000000	4.84927	5.57382

EXHIBIT A  
TO  
UNIT AGREEMENT  
JALMAT FIELD YATES SAND UNIT  
LEA COUNTY, NEW MEXICO  
TRACT DESCRIPTION, TRACT OWNERSHIP  
AND TRACT PARTICIPATION PERCENTAGE  
4-1-82

Tract No. (Lease Name)	Tract Description	No. Acres	State Lease No. and Date of Lease	Royalty Interest Ownership and Percentage	Working Interest Ownership and Percentage	Tract Participation Percentage Primary Secondary
9 (State-B)	E/2 Sec. 14	320	The British-American Oil Producing Company 5-18-54	State of New Mexico 12.500000	The British-American Oil Producing Company 100.000000	22.77251 26.74397
10 (Merchants Livestock)	NE/4 NW/4 Sec. 14	40	The British-American Oil Producing Company	The Merchants Live- stock Company 25.000000	The British-American Oil Producing Company 100.000000	5.93640 3.74621
11 (Janda-NCT-K)	NW/4 NW/4, S/2 NW/4 280 & SW/4 Sec. 14	280	Gulf Oil Corporation 9-10-31	State of New Mexico 12.500000	Gulf Oil Corporation 100.000000	22.91078 16.76495
12 (Hall-State D)	N/2 Sec. 23	320	The British-American Oil Producing Company 6-15-54	State of New Mexico 12.500000	The British-American Oil Producing Company 100.000000	4.44946 6.09771
						<hr/> 100.00000 100.00000 <hr/>
	Total State of New Mexico Land			2640 Ac.		
	Total Fee Land			40 Ac.		
	Total Land In Unit			2680 Ac.		

\*All described tracts in T22S-R35E N.M.P.M.



CASE NO. 2546  
EXHIBIT NO. 4  
WATERFLOOD DATA

BEFORE EXAMINATION
OIL CONSERVATION COMMISSION
EXHIBIT NO. 4
CASE NO. 2546

OPERATOR The British-American Oil Producing Company DATE April 25, 1962

FIELD Jalmat COUNTY Lea

RESERVOIR Yates Sand

Date of completion of first well in reservoir December 19, 1955

Other operators injecting into this reservoir in this field None

I. Reservoir and fluid characteristics

A. Information on entire reservoir

1. Name of reservoir Yates Sand
2. Composition (sand, limestone, dolomite, etc.) Sand
3. Structure Monocline  
(See cross-section and structural maps)
4. Type drive during primary production Solution Gas
5. Original reservoir pressure 1400 psi
6. Average well density 40 acres per well

B. Information on proposed project area

1. Number of productive acres in lease or leases to be flooded 2078
2. Average depth to top of pay (feet) 3600'
3. Estimated average effective thickness (feet) 40'
4. Estimated average porosity (%) 21.5
5. Average horizontal permeability (mds.) 18 md. Range 0.1 - 200 md.
6. Connate water content (% of pore space) 43% - core analysis
7. Gravity of oil (API) 36.9° API
8. Viscosity of oil (centipoises) 1.5 cp.
9. Solution GOR @ bubble point 364 cubic feet per barrel

II. Primary production history and present status

1. Date first well completed in Unit area April 8, 1955 - Texaco BZ #1
2. Stage of depletion of project area Stripper
3. Number of wells in project area 1 F, 43 P, 1 T.A.
4. Average daily oil production per well at present time 10.7 BOPD
5. Cumulative oil production to 4-1-62 from Unit area 1,569,732
6. Estimated oil saturation at present time (% of pore space) 52%
7. Estimated ultimate primary recovery 1.9 million barrels of oil
8. Remaining primary reserves 400,000 barrels of oil

III. Injection

1. Source of injected water (formations, depths) Capitan Reef 4200'
2. Fresh or salt water Fresh
3. Open or closed system Closed
4. Treatment of injected water Chemical as required
5. Pattern and spacing 5 spot pattern, 80-acre spacing
6. Initial injection pressure to be used (psi) 500 psi (estimated)
7. Estimated initial per well rate of injection (bbls.) 350 BPD

IV. Results expected

1. Estimated residual oil saturation at abandonment (% of pore space) 34%
2. Estimate increased ultimate as a result of waterflood (bbls.) 2 million bbls.
3. Estimated original oil in place (bbls.) 32.6 million barrels of oil
4. Estimated water requirements 50 million barrels of water

## BEFORE EXAMINER UTZ

OIL CONSERVATION COMMISSION

EXHIBIT NO. 9

CASE NO. 2546

CASE NO. 2546

EXHIBIT NO. 9

COMPLETION AND PRODUCTION DATA

Operator, Lease and Well	Completion Date	Perforations	Initial Potential	Production March, 1962
<b>Amarada</b>				
State WE-J				
Well No. 1	7-28-58	3902-4024 (selective)	Pump 44 BO and 0 BW	345 BO
Well No. 2	2-1-59	3877-4008 (selective)	Pump 108 BO and 1 BW	125
				220
<b>Astec</b>				
State J-10				
Well No. 1	9-1-58	3940-4062 (selective)	Pump 9 BO	0 BO
<b>British-American</b>				
Hall State "D"				
Well No. 1	5-4-56	3854-3928 (selective)	Flow 245 BO and 0 BW	591 BO
Well No. 2	7-30-56	3810-3928 (selective)	Pump 23 BO and 8 BW	374
Well No. 3	3-28-57	3850-3956 (selective)	Pump 26 BO and 0 BW	58
				159
Hall State "F"				
Well No. 1	9-27-56	3812-3970 (selective)	Pump 38 BO and 0 BW	4839 BO
Well No. 2	5-5-57	3910-3976 (selective)	Pump 42 BO and 5 BW	273
Well No. 3	3-29-57	3844-3990 (selective)	Flow 63 BO and 0 BW	187
Well No. 4	5-13-57	3866-3944 (selective)	Pump 9 BO and 2 BW	408
Well No. 5	3-12-58	3867-4013 (selective)	Flow 85 BO and 0 BW	—
Well No. 6	4-1-58	3893-4018 (selective)	Pump 134 BO and 0 BW	1082
Well No. 7	5-5-58	3868-4004 (selective)	Pump 187 BO and 4 BW	210
Well No. 8	5-4-58	3888-4006 (selective)	Flow 40 BO and 0 BW	508
Well No. 9	5-27-58	3885-3998 (selective)	Flow 46 BO and 0 BW	457
Well No. 10	5-29-58	3882-4010 (selective)	Flow 70 BO and 0 BW	282
Well No. 11	6-17-58	3876-3972 (selective)	Flow 140 BO and 0 BW	740
Well No. 12	6-25-58	3874-4004 (selective)	Flow 160 BO and 0 BW	347
Well No. 13	7-20-58	3883-3959 (selective)	Flow 161 BO and 0 BW	284
				61
<b>Merchants Livestock</b>				
Well No. 1	2-14-58	3853-3964 (selective)	Flow 83 BO and 0 BW	1278 BO
<b>New Mexico "B"</b>				
Well No. 1	1-1-56	3831-3932 (selective)	Flow 62 BO and 0 BW	3124 BO
Well No. 2	2-22-56	3862-3934 (selective)	Flow 133 BO and 2 BW	75
Well No. 3	4-30-56	3862-3950 (selective)	Pump 78 BO and 0 BW	75
Well No. 4	6-21-56	3370-3945 (selective)	Flow 170 BO and 7 BW	100
Well No. 5	2-1-57	3892-3960 (selective)	Flow 92 BO and 0 BW	350
Well No. 6	12-10-56	3838-3936 (selective)	Flow 115 BO and 1 BW	587
Well No. 7	1-16-57	3833-3940 (selective)	Flow 101 BO and 0 BW	526
Well No. 8	2-20-57	3864-3978 (selective)	Pump 122 BO and 2 BW	636
				775
<b>Carper Drilling Company</b>				
Randel "A"				
Well No. 5	3-5-59	3832-3920 (selective)	Flow 25 BO and 0 BW	546 BO
Randel "C"				
Well No. 2	12-9-56	3902-3918 (selective)	Flow 552 BO and 0 BW	355 BO
Well No. 3	3-8-57	3812-3842 (selective)	Flow 15 BO and 0 BW	187
Well No. 4	9-10-58	3828-3936 (selective)	Pump 60 BO and 0 BW	56
				112
<b>Dixilyn Drilling Company</b>				
Atlantic-State				
Well No. 1	8-18-58	3906-3988 (selective)	Pump 10 BO and 0 BW	95 BO
Phillips-State				
Well No. 1	5-20-58	3923-4113 (selective)	Flow 30 BO and 0 BW	359 BO
Well No. 2	12-3-58	3910-4033 (selective)	Flow 33 BO and 0 BW	162
				197
<b>Gulf Oil Corporation</b>				
Janda "K"				
Well No. 1	2-2-58	3910-4030 (selective)	Flow 128 BO and 4 BW	2199 BO
Well No. 2	2-25-58	3882-3982 (selective)	Flow 122 BO and 2 BW	589
Well No. 3	4-9-58	3892-3952 (selective)	Pump 62 BO and 17 BW	—
Well No. 4	5-21-58	3857-3984 (selective)	Pump 165 BO and 4 BW	560
Well No. 5	5-21-58	3854-3988 (selective)	Pump 159 BO and 6 BW	374
Well No. 6	10-31-58	3883-4006 (selective)	Pump 11 BO and 6 BW	91
<b>Texaco, Inc.</b>				
State BZ				
Well No. 1	3-18-55	Open hole, recompleted	Pump 11 BO and 0 BW	525 BO
Well No. 2	9-23-56	3898-3950 (selective)	Pump 60 BO and 0 BW	203
Well No. 3	6-26-56	3830-3875 (selective)	Pump 28 BO and 0 BW	139
Well No. 4	8-15-56	3822-3900 (selective)	Pump 72 BO and 0 BW	32
				157