CASE 3447: Application of TEXAS PACIFIC OIL CO. for down-hole commingling, Lea County, N. Mex.

CASE 3447: Application of TEXAS PACIFIC OIL CO. for down-hole commingling, Lea County, N. Mex.

Case Number

3447

Application

Transcripts.

Small Exhibits

ETC.

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. 3447
Order No. R-3117

APPLICATION OF TEXAS PACIFIC OIL
COMPANY FOR DOWN-HOLE COMMINGLING,
LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on August 24, 1966, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 21st day of September, 1966, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Texas Pacific Oil Company, is the operator of the J. P. Collier Well No. 1, located in Unit F of Section 10, Township 11 South, Range 33 East, NMPM, Lea County, New Mexico.

(3) That said well is presently completed and equipped to produce from perforations in the North Bagley-Upper Pennsylvanian Pool from 9466 feet to 9474 feet and from perforations in the North Bagley-Middle Pennsylvanian Pool from 9862 feet to 9872 feet through parallel strings of tubing, separation of the two pools being achieved by means of a packer set at 9852 feet.

(4) That said well is assigned a top allowable for each of said pools.

(5) That said well is presently flowing as a top allowable well from the North Bagley-Upper Pennsylvanian Pool.

(6) That said well is presently shut in in the North Bagley-Middle Pennsylvanian Pool.

(7) That the applicant proposes to produce and to commingle in the casing-tubing annulus the non-marginal oil production from the aforesaid pools by means of a Special Multiple Zone Single String Production Hookup without first measuring the production from each zone.

(8) That the applicant proposes to ensure that neither of the aforesaid zones produces more than its assigned allowable by means of down-hole choke assemblies.

(9) That neither of the producing zones in the subject well is of a settled nature, and both are, in fact, presently subject to rapid change in productivity of oil and water.

(10) That a change in the rate of pumping, bottom hole pressure of either or both zones, or percent of water in either or both zones, can cause either or both zones to produce more or less than its calculated share of the combined allowable for said well thereby endangering correlative rights and causing waste.

(11) That the applicant has not established that correlative rights can be protected by allocating production from each of these non-marginal zones in said well by periodic production tests utilizing the subtraction method.

(12) That the subject application should be denied.

IT IS THEREFORE ORDERED:

(1) That the subject application is hereby denied.

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Jack M Campbell
JACK M. CAMPBELL, Chairman

Guyton B. Hays
GUYTON B. HAYS, Member

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

esr/

GOVERNOR
JACK M. CAMPBELL
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

P. O. BOX 2088
SANTA FE

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

September 21, 1966

Mr. John Russell
Attorney at Law
P. O. Drawer 640
Roswell, New Mexico

Re: Case No. 3447
Order No. R-3117
Applicant:
TEXAS PACIFIC OIL COMPANY

Dear Sir:

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

Very truly yours,

A. L. Porter, Jr.

A. L. PORTER, Jr.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC
OTHER

Case 3447
Heard 8-24-66
Rec. 9-1-66

1. I recommend that the D & P Oil Co. application be denied.

2. Failed to prove that 2 non-marginal zones cant be commingled downhole. and the allowables regulated with reasonable accuracy.

Thos A Hall

Case 3447 Comments.

This well has 5½ inch casing which is the apparent reason for the operator wanting to commingle downhole. The well also produces large volumes of water. Both zones are non-marginal. The saving of chokes by stabbing production tests and bottom hole pressures is at best a calculated estimate. Any change in ~~rate~~ differential pressure across these chokes will change the flow volume thru the chokes ~~and~~ which will change the production relationship between the 2 zones. A change in water cut will also change the gravity of the fluid in either zone and cause inaccuracies in measurement.

I feel that ~~each~~ an approval ~~where~~ where one or more zones are non-marginal will open the door for the substitution of downhole commingling for ~~future~~ completions.

The commission cautiously allowed downhole commingling of marginal zones. Then came downhole commingling without separation of zones. Now we are faced with non-marginal requests. If we do not hold the line at this point we will ~~have~~ eventually have

Docket No. 21-66

DOCKET: EXAMINER HEARING - WEDNESDAY - AUGUST 24, 1966

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

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

CASE 3437: (Continued and readvertised from the August 3, 1966 Examiner Hearing)

Application of Anadarko Production Company for a waterflood expansion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to expand its Pearsall Queen Sand Unit waterflood project by the injection of water into the Queen formation through one well to be drilled at an unorthodox location 25 feet North of the South line and 25 feet West of the East line of the SE/4 NW/4 of Section 4, Township 18 South, Range 32 East, Lea County, New Mexico.

CASE 3443: Application of Mobil Oil Corporation for a unit agreement, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the approval of its Northeast Square Lake (Premier) Unit Area comprising 2,200 acres, more or less, of Federal and State lands in Township 16 South, Range 31 East, Eddy County, New Mexico.

CASE 3444: Application of Mobil Oil Corporation for a waterflood project, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project in its Northeast Square Lake (Premier) Unit by the injection of water into the Premier Sand of the Grayburg formation through 14 wells located in Sections 2, 3, 9, 10, and 11, Township 16 South, Range 31 East, North Square Lake Pool, Eddy County, New Mexico.

CASE 3445: Application of Kersey & Company for a waterflood project. Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Grayburg-San Andres formation through two wells located in Section 32, Township 17 South, Range 32 East, Maljamar Pool, Lea County, New Mexico.

CASE 3446: Application of Kersey & Company for an amendment to Order No. R-2908, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-2908 which authorized a waterflood project in the Old Loco Unit, Loco Hills Pool, Eddy County, New Mexico. Applicant seeks authority to substitute 8 wells in Section 32, Township 17 South, Range 29 East, for the 6 wells previously authorized for injection so that the injection pattern will conform to that of a nearby project currently in operation.

CASE 3447: Application of Texas Pacific Oil Company for down-hole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to commingle production from the North Bagley Middle-Pennsylvanian and North Bagley Upper-Pennsylvanian Pools in the wellbore of its J. P. Collier Well No. 1 located in Unit F of Section 10, Township 11 South, Range 33 East, North Bagley Field, Lea County, New Mexico.

CASE 3448: Application of Pan American Petroleum Corporation for an unorthodox location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to complete its South Mattix Unit Well No. 21 at an unorthodox location 1873 feet from the South line and 2087 feet from the West line of Section 15, Township 24 South, Range 37 East, Fowler Ellenburger Pool, Lea County, New Mexico.

LAW OFFICES OF
JOHN F. RUSSELL
SUITE 1010 SECURITY NATIONAL BANK BUILDING
P O DRAWER 640
ROSWELL, NEW MEXICO 88201

TELEPHONE 622-4641
AREA CODE 505

July 20, 1966

Case 3447

Mr. A. L. Porter Jr.
Secretary Director
New Mexico Oil Conservation Commission
Santa Fe, New Mexico 87501

'66 JUL 21 AM 7 3

Dear Mr. Porter:

I transmit herewith in triplicate an Application of Texas Pacific Oil Company and request that it be set for hearing before an examiner.

Very truly yours,

John F. Russell

JFR:bl

Enclosure
cc: Mr. Eldon Scott
Texas Pacific Oil Co.
Box 747
Dallas, Texas 75221
w/enc.
Mr. Fred Hughey
Texas Pacific Oil Co.
Midland, Texas 79704
w/enc.

DOCKET MAILED
Date 7-11-66

BEFORE THE OIL CONSERVATION COMMISSION

OF THE STATE OF NEW MEXICO

MAIN OFFICE O.C.C.

'66 JUL 21 AM 7 31

IN THE MATTER OF THE APPLICATION OF TEXAS PACIFIC OIL COMPANY FOR AN ORDER AUTHORIZING THE SUBSURFACE COMINGLING OF PRODUCTION FROM ITS J. P. COLLIER WELL NO. 1 LOCATED IN UNIT F OF SECTION 10, TOWNSHIP 11 SOUTH, RANGE 33 EAST N.M.P.M., LEA COUNTY, NEW MEXICO, IN THE NORTH BAGLEY, MIDDLE AND UPPER PENN POOLS

No. 3447

APPLICATION

COMES NOW Texas Pacific Oil Company and makes application for an order authorizing the subsurface comingling of production from its J. P. Collier Well No. 1 and in support thereof states:

1. Applicant is the owner and operator of its J. P. Collier Well No. 1, located in unit F of Section 10, Township 11 South, Range 33 East, N.M.P.M., Lea County, New Mexico. Said well is in the North Bagley Middle and Upper Penn Pools.

2. Said well is presently flowing as a top allowable well from the Upper Penn and the Middle Penn has been shut in since it ceased to flow.

3. Subsurface comingling is desired in order to lift sufficient fluid volumes to obtain the top allowables from the Upper and Middle Penn.

4. The granting of this application will permit applicant to recover the maximum amount of oil from each of these zones.

5. That the proposed subsurface comingling will not cause waste nor impair the correlative rights of any other operator in the North Bagley Middle or Upper Penn Pools.

WHEREFORE, applicant requests that this matter be set down for hearing before an examiner for the purpose of authorizing subsurface comingling as herein requested; that notice of the hearing be published as required by law and that, after said hearing, the Commission issue an order as prayed for herein.

Respectfully submitted,

TEXAS PACIFIC OIL COMPANY

By John F. Russell
Attorney for Applicant

P. O. Drawer 640
Roswell, New Mexico

DATED: July 14, 1966

7/21/66

Re: T.P. Reservoir agreement to
Clear Lake PST
Application Number
Section Number NEB-482

1-22-35/0 8
3

Dear Dan

Enclosed is [illegible] agreement
[illegible] application to [illegible]. Today I am sending
[illegible] except that T.P.
Bayley Road (West) [illegible] the pavilion area.
Lower gate is now shown because of the
visibility to flow. Mayrun agrees for the
gas gate to left lower gate. Also told you we
could possibly make top automatic & telephone
might request top automatic for each gate, but
she had not arranged [illegible] and guards to
unlock gates [illegible].

It is possible to put each gate separately
and to establish permanently [illegible]
to [illegible] pocket leakage [illegible]

can be completed with a [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

in production.

I have [illegible] APSC [illegible] [illegible]

the plans of the [illegible] available [illegible]

All additional details [illegible] as soon as we

can communicate it.

My own thoughts is of economics is the

main consideration, when [illegible] are [illegible]

setup with double allowable by conservation

for continuation of reasonable controls for

dual completion then only a single

allowable with packer leakage tests. If

these zones are [illegible] large, economical to

produce [illegible] [illegible] Maybe a secondary

project should be considered.

He said that [illegible] [illegible] might come [illegible]

hearing in about a month. I did not have

conversation with [illegible].

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 24, 1966

Application of Texas Pacific Oil Company for down-hole commingling, Lea County, New Mexico	CASE NUMBER 3447

BEFORE:

ELVIS A. UTZ, Examiner

TRANSCRIPT OF HEARING

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 24, 1966

Application of Texas Pacific Oil Company for down-hole commingling, Lea County, New Mexico.	CASE NUMBER 3447

BEFORE:

ELVIS A. UTZ, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: The hearing will come to order, please, Case Number 3447.

MR. HATCH: Application of Texas Pacific Oil Company for down-hole commingling, Lea County, New Mexico.

MR. RUSSELL: John F. Russell of Roswell, representing the Applicant, Texas Pacific Oil Company, and I will have three witnesses.

MR. UTZ: Are there other appearances in this case?

(No response.)

Swear the three witnesses.

(Whereupon, the witnesses were sworn.)

MR. RUSSELL: Mr. Examiner, I have an exhibit which has been marked Applicant's Exhibit Number A which consists

of three pages of statements and twelve attachments to it, all combined into one document. It has already been marked.

FRED **HUGHEY**, called as a witness, having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. JOHN F. RUSSELL:

Q Will you please state your name, where you reside, and by whom you are employed, and in what capacity?

A I am Fred **Hughey**. I live in Midland, Texas. I work for Texas Pacific Oil Company and I am a petroleum engineer.

MR. UTZ: Spell your last name.

A H-U-G-H-E-Y.

Q (By Mr. Russell.) Mr. Hughey, have you previously qualified to testify before this Commission or its Examiner?

A No, I have not.

Q Will you give us a brief resume of your educational background and the position you've held in this type of work since graduation.

A I attended the University of Oklahoma and graduated in 1960 with a B.S. Degree in petroleum engineering.

I went to work at that time for Pan American Petroleum Corporation and worked for six years in Andrews, Texas, in all phases of petroleum engineering.

At that time, I accepted a position with Texas

Pacific Oil Company as petroleum engineer in the Midland office.

Q And that is where you are located at this time?

A Yes.

MR. RUSSELL: Mr. Examiner, are the witness' qualifications acceptable?

MR. UTZ: Yes, they are.

Q (By Mr. Russell.) Mr. Hughey, are you familiar with the application of Texas Pacific Oil Company in Case Number 3447?

A Yes, I am.

Q What is it that you are requesting by this application?

A Texas Pacific Oil Company respectfully requests the Oil Conservation Commission of New Mexico to grant an exception to the state wide rule number 303A and any other related rule to allow the subsurface commingling of production from the J. P. Collier Well Number One, located in Unit F of Section 10, Township 11 South, Range 33 East, Lea County, New Mexico.

It is proposed that this well be equipped with a multichoke assembly so designed and located to maintain segregation of producing zones and prevent commingling in the formation, but permit the commingling and production of the full allowable of each zone through a single strain

of tubing.

Q Will you give us a brief history of your J. P. Collier Well Number One and the reason why you want to go to this type of production?

A Yes, sir.

The J. P. Collier Well Number One was completed in 1957 flowing 531 barrels of oil per day from the Lower-Penn.

Production continued until May of '64 at which time the well was completed into the two upper zones, the Middle-Penn. and the Upper-Penn.

The Middle-Penn. was completed May 18th, 1964, for an initial potential of 330 barrels of oil per day. The water cut has increased in this zone until the well has now ceased to flow. Cumulative production of this zone is some 73,765 barrels. The zone is now shut in and waiting artificial lift equipment which has been postponed to prevent damage of the flowing Upper-Penn. completion.

The Upper-Penn. was completed May 23rd, 1964, flowing 440 barrels of oil and has produced 138,180 barrels of oil cumulative to June 1st, 1966, and is still flowing; however, the well is heading and becoming weaker and will require artificial lift in the near future.

The five and half inch casing in the well limits

the maximum amount of fluid that can be produced from such a completion. Under the conventional dual completion total fluid from the well will be limited to approximately 400 barrels of oil -- I'm sorry, 400 barrels of fluid per day. The 60 to 70 percent water cut would then limit us to only a 114 barrels of oil per day. The proposed installation will allow a 1200 barrel fluid per day maximum production and should allow Texas Pacific to maintain top allowable for the well for an extended period.

Q That's from each zone?

A The 1200 barrels is from the well, I mean as is the 400 for the conventional. Texas Pacific recommends approval for this application to produce and commingle fluid through one tubing string to prevent economic waste, to install dual artificial lift equipment, to allocate all production according to semi-annual well tests to produce the top legal allowable from each zone and to produce sufficient fluid to allow complete depletion of other producing zones. The royalty interest and working interest for this lease is common for each zone. The cross flow of reservoir fluid cannot occur in the proposed equipment arrangement even while work is being done to change the pump. This will be illustrated later in our exhibits. Semiannual well tests will be taken to insure that each zone is contributing its share of production for the

well. This testing can be accomplished by the subtracting method without the necessity of expensive tripping and tubing or extensive wire line work. An upper movement of only five inches of the tubing string will flank off the upper zone and will allow an individual well test for the lower completion. By subtracting this from a previous 24-hour test for the two zones, you can then arrive at the production derived from the upper zone. This proposal is similar to a case numbered 3112, 1964, for Continental in which similar subsurface equipment was approved. However, their well was a marginal producer.

I would like to point out that an approval for an allowable for each of the zones is necessary in order to make this installation economically feasible or, in other words, the extensive work to do this could not be justified on one allowable since our Upper-Penn. is capable of making top allowable for itself.

Q Now, turning to what is marked Attachment Number One to the exhibit, will you explain what that is?

A This is a plat of the North Bagley field showing all completions with the Lower-Penn., colored brown, the Middle-Penn., colored red, and the Upper-Penn., blue. As you can see in Section 10 --

Q Will you locate the well in question?

A In Section 10, Unit F, the red and blue dot there is

the subject well. The only other dual in this field is the west offset, the David Paskin Belmont Collier Number One. It can be noted also there are several Upper-Penn. zones as well as one other Middle-Penn. producer approximately one mile to the south. Approval of this application would then allow Texas Pacific to protect its correlative rights by producing the Middle-Penn. which is now impossible to do.

Q All right. Now turn to what has been identified as Attachment Two to this exhibit and explain what that shows.

A Attachment Two is the present condition of the J. P. Collier Well Number One illustrating the previous zones that were produced and are now abandoned. With the blue zone being the Middle-Penn., the zone now shut in and the upper red zone being the Upper-Penn., which is now flowing. And the orange --

Q In between the lower formations, what are they?

A The orange with the large X's are bridge plugs used to isolate previous perforated interval. The upper orange is the packer now used to segregate production from the Upper and the Middle-Penn.

Q And tubing is presently run to the Middle-Penn., is that correct?

A Yes, sir. the blue line from the surface to the packer is an illustration of that tubing from the Middle-Penn.

MR. UTZ: Let me get something straight in my mind.

Which of these zones is now shut in?

A The Middle-Penn. The blue one there.

Q (By Mr. Russell.) All right. Now, turning to what is marked Attachment Three, will you now explain what that reflects?

A Yes, sir. This is the proposed condition if our application is approved. The difference here from Attachment Two is the fact that we now have another packer which is situated above the Upper-Penn. perforations. There is one string of tubing in the well and our Baker down-hole assembly is sitting between the two packers to insure that complete segregation is maintained and we also have our hydraulic pump above our upper packer.

Q All right. Now, turn to Attachment Number Four and explain it.

A Attachment Number Four is a more detailed illustration of the Baker tool which is set between the two packers. The two packers shown here are the yellow squares with X's on them. This tool is in position for normal operating conditions. As can be seen, the lower part of the tool there has a circular yellow dot which is a standing valve to prevent fluid from entering the lower zone and in the middle of the page is another standing valve which will prevent the lower zone from flooding the Upper-Penn. The two fluids are commingled

approximately opposite the Upper-Penn. perforations and go on up the string to our hydraulic pump equipment and then it is pumped to the surface.

Q All right. Now, turn to Attachment Number Five and explain what that is.

A Attachment Number Five is an illustration of the same equipment. During our semiannual tests in which the upper zone has been blanked off by slight movement of your tubing and you are now producing the lower zone only through the same pump equipment as before. This equipment is also designed such that anytime the pump is pulled to be repaired, this same blank off is effective. As long as the equipment is working as designed, there can be no mixing of the fluids within the reservoir.

Q Now, we do have a witness from the Baker Tool Company who will, if necessary, give more technical information on the operation of the unit and answer any questions perhaps in that connection.

A Yes, sir. We have large detailed drawings.

Q All right. Now turn to Attachment Six and just briefly state what that is.

A This is a step-by-step description of the work necessary to size the choke assembly shown in Attachment Four which will limit the amount of fluid that can be produced from

ither zone. It is done by obtaining producing bottom hole pressures and productivity indexes for each zone and from this there are calculations to be gone through to properly size these chokes. I might refer you back to Attachment Four. One of the chokes is in the lower part of your tubing string where your second choke is opposite your upper perforations here. Again, if there are more questions on the specific work done or the calculations, our representative from the Baker Oil Tool Company can give you a much better answer on any questions to that.

Q But this is a listing of the step-by-step procedure which you will follow in determining the size choke in order to insure that each zone is only producing the amount of oil of which it is entitled to produce, is that correct?

A That's correct.

Q And this, you anticipate, will be checked semi-annually by the tests which you have previously testified to?

A Yes, sir.

Q All right, now turn to what has been marked as Attachment Number Seven and explain that.

A This is a copy of an electric log on J. P. Collier Number One depicting the completion of the Middle and the Upper-Penn. showing a present packer and bridge plug which separates the Middle-Penn. from the previous zone produced lower in the

well.

Q And what are the colors which are indicated?

A The orange again is the bridge plug. The upper orange squares are permanent packers now in place. The blue perforations -- the blue dashes are the Middle-Penn. perforations. The red dashes are the Upper-Penn. perforations.

Q All right, now turn to Attachment Number Eight and explain what that is.

A Attachment Number Eight is an estimated tabulation of the cost to pump the well, first of all, under the proposed condition and, secondly, under the method which would be required as a conventional dual completion. There can be seen there approximately $10,000.00 more which would be required under a conventional dual. However, the main factor here as well as the money, is the amount of fluid that can be recovered from the small casing. As stated earlier, the proposed installation would allow us to produce 1200 barrels fluid per day from the well, where the capacity of the conventional Kobe equipment would limit it to approximately 400 barrels of fluid total from the two zones.

MR. PORTER: That is with a twin string?

A Yes, sir.

Q (By Mr. Russell.) All right, now turn to Attachment Number Nine and explain what that is.

A Attachment Nine is a listing of the pertinent data for each zone in the J. P. Collier Well Number One. The first listing is for the lower zone which was inserted just for completeness in the well. A comparison of the Upper-Penn. and Middle-Penn. zone will show the gravity is essentially the same lacking one and a half degrees A.P.I. and again showing an accumulative production for the Middle-Penn. approximately 74,000 barrels and the Upper-Penn. was 138,000 barrels as of June 1st of this year.

Q All right, now turn to Attachment Number Ten and explain it.

A Attachment Number Ten is a summary of field data for each of the three zones in the North Bagley field listing the numbered wells, the top allowable, the accumulative oil production from each pool, your approximate water cut, which you can see is in the range of fifty percent. Your average gas-oil ratio shows that the Middle-Penn. and Upper-Penn. are approximately the same.

Q What is the Middle-Penn.?

A The gas-oil ratio?

Q Yes.

A Fifteen hundred cubic feet per barrel.

Q And the Upper-Penn.?

A Seventeen hundred cubic feet per barrel. Your

original bottom hole pressure of your Middle-Penn. was 3,500 P.S.I. Your Upper-Penn. 3,200 P.S.I.

Again, it depicts your average oil gravity and your estimated current reservoir pressure taken from drill stem tests data of a previously -- recently drilled well indicates that the Middle-Penn. pressure has not been depleted an appreciable amount, in fact, it appears that it is still 3,500 P.S.I.

However, the amount of production from the Upper-Penn. has lowered its present pressure to approximately 2,000 P.S.I. All three zones are apparently water dry reservoirs and on eighty acre spacing.

Q All right. Turn to Attachment Eleven and just briefly state what that shows.

A Attachment Eleven is production data from each well in the North Bagley Penn. field illustrating the accumulative production as of June 1st of this year and the amount of oil produced during May of this year.

Q All right. Now turn to Attachment Number Twelve and explain what that is.

A Attachment Number Twelve is an illustration of the conventional dual Kobe installation I was talking about on the left side. The colored one showing the type of installation that would be required in the five and a half inch casing.

Q And that is the type of completion that you were referring to with the limited production of fluids from the two formations?

A That's correct.

Q Do you have anything else you would like to add as to your method of producing the J. P. Collier well if this is granted or if it is not granted?

A If the application is not granted, the well will be produced as a single completion until such time as the Upper-Penn. is depleted. At that time a study will have to be undertaken to determine if sufficient volume of oil remains in the Middle-Penn. to justify work to lift it.

Q And in that interim period, in your opinion, would your Lower-Penn. be drained by this Isham State Number One well in the Northwest Quarter of Section Fifteen?

A Yes, sir.

MR. RUSSELL: I have no further questions.

MR. UTZ: Mr. Hughey, referring to your Attachment Number Ten, you list the Upper-Penn. as producing from 10,000 feet and the Lower-Penn., 9,450. Should that be turned around, possibly?

A Yes, sir. Apparently, all three of the depths are off. Well, the Lower-Penn. and the Upper-Penn. should be reversed.

Q (By Mr. Utz.) Would that be the only thing in here that would be in error?

A Yes, sir. The rest of them are correct.

MR. PORTER: Sometimes these errors occur, Mr. Hughey. I noticed the Commission nomenclature designated the Vacuum Devonian being north of the North Vacuum.

MR. UTZ: I would like to clarify the amount of oil that you propose to produce from each of these zones. What was your statement regarding that?

A The amount of oil to be produced as illustrated again on Attachment Ten would be the top allowable for the Middle-Penn. plus the top allowable for the Upper-Penn. assuming the well will maintain that amount of production.

MR. UTZ: That's what I thought you said. Now what about this production test that you ran in July 1965 of 208 barrels of oil per day, what type of test was that and is that indicative of what the well will produce now?

A That is the last flowing test on the well. Soon after that, the water cut apparently increased enough to kill the well. Attempts were made to swab it in and were unsuccessful and we feel like by producing -- being able to produce this large amount of volume of fluid that we would be able to bring the well up to a top allowable well in this zone.

MR. UTZ: In other words, the proposed method of

production here, you think, will make a top allowable well out of the Middle-Penn.?

A Yes, sir.

MR. UTZ: Now again, for the sake of clarification, what type of tests do you propose to run to determine the producing capacity of each zone?

A On our Attachment Six actually is a more detailed step-by-step procedure in which we will produce each zone with a hydraulic pump separately to determine its productivity and its producing bottom hole pressure. The production tests will tell us of the amount of production that can be obtained from the zone and then the bottom hole pressure will be used to size any chokes that are necessary to insure that each zone is producing its amount of oil only.

MR. UTZ: And you will then test each zone separately or will you use the subtraction method to determine the volume of the second zone?

A No, sir. On initial installation, we will test each zone separately by use of wire line equipment which is necessary on initial installation to size our chokes and to prove the productivity of each zone. However, this sort of thing on a semiannual or annual basis would be prohibited in the cost to do it semiannually, to pull our pump from the well to do the required wire line work and all, but this is necessary on

initial installation.

MR. UTZ: In order to size your chokes?

A Yes, sir.

MR. UTZ: Now, did you propose to leave these chokes sized in the same relationship from now on?

A Until our semiannual tests indicate an inbalance which needs to be adjusted.

MR. UTZ: Due to bottom hole pressure?

A Or different water cuts and/or bottom hole pressure.

MR. UTZ: Now will this test be run with the same capacity pump and the same make pump as you will on the subsequent production tests?

A No, sir. But the initial tests will be run with a pump of approximately half the capacity but you will only be producing the one zone, where when you are producing the two zones together, you have twice the capacity of the pump used for the initial testing.

MR. UTZ: Yes. That's why I asked the question. In other words, will the wells be drawn down to their full capacity or just how much oil do you intend to produce on these initial tests? In other words, the relationship between the pump that you used to test with and the pump that you used to produce with, will each zone produce the amount of test oil?

A The purpose of using the smaller pump for the initial

installation is again a matter of economics because we can use a type pump where we can retrieve from the well by simply reversing our valve and pump it out. I believe that is correct. When Mr. Whetzel is on the stand, we can ask him more specifically on this but I do believe that the required data to size these chokes can be obtained without getting the absolute draw down producing pressures through the productivity index.

MR. UTZ: Well, on your initial test, and I feel you should be able to answer this question, will you draw each zone down to its full producing capacity or what limitations are you going to put on it?

A It won't be necessary to produce the well to its absolute producing capacity.

MR. UTZ: Well, how much?

A If we are talking about -- this is something -- it is hard to say because there is, especially on the Middle-Penn., we do not know the producing capacity.

MR. UTZ: Yes.

A But there would be no need to produce it at 400 barrels a day or 500 barrels a day rate. The allowable rate would be sufficient.

MR. UTZ: But you will make the test at the allowable rate?

A Yes.

MR. UTZ: This will preclude then the possibility of one zone making allowable for the other zone in the instance where one zone may be actually still a marginal zone?

A Yes, sir. That is the purpose of this step-by-step testing and using these chokes here as well as semiannual well tests.

MR. UTZ: Now, let's look at it another way. If you test each zone at the allowable rate and install a larger pump to produce both zones together, then, in your opinion, will each zone produce in the same relationship or will one zone produce a little more than it would under the pump allowable test?

A No, sir. I feel that it will produce --

MR. UTZ: You think that this choke system, in sizing your chokes, will prevent this?

A Yes, sir. As well as the control of the speed at which you pump this well. In other words, even though we have a pump in here capable of producing 1200 barrels of fluid per day, the well won't necessarily be produced at this rate. It is just capable of it if that amount is required to make the allowable.

MR. UTZ: So this will actually depend on, whether each zone produces its proper share of oil will depend on the sizing of your chokes?

A Yes, sir.

MR. UTZ: Well, I think probably the Baker man can best answer the other questions that I probably will have. Are there other questions of the witness?

MR. PORTER: I have one or two.

Is the production from these two zones now commingled at the surface?

A Well, at the present time, one zone is shut in.

MR. PORTER: I see, but has it been in the past? Have you ever produced the other?

A Yes, sir. It was commingled.

MR. PORTER: It was, so far as the sale of the oil is concerned or difference in price, it would not be any different than what it is at the present time?

A That's right.

MR. PORTER: Have you studied this Continental order that the Commission issued?

A I studied the case. I did not see the actual order, no.

MR. PORTER: But you did read the transcript?

A Yes, sir.

MR. PORTER: And their proposal?

A Yes, sir.

MR. PORTER: Would you say the only significant

difference in what you are asking for and what they got, is a matter of volume of production?

A As far as I can tell, that is the difference.

MR. PORTER: Their wells were marginal in both zones?

A Yes, sir.

MR. PORTER: I believe Mr. Utz already asked the other questions I had.

MR. UTZ: Are there any other questions?

THE WITNESS: I would like to show the method which we intend to go about proving packer leakage test on this well, if approved, also. Would this be another exhibit?

MR. RUSSELL: Do you want to go into that at this time or would you rather have the Baker man now?

MR. UTZ: It does not make any difference. I think probably we should ge this into the record, but how you do it is up to you.

(Whereupon, Exhibit B was marked for identification.)

Q (By Mr. Russell.) Referring to what has been marked as Applicant's Exhibit B, will you please explain what that is supposed to reflect or show?

A Yes, sir. In order to prove that our equipment is functioning properly and that there is no cross-flow of fluids from one reservoir to the other, we propose to perform the following packer leakage test. On the front page of Exhibit B,

the first test taken would be to test the lower packer by installing a pressure recorder in the seeding nipple in the bottom of the string as shown on this attachment. Then a wire line plug would be set in the nipple above this point. At that time, then the upper zone would be, first of all, shut in, then produced, and then shut in again. Any leakage of the packer would be clearly illustrated by the accurate measurements of pressures at this depth. This would actually be a more stringent requirement than under the conventional packer leakage test. The tests of the upper packer --

MR. UTZ: Excuse me just a moment. I lost you here in the location of this line plug -- wire line plug and Model F nipple. Now where would that be located?

A That is approximately in the middle of the page just below the red arrows. It says, "P.S.I.C. nipple with the plugs". In other words, the tubing string will be blanked off above your pressure recorder.

MR. UTZ: I see.

A Your upper zone would then be produced -- or shut in and then produced and then shut in again. Testing of the upper packer would be done by a pressuring of the casing tubing annulus to insure that it did not leak. This would be done with a recorder to show that there was no leak-off.

MR. UTZ: Build up a pressure and shut it in?

A Yes, sir. As shown here, the blue is the pressure exerted by your Middle-Penn. The red stripes are the pressures exerted by your Upper-Penn. zone and then the orange arrows are pressures that would be inflicted on the well to test the equipment. To test the seals and the back check valve and the lower choke, this would be to insure that production from the Upper-Penn. could not migrate down into the Middle-Penn. through the tubing string. This would be done again by pressuring techniques.

MR. UTZ: Again, does the orange indicate your pressuring?

A Yes, sir, that you would be putting on the tubing string from the surface. Again, your red is the pressure of your Upper-Penn. The blue is the pressure of your Middle-Penn. Then, the last page is a test of both your seals and your back check valve installed for each zone to insure that neither zone can migrate fluids to the other one. The orange arrows again are pressure from the surface. The red is pressure from the Upper-Penn. and the blue is pressure from the Middle-Penn.

This test -- this series of packer leakage tests could and would be done in conjunction with the test required to size our choke equipment.

MR. RUSSELL: Do you have any further testimony or statements to make?

A No.

MR. RUSSELL: I have no further questions of this witness.

MR. UTZ: In each case these pressures would be built up and shut in and recorded by what?

A By surface pressure recorder with the exception of the first one where you will have the subsurface pressure recorder down there.

MR. UTZ: Spring gauge?

A Bottom hole pressure bomb.

MR. UTZ: On that one, yes, but I mean your surface pressures, what type of gauge would you use there?

A You would use the same gauge that you use in the normal packer leakage test.

MR. UTZ: And when it is shut in, you will record pressures periodically over a period of time?

A Yes, sir.

MR. UTZ: What period of time?

A I don't know. I haven't gone into that. Again, this same period of time that is required for your conventional bottom hole pressure test -- packer leakage test.

MR. UTZ: I think it's twenty-four hours. I am not real sure myself. But, at any rate, you will check the pressure immediately on shut in and subsequent pressures to show whether

there is pressure that has leaked off.

Are there other questions?

The witness may be excused.

(Witness excused.)

MR. RUSSELL: Mr. Whetzel?

RODNEY WHETZEL, called as a witness, having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. JOHN F. RUSSELL:

Q Will you please state your name, your residence, by whome you are employed and in what capacity?

A Rodney Whetzel, Odessa, Texas. Employed by Baker Oil Tools as a District Mechanical Engineer in the West Texas District.

Q And you are familiar with the equipment which Mr. Hughey has referred to?

A Yes, I am.

Q You have heard Mr. Hughey's testimony in connection with the operation of this equipment?

A Yes, sir.

Q Is there anything that you would like to add to it at this time?

A No, sir, unless Mr. Utz has any questions.

Q Let me ask you this. Do you have with you a larger

scaled drawing that may a little better show the operation of the equipment?

A Yes, sir.

Q Could you put it on the board here -- on the wall, and perhaps it will help them in identifying it.

(Witness complies.)

Q Will you just explain to the Examiner the operation of this equipment during normal production and also when it is shut in for making a semiannual test?

A Okay. I think on Attachment Number Four, you see a schematic of this piece of equipment in relation to the rest of the equipment in the well and this equipment is -- the item that's right below the upper packer, it is designated a P.S.I. Model G One Bypass Sliding Sleeve with a choke. The tool is initially installed in the tubing string in this position here with the closing sleeve in the closed position or in the open, either way, but without the choke in it.

Now, during our initial testing, this zone will be open to flow -- the upper zone will be open to flow by installing the upper choke in the middle and the upper choke is wire-lined retreivable for initial testing. Now, as long as the choke is installed in the sleeve, the upper zone can flow through ports in the sleeve pass the back check valve through the choke and into the tubing, where in initial testing,

it will be tested by itself and during commingling operations, it will be joined with flow from the lower zone at this point.

Now, whenever this choke is pulled, the sleeve automatically closes so you can never get zone communication down-hole either with the choke in place because of the check valve or with the choke out because it automatically closes the sleeve.

Now, during production of the well, this choke will be attached to the tubing string and whenever the tubing string is picked up a distance of five inches which we will have an automatic stop in a took above the top packer and that will automatically pick this up and shut off the upper zone, so that we can test the lower zone.

MR. UTZ: Now, what part is it that actually comes out, you say is retreivable?

A The blue.

MR. UTZ: The blue part?

A Yes, sir.

MR. UTZ: Which way is up on that?

A This is up. This is the top. This is the fishing neck and during the initial testing, this tool will be run in and out on a wire line and during actual production of the well after the chokes have been sized, essentially, this same tool will be fixed to the tubing string.

MR. UTZ: What portion of that blue is the choke?

A The choke is this pink part down here. This is the choke itself. The whole tool is a choke check assembly.

MR. UTZ: Is it a ring?

A Yes, sir, it is a ring. It is a ceramic ring and it can be drilled to any size -- not drilled but made to any size. So flow from the zone will come through these ports and pass the back check valve through the choke into the tubing.

MR. UTZ: That choke would actually be a restriction on the periphery of the tubing and between the tubing and the choke, is that right?

A This is where the tubing connects to this tool so it will be a restriction, say, in the tubing string from the zone.

MR. UTZ: Yes, actually it would be a restriction between the chokes which would be different sizes in the casing of your tool.

A Yes, that's right. This will be the smallest flow path that the fluid will have to travel in getting from the casing to the tubing.

MR. UTZ: How about the upper choke?

A This is the upper choke.

MR. UTZ: I mean the middle or lower choke?

A The lower choke is essentially the same tool

set in a nipple and the reason why it doesn't have to be set in the sleeve is that production from the lower zone enters the bottom of the choke as shown in that attachment you have right there.

See, the lower zone would come in from the bottom of the tubing string and the choke itself is exactly the same choke housed in a different type of tool and it operates the same way as that

choke does. That bottom choke also contains a check valve.

MR. UTZ: I do not have anything else other than that.

MR. PORTER: With this assembly, in the event one zone became marginal before the others, you could produce a portion of the marginal allowable from a non-marginal zone by adjusting the choke, is that right?

A You could produce?

MR. PORTER: In the event one zone becomes marginal and the other remains non-marginal, you could produce a portion of the marginal well allowable from the non-marginal zone by adjusting the choke size.

MR. UTZ: In other words, to keep the non-marginal zone from producing more than its allowable, you would have to size the choke properly here.

A Yes, sir.

MR. UTZ: By changing or enlarging the orifice of the choke, then the lower zone or the non-marginal zone could produce a portion of the marginal zone allowable.

A It could if you didn't adjust the choke sizes.

MR. UTZ: It makes these tests pretty important, doesn't it?

A Yes, sir. See, these tests, the chokes are sized according to pump and bottom hole pressure and they are sized at the pressure at which the well will be produced so that the

only thing that could -- as long as the pressure stays the same and the fluid gravity stays the same, then the choke sizes should be all right, and the semiannual tests will determine if any choke sizes has to be changed because we will test the well at the pressures at which they are going to be pumped when they are in production.

MR. UTZ: Now, can you tell me why this system pumps so much more fluid than the usual Kobe tubing pump?

A Well, this is -- is it a Kobe -- it is a Kobe tubing pump, well, it's a fixed type pump is what it is, which means it is a part of the tubing string so it can handle higher volume than one that would be retrievable, see, pump in and out. It's just a larger pump. Now, the reason why you need that type pump here because in five and a half inch casing in order to produce both zones up separate tubing strings, you would need two pumps and you just couldn't get them in there that are big enough to produce the required volume.

MR. PORTER: Would they be smaller size strings of tubing than what you anticipate using?

A Yes, sir.

MR. UTZ: Well, would the tubing be the factor or the size of the pump?

A The size of the pump would be the factor because the production in this case will actually come up the annulus and

in the other case I guess it would too. I'm not familiar -- I am kind of familiar but not completely familiar with what the other hookup would be with two tubing strings except that it would be two pumps, neither one of them capable of getting the required production from each zone.

MR. UTZ: Did you say this production will come up the casing tubing annulus?

A Yes, sir, through the pump.

MR. UTZ: The pump is on the tubing string, is it not?

A Yes, sir, it has openings from the pump into the casing and annulus. It is a conventional Kobe type tubing pump.

MR. UTZ: So this does use power oil, right?

A Yes, sir.

MR. UTZ: Which would go down the tubing string?

A Yes, sir.

MR. UTZ: What size tubing will this be?

A Two and three-eighths, I think.

MR. UTZ: I don't believe I have any more questions. Does anyone else have any questions?

I am still a little concerned about the sizing of these chokes in order to, perhaps it is much simpler than it seems to me, but these initial tests that you run on this well, in your opinion, you will be able to use those tests to properly size these chokes so each zone produces the proper amount of oil?

A Yes, sir.

MR. UTZ: And you have a formula, I presume for calculating this cross section area of the choke and pressure and gravity level and all of this?

A Yes, the information necessary to size the chokes will be taken during the initial testing. We will flow the well initially without chokes to determine the volume required to give the desired production and at this time we will get the information necessary to size the chokes, such as bottom hole pressure, fluid gravity, gas oil ratio, and such things as that. So it will be obtained during the initial testing. The pump that is used to initially test the zones will have a bottom hole pressure bomb attached to it to record bottom hole pressures at the desired pumping rate, so we will know at what pressure each zone is at when it is being produced at the desired rate.

MR. UTZ: The differential across the choke does make a difference in the amount of oil that will go through there?

A Yes, sir.

MR. UTZ: Now, will the upstream pressures on the choke be the same on the test side -- well, when you make your initial test, as it will during the production?

A Yes, sir, that's right.

MR. UTZ: And those can be maintained?

A Yes, sir.

MR. UTZ: Are there any other questions.

The witness is excused.

(Witness excused.)

MR. RUSSELL: Mr. Wilson.

PHIL WILSON

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

DIRECT EXAMINATION

BY MR. JOHN F. RUSSELL

Q Will you please state your name and where you live and by whom you are employed and in what capacity.

A Phil Wilson. I live in Midland. I am the Area Sales Manager for Kobe Incorporated.

Q Now that is the maker of the pump which has been referred to today?

A Yes, sir.

Q Now you heard the testimony of Mr. Hughey and also Mr. Whetzel?

A Yes, sir.

Q In connection with the operation of your pump?

A Yes, sir.

Q Now is there anything that you would like to add to what they have testified to as to the operation of your pump in this type of operation?

A Yes, sir. I would like to, number one, verify Mr. Hughey's testimony on the volume that we can pump from a dual with two pumps, that is, keeping the production separate. We are limited in size of casings, in size of pumps, that we can get in the hole on Attachment Twelve which shows the method of producing them separately. This is with three strings of tubing. One string of two and three-eighths inch, O.D. tubing, and two strings of one inch, O.D. tubing, and one pump must, of necessity, go inside the two and three-eighths tubing and the other on the outside. This is what limits the capacity that we can get with two pumps.

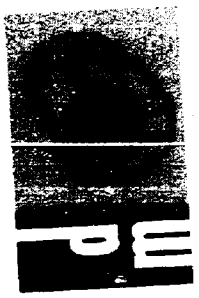
With one pump installed, we, of course, can go to this 1,200 barrels a day with just one string of tubing and I would like to verify Mr. Hughey's figures on the cost and the capacity.

I would like to show how we, on the initial testing, run a pressure bomb for each zone.

Q Would you like to put that up on the board?

A (Witness complies.)

During the initial testing of each zone, this is what would be in the hole above the top packer. The black is the Kobe pump. The white is an attachment on top of it that is sealed and contains a pressure bomb. The bottom hole pressure is conducted to that bomb through a small steel tube that is threaded through the pump, sealed off at this point, and at this



point so that the bottom hole pressure is actually communicated to the bomb. This is a free pump which with this pump out of the hole, and this standing valve which is right here, out of the hole, it is retrieved with a wire line and this is circulated out with those out of the hole, a wire line can go through this assembly and open the lower zone and blank off the upper as Rodney Whetzel explained, so that we can pump first the upper zone at the top allowable rate and record the bottom hole pressure at that time and there will be no choke installed, no restriction at that time, so this will effectively represent the bottom hole pressure accurately at that particular rate and the pump may be speeded up or slowed down and get the pressure at different rates, but the actual producing rate is the important one. Then this pump and bomb can be circulated out, the standing valve pulled, the wire lines worked to shut off the upper zone and open the other Lower or Middle-Penn. with no choke and again run the standing valve back, run the pump back with the bomb and record the bottom hole pressure of the Middle-Penn. zone at the desired producing rate.

With this information of the producing rate and the bottom hole pressure of each zone, the Baker chokes can be sized to prevent the pump from pumping more from one zone than the other with the accurate bottom hole pressures and production rates that are at the allowable rate.

After this initial test period, this pump or this tubing and bottom hole assembly will be pulled out and a casing type fixed pump run in which is essentially just exactly like this pump except that it is too big to run up and down the tubing. The tubing is screwed onto it and it is run in the hole. The upper choke assembly is connected to that pump at that time instead of a wire line, then, when the big casing pump is run in, the upper choke is attached to it and we produce both zones. To test then, by picking up the pump five inches, you remain sealed off here in a packer but you close the Upper-Penn. formation and pump from only the Lower-Penn. to test semiannually.

MR. UTZ: You merely mean the lower zone, don't you?

A Right, lower zone. I'm sorry.

MR. UTZ: How do you maintain the upstream pressure on your pump? By upstream, I mean the upstream pressure on the choke size. How do you maintain a constant pressure there or do you?

A Well, the production rate combined with the choke size would determine the upstream pressure.

MR. UTZ: How about the amount of pressure you apply to your power oil?

A Well, each zone, for instance, produces 250 barrels of oil and 250 of water, then we will run the pump at the necessary

rate to produce 500 barrels of oil and 500 barrels of water and chokes, as previously determined at this rate, the chokes will keep that evenly divided between the zones, depending on the bottom hole pressures at that rate, that we have previously determined. And if we were to speed it up, we would not only oil produce but we would lower the upstream pressure on the choke.

MR. UTZ: In other words, during this six month period, if you size your choke to produce -- we'll round it off to, say, 12,00 barrels of fluid combined from both zones, this is water and oil at some predetermined water cut?

A Yes, sir.

MR. UTZ: Now, if the water cut changes in either zone or the ratio of water cut between the two zones changes, then you are going to know that you are getting more water and less oit. right?

A Yes, sir.

MR. UTZ: And you want to produce your allowable in oil so then you are going to speed up your pump to produce more fluid, right?

A Yes.

MR. UTZ: In order to make the oil. Now what will this do with your upstream pressure across your chokes and will it change the volume of fluid that passes through these chokes?

A Yes, it will change the volume. I think I understand the question in that if in one zone water-oil ratio increased, then we might produce too much from the other zone to make it up. I think when the total water-oil ratio changes appreciably then it would be necessary to test at that time. If this is sooner than six months, pick up the pump five inches and test the lower zone and see if its water-oil ratio has changed and we will be pumping that at that time at a -- not the 1,200 barrel a day rate. We will not be running the pump at a 1,200 barrel a day rate when we pick it up. We will be running it at a rate that is the same rate as when they were commingled and we will determine this by our operating pressure on the surface of the power oil. The operating pressure is a direct function of the bottom hole pressure so that when we shift the pump and shut off the Upper-Penn, we will slow the pump down so that it maintains the same operating pressure, which would mean the same down-stream pressure of the choke as when they were commingled.

MR. UTZ: In other words, with the same choke, you will be able to vary the volume of fluid that goes through those chokes by the speed of your pump.

A Yes, sir, we will, but we will on that test not vary it and we will determine this by the operating pressure on the pump. We will not draw the pressure down lower or higher.

MR. UTZ: Then would you say if you had to produce

more fluid to get your oil allowable then the gravity of the fluid would also change, am I correct?

A Yes, sir.

MR. UTZ: And if this situation should occur, say at more than the normal rate of increase in the water and I am assuming that the water rate will increase in both of these zones, then would you say that the testing rate probably should be less than six months for a testing period or frequency?

A If the total water fluid ratio changes appreciably, I should think so. I wouldn't expect them to change much in a six month period.

MR. UTZ: Well, I think under normal conditions, they probably wouldn't but should it occur, this is just a point I wanted to get in the record.

A I think this will be obvious on the surface if the water-oil ratio for the commingled total changes, you will know it. It would seem unlikely that the water ratio would go up in one and go down in the other.

MR. UTZ: It could go up in each zone at different rates?

A Yes, sir.

MR. UTZ: Does anyone have any further questions?

MR. RUSSELL: I have one more question of Mr. Hughey. Was Exhibit A and the Attachments and Exhibit B prepared by you

or under your direct supervision?

MR. HUGHEY: Yes, sir.

MR. RUSSELL: I would like to move the introduction of Exhibit A with its Attachments and Exhibit B.

MR. UTZ: Without objection, they will be entered into the record in this case.

MR. RUSSELL: Is there another statement that you wanted to make?

MR. HUGHEY: No, sir.

MR. RUSSELL: Has it been cleared up?

MR. HUGHEY: Yes, sir.

MR. RUSSELL: I have nothing further to offer, Mr. Examiner.

MR. UTZ: Any further statements in this case?

The case will be taken under advisement.

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

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

WITNESS my Hand and Seal this 12th day of September, 1966.

W. Don McIntyre
W. DON McINTYRE

My Commission Expires:

July 14, 1970

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3447, heard by me on Sept. 7, 1966.

....., Examiner
New Mexico Oil Conservation Commission

BEFORE THE OIL CONSERVATION COMMISSION

OF THE STATE OF NEW MEXICO

STATE OFFICE

'66 JUL 21 AM 7 31

IN THE MATTER OF THE APPLICATION OF TEXAS PACIFIC OIL COMPANY FOR AN ORDER AUTHORIZING THE SUBSURFACE COMINGLING OF PRODUCTION FROM ITS J. P. COLLIER WELL NO. 1 LOCATED IN UNIT F OF SECTION 10, TOWNSHIP 11 SOUTH, RANGE 33 EAST N.M.P.M., LEA COUNTY, NEW MEXICO, IN THE NORTH BAGLEY, MIDDLE AND UPPER PENN POOLS	)	No. 3447

APPLICATION

COMES NOW Texas Pacific Oil Company and makes application for an order authorizing the subsurface comingling of production from its J. P. Collier Well No. 1 and in support thereof states:

1. Applicant is the owner and operator of its J. P. Collier Well No. 1, located in unit F of Section 10, Township 11 South, Range 33 East, N.M.P.M., Lea County, New Mexico. Said well is in the North Bagley Middle and Upper Penn Pools.

2. Said well is presently flowing as a top allowable well from the Upper Penn and the Middle Penn has been shut in since it ceased to flow.

3. Subsurface comingling is desired in order to lift sufficient fluid volumes to obtain the top allowables from the Upper and Middle Penn.

4. The granting of this application will permit applicant to recover the maximum amount of oil from each of these zones.

5. That the proposed subsurface comingling will not cause waste nor impair the correlative rights of any other operator in the North Bagley Middle or Upper Penn Pools.

WHEREFORE, applicant requests that this matter be set down for hearing before an examiner for the purpose of authorizing subsurface comingling as herein requested; that notice of the hearing be publisned as required by law and that, after said hearing, the Commission issue an order as prayed for herein.

Respectfully submitted,

TEXAS PACIFIC OIL COMPANY

By John F. Russell
Attorney for Applicant

P. O. Drawer 640
Roswell, New Mexico

DATED: July 14, 1966

Oil Conservation Commission Hearing

For Subsurface Commingling (Case 3447)

Texas Pacific Oil Company's J. P. Collier

Well No. 1, North Bagley Field

Lea County, New Mexico

August 24, 1966

RECOMMENDATION

Texas Pacific Oil Company respectfully requests that the Oil Conservation Commission of New Mexico grant an exception to Statewide Rule No. 303A and any other related rule to allow the subsurface commingling of production of the J. P. Collier Well No. 1 located in Unit F, Section 10, T-11-S, R-33-E, Lea County, New Mexico. It is proposed that this well be equipped with a multiple choke assembly so designed and located to maintain segregation of the producing zones and prevent commingling in the formations, but permit the commingling and production of a full allowable from each zone through a single string of tubing.

The J. P. Collier Well No. 1 was completed July 9, 1957, flowing 531 barrels oil per day from the Lower Penn. Production continued until May, 1964, for a cumulative production of 59,878 barrels oil. At this time, water production precluded the economic recovery of additional oil and the well was recompleted as a Middle Penn and Upper Penn dual oil well.

The Middle Penn was completed flowing for 330 barrels oil per day on May 18, 1964. Water cut of the production steadily increased until the flowing production ceased late in 1965. Cumulative production from this zone is 73,765 barrels. The zone is now shut-in awaiting artificial lift equipment. Necessary work to install this equipment has been postponed to prevent damage to the flowing Upper Penn completion.

The Upper Penn was completed May 23, 1964, flowing 440 barrels oil per day. This zone has produced 138,180 barrels oil to June 1, 1966, and is still flowing top allowable. The zone is becoming weaker and will require artificial lift in the near future.

The added flexibility and capacity of the proposed installation in the 5½" casing will allow increased recovery by producing the well to a lower economic limit through more efficient operations. The 1220 barrel per day fluid production available with commingled production will allow protection of correlative rights since both zones are being produced by offset operators. A conventional dual artificial lift arrangement would allow a total fluid recovery of only 380 barrels per day. A water cut of 70% would then allow only 114 barrels oil per day production from the two zones. An estimated $10,723 capital expenditure can be eliminated by commingling in the production tubing in the J. P. Collier Well No. 1.

Texas Pacific Oil Company recommends approval of the application for downhole commingling in the J. P. Collier Well No. 1 to:

1. Produce the commingled fluid through one tubing string.
2. Prevent economic waste to install dual artificial lift equipment on the well.
3. Allocate all production according to semi-annual well tests.
4. Produce the top legal allowable from each zone.
5. Produce sufficient fluid to allow complete depletion of the producing zones.

This operation would not be detrimental to the interest of any other operator. The royalty interest and working interest ownerships for this lease is common to both zones.

Cross flow of reservoir fluids cannot occur in the proposed equipment arrangement. This installation would also insure against any cross flow while tubing is being pulled to change the pump.

Semi-annual well tests will be taken to insure that one zone is contributing its share of the production for the well. This testing can be accomplished by the subtraction method without the necessity of tripping the tubing or extensive wireline work. An upward movement of only five inches will blank off the upper zone and will allow individual testing of the lower zone. The twenty-four hour test results of the lower zone will then be subtracted from the twenty-four hour test results from the commingled production to determine the daily producing rate of the upper zone. The use of chokes, if necessary, will insure that each zone contributes its share of the commingled production. Gas production from this lease is sold and can be allocated to its respective zone by the semi-annual gas-oil ratio tests.

This proposal is very similar to Case No. 3112 heard before Mr. Elvis A. Utz on September 30, 1964, and Mr. Daniel S. Nutter on July 28, 1965. This referenced case was presented for Continental Oil Company on a marginal well in Rio Arriba County, New Mexico. Use of similar subsurface equipment was approved in this previous hearing.

Approval of an allowable for each of the commingled zones is necessary for the proposed installation to be economically justified. Southland Royalty, an offset operator to the Texas Pacific Oil Company leases, has expressed an interest in the outcome of this hearing, as approval would enhance the drilling on their lease. Their lease is a direct north offset to the J. P. Collier #2.

PLAT OF WELLS COMPLETED IN NORTH BAGLEY (PENN) POOLS LEA COUNTY, NEW MEXICO

R – 33 – E

ATTACHMENT I

T 11 S

5 | 4 | 3 | 2

Chas. B. Gillespie Jr. 1 — State "A"

8 | 9 | 10 | 11

Sam Boren 1 — Gulf-Sohio State

B.T.A. 1 — Bagley

David Fasken — Felmont Collier

Texas Pacific Oil Co. 3, 2 — J.P. Collier 1

Stoltz & Co. — Hissom State "A"

Felmont Oil Corp. 3, 1 — State "F"

Texas Pacific Oil Co. 1 — State "AK"

17 | 16 | 15 | 14

Felmont Oil Corp. 1 — Hissom State

Stoltz & Co — State "NBN" 1

Pan American Pet. 1 — State "DC"

Cabot Corp. 1 — Merry E. Dallas

TO ROSWELL

20 | 21½ | 22 | 23

Stoltz & Co 1 — Bell "A"

Stoltz & Co 2½ — Bell 1

Stoltz & Co. 1 — Gulf State

Cabot Corp. 1 — State "M"

Stoltz & Co. 1 — State "NBF"

Felmont 1 — State "262"

Stoltz & Co 1 — J.D. Guye"

Stoltz & Co. 2, 1 — Sinclair State

Cabot Corp. 1 — J.R. Thompson

TO TATUM

U.S. 380 Highway

N

LOWER PENN

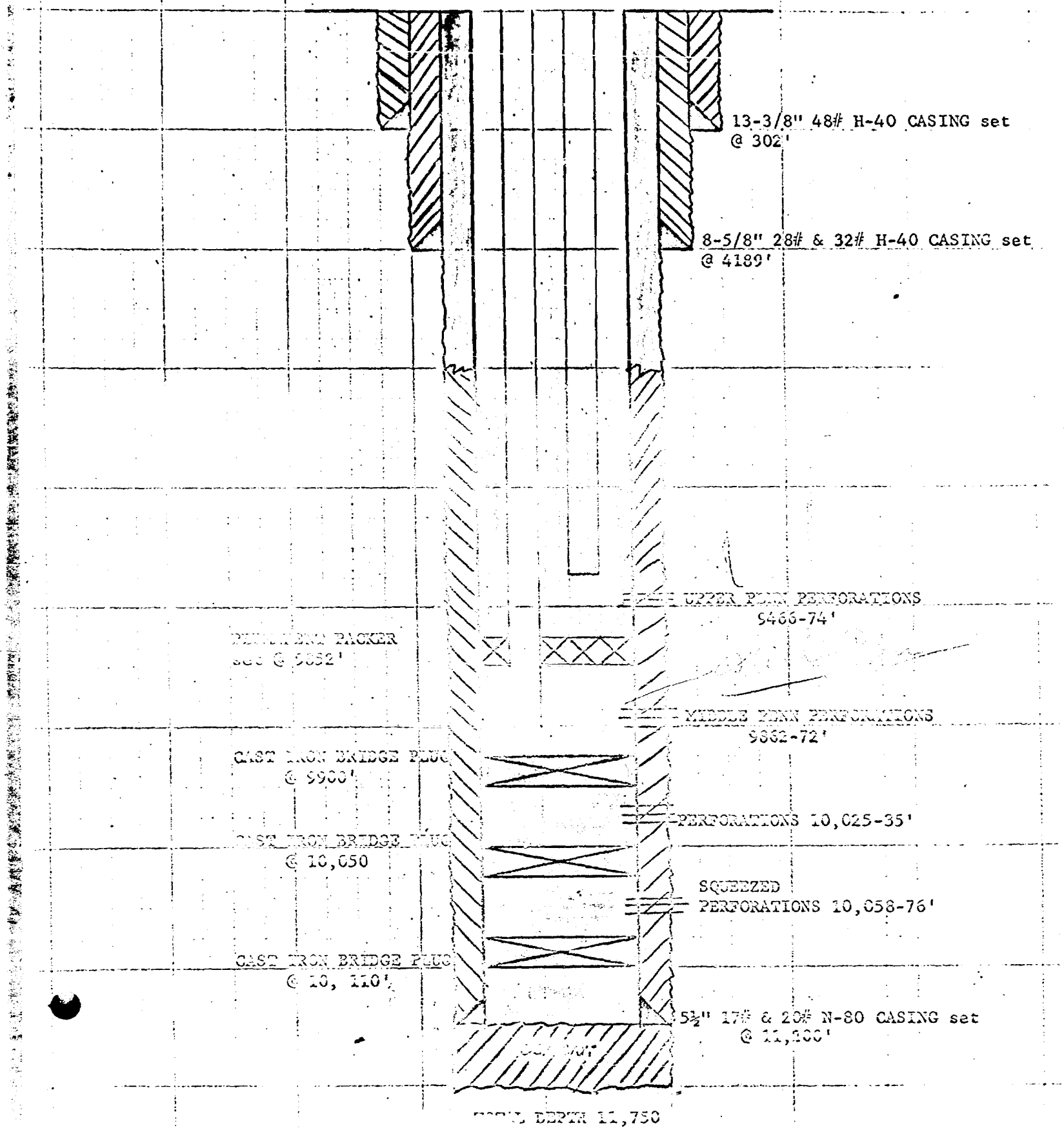
MIDDLE PENN

UPPER PENN

DRILLING OR BEING COMPLETED

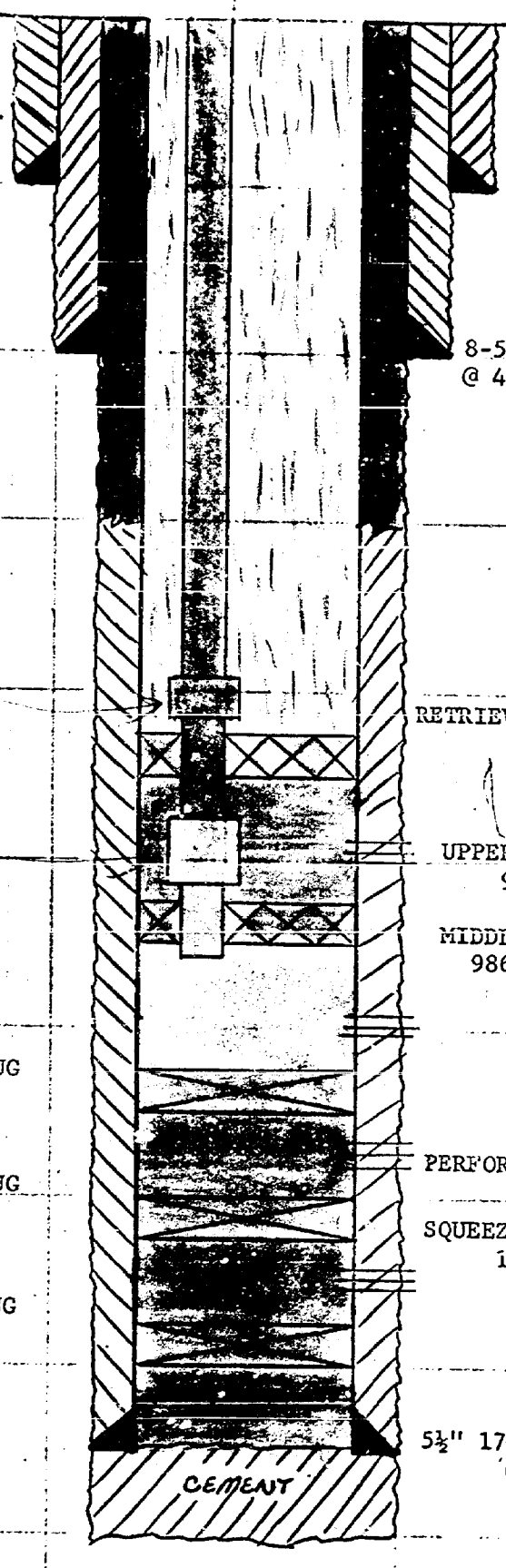
PRESENT CONDITION - J. P. COLLIER WELL No. 1
NORTH BAGLEY (PENN) FIELD
SECTION 10, T-11-S, R-33-E
LEA COUNTY, NEW MEXICO

ATTACHMENT II



ATTACHMENT III

PROPOSED CONDITION - J. P. COLLIER WELL No. 1
NORTH BAGLEY (PENN) FIELD
SECTION 10, T-11-S, R-33-E
LEA COUNTY, NEW MEXICO



13-3/8" 48# H-40 casing set @ 302'

8-5/8" 28# & 32# H-40 casing set @ 4189'

Hydraulic Pump

RETRIEVABLE PACKER

BAKER DOWN HOLE ASSEMBLY

UPPER PENN PERFORATIONS 9466-74'

MIDDLE PENN PERFORATIONS 9862-72'

CAST IRON BRIDGE PLUG @ 9900'

PERFORATIONS 10,025-35'

CAST IRON BRIDGE PLUG @ 10,050'

SQUEEZED PERFORATIONS 10,058-76'

CAST IRON BRIDGE PLUG @ 10,110'

5½" 17# & 20# N-80 casing set @ 11,200'

TOTAL DEPTH 11,750'

ATTACHMENT IV

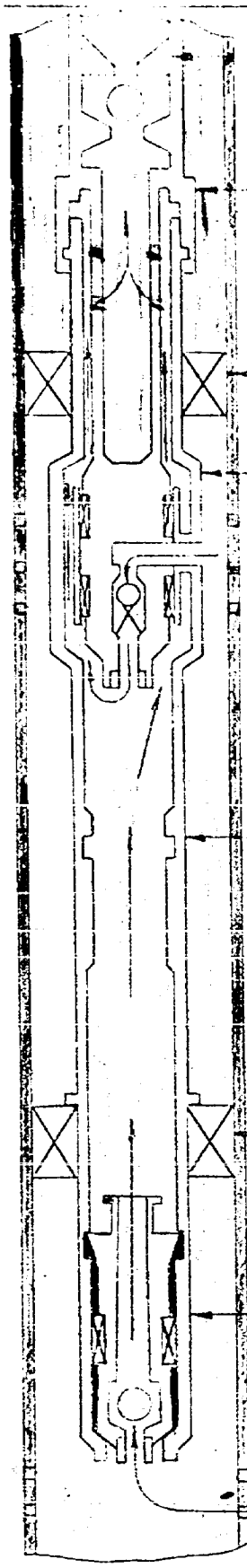
NAME SPECIAL MULTIPLE ZONE SINGLE STRING PRODUCTION HOOKUP

DRAWING NO.

DATE 6-24-66

ILLUSTRATIVE DRAWINGS OF SPECIAL TOOLS AND METHODS

ENG. REPORT 461-1



HYDRAULIC PUMP SEAT

SPECIAL ON-OFF SEALING CONNECTOR W/STINGER CONNECTED TO SPECIAL 'GBJ-01' CHOKE

MODEL 'A-1' LOK-SET PACKER

PSI MODEL 'G-1' BYPASS SLIDING SLEEVE W/ GBJ-01 CHOKE

PSI MODEL 'F' SEATING NIPPLE

MODEL 'D' PACKER

PSI MODEL 'R' SEATING NIPPLE W/CHOKE IN PLACE

BAKER OIL TOOLS, INC.
LOS ANGELES HOUSTON
NEW YORK
U. S. A.

DRAWN BY R.C. FEAZLE

APPROVED BY

ATTACHMENT V

NAME SPECIAL MULTIPLE ZONE SINGLE STRING PRODUCTION HOOKUP

DRAWING NO.

DATE 6-24-66

ILLUSTRATIVE DRAWINGS OF SPECIAL TOOLS AND METHODS

ENG. REPORT 4G1-1

HYDRAULIC PUMP SEAT

ON-OFF SEALING CONNECTOR

MODEL 'A-1' LOK-SET PACKER

PSI MODEL 'G-1 BY-PASS SLIDING SLEEVE

PSI MODEL 'F' SEATING NIPPLE

MODEL 'D' PACKER

PSI MODEL 'R' SEATING NIPPLE W/CHOKE IN PLACE

BAKER OIL TOOLS, INC.
LOS ANGELES HOUSTON
NEW YORK
U. S. A.

FORM 419

DRAWN BY R.C.FEAZLE

APPROVED BY

ATTACHMENT VI

SINGLE-STRING MULTI-ZONE PRODUCTION SYSTEM
TESTING & COMPLETION PROCEDURE USING KOBE PUMP

1. Set the Baker Model 'D' Retainer Production Packer.

2. Run tubing with Baker Model 'E' Locator Seal Assembly with extra seals, PSI Model 'R' Seating Nipple, PSI Model 'F' Seating Nipple, PSI Model 'G-1' Bypass Sliding Sleeve in the closed position, Baker Model 'A-1' Lok-Set Retrievable Casing Packer, Baker Model 'FL' On-Off Sealing Connector, and 2½" KOBE Type 'B' Bottom Hole Assembly.

3. Locate on the Model 'D' packer then pick up a distance sufficient to set the Lok-Set Packer.

4. Run the Pump Standing Valve. (wire line)

5. Run the KOBE Free Pump with a pressure bomb and pump the lower zone to determine the production rate required to give the desired oil production. Determine the flowing bottom hole pressure at the required production rate. If practical, obtain a flowing bottom hole pressure at a different production rate.

6. Pump the KOBE Free Pump out.

7. Retrieve the pump Standing Valve. (wire line)

8. Plug off the lower zone and open the Model 'G-1' Bypass Sleeve to test the upper zone. (wire line)

9. Run the pump Standing Valve. (wire line)

10. Run the KOBE Free Pump with pressure bomb and pump the upper zone to determine the rate required to give the desired oil production. Obtain the flowing bottom hole pressure at the required production rate. Obtain a flowing bottom hole pressure at a different production rate also.

11. Pump the KOBE Free Pump out.

12. Retrieve the pump standing valve. (wire line)

13. From the flowing bottom hole pressures determine a Tubing Inlet Pressure, or pressure downstream of the chokes. If possible, select a pressure that will allow the high pressure zone to be in critical flow.

14. Obtain the information required on "Well Test Data For Baker Multiple Zone Production Systems".

15. Calculate choke sizes for both zones.

16. Pull the Lock Mandrel Sub Assembly from the Model 'G-1' Bypass Sleeve. (wire line)

17.

17. Run the PSI Model 'GBJ-Cl' Choke w/Ceramic Bean and set in the PSI Model 'G-1' Bypass Sliding Sleeve. (wire line)

18. Run the pump standing valve. (wire line)

19. Run the KOBE Free Pump and pump the upper zone to test the choke.

20. Pump the KOBE Free Pump out.

21. Retrieve the pump standing valve. (wire line).

22. Pull the upper choke, which automatically shuts off the upper zone. (wire line)

23. Retrieve the plug from the lower zone. (wire line)

24. Run the PSI Model 'RZK' Equalizing Check Valve Choke w/Ceramic Bean and set in the Model 'R' Nipple. (wire line)

25. Run the pump standing valve. (wire line)

26. Run the KOBE Free Pump and pump the lower zone to test the choke.

27. Pump the KOBE Free Pump out.

28. Retrieve the pump standing valve. (wire line)

29. Run the upper choke back in and test both zones in combined flow with the KOBE Free Pump, if possible.

30. Pump the KOBE Free Pump out, retrieve the pump standing valve on wire line, and pull the top choke on wire line.

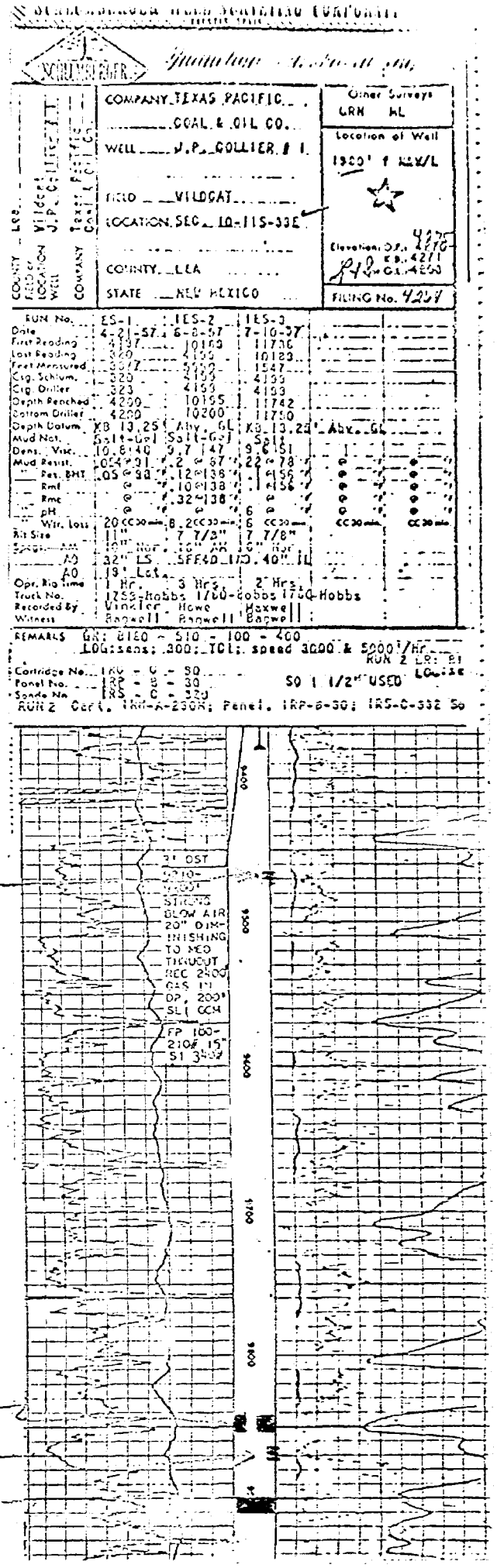
31. Pull the tubing at the On-Off Sealing Connector.

32. Run the final completion equipment. (Special On-Off Sealing Connector Top Sub w/Stinger connected to the Special 'GBJ-Cl' Choke and KOBE Fixed Casing P

NOTE: Perform steps 29 and 30 if the capacity of the KOBE Free Pump is sufficient to pump the combined production from both zones.

ATTACHMENT VII

Electric Log of The
Upper Penn and Middle Penn
J. P. Collier Well No. 1
North Bagley Field
Lea County, New Mexico



Upper Penn Perforations
@ 9466-74'

Permanent Packer @ 9852'
Middle Penn Perforations
@ 9862-72'
Cast Iron Bridge Plug @ 9900'

ATTACHMENT VIII

Economics of Subsurface Commingling
J. P. Collier Well No. 1

Cost to Pump Commingled Production

Service Unit	$ 2,000
Baker Subsurface Assembly	1,410
Retrievable Packer	585
Kobe Subsurface Assembly	5,000
Kobe Surface Assembly	16,300
Miscellaneous	2,750
	$26,045
Less Salvage of 9400' of 2-1/16" tubing @ 50¢/foot	- 4,700
Total Cost to Commingle	$21,345

Cost to Pump Well as a Conventional Dual Completion

Service Unit	$ 2,500
Retrievable Packer (dual)	1,100
Kobe Subsurface Assembly	3,980
Kobe Surface Assembly	13,000
Additional Tubing	9,738
Miscellaneous	1,750
	$32,068
Commingled capacity of pump equipment	1220 BFPD
Capacity of conventional dual pump equipment	380 BFPD (190 B/D Upper 190 B/d Lower)

ATTACHMENT IX

Pertinent Data On
J. P. Collier Well No. 1

1. Lower Penn Zone

Completed - 7-9-57
Initial Potential - 531 BOPD, GOR 4445
Gravity - 50° API
Perforations - 10,025'-35' & 10,058'-76'
Cumulative Production - 59,878 barrels
Present Status - abandoned

2. Middle Penn Zone

Completed - 5-18-64
Initial Potential - 330 BOPD, GOR 2380
Gravity - 48.6° API
Perforations - 9862' - 72'
Cumulative Production - 73,765 barrels
Latest production test - July, 1965, 208 BOPD & 180 BWPD

3. Upper Penn Zone

Completed - 5-25-64
Initial Potential - 440 BOPD, GOR 1691
Gravity - 47.1° API
Perforations - 9466'-74'
Cumulative Production to 6-1-66 - 138,180 barrels
Latest production test - June, 1966, 217 BOPD & 60 BWPD

ATTACHMENT X

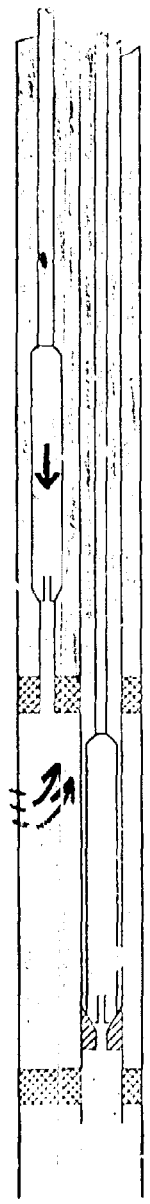
Summary of Field Data
North Bagley Field, Lea County, New Mexico

Item	Lower Penn	Middle Penn	Upper Penn
Producing Wells	3	2	19
Top Allowable, BOPD	211	215	215
Cumulative Oil Production @ 6-1-66, barrels oil	198,063	109,495	950,355
Approximate Water Cut	50%	65%	0-70%
Average Gas-oil Ratio, ft.3/bbl.	600	1,500	1,700
Original Bottom Hole Pressure	3700 psi	3500 psi	3200 psi
Average Oil Gravity, Degrees API	50	48.6	47.1
Estimated Current Reservoir Pressure	3200 psi	3500 psi	2000 psi
Producing Mechanism	Water Drive	Water Drive	Water Drive
Producing Depth	9450'	9850'	10,000'
Well Spacing	80 acres	80 acres	80 acres

ATTACHMENT XI

Production Data
North Bagley (Penn) Pools
Lea County, New Mexico

Pool	Company	Lease & Well	Cum. Bbls. Oil to 6-1-66	Monthly Bbls.Oil Produced During May,1966
Lower	BTA Oil Producers	Bagley Well No. 1	49,459	2589
	Sam Boren	Gulf Sohio State Well No. 1	3,939	37
	David Fasken	Felmont Collier Well No.1	10,385	-0-
	Felmont Oil Corp.	Hissom State Well No. 1	35,112	4857
Middle	Texas Pacific Oil Co.	J. P. Collier No. 1	73,765	-0-
	Cabot Corp.	Mary Ellen Dallas No. 1	103,949	1706
Upper		New Mexico "M" State Well #1	65,529	762
		J. R. Thompson Well No. 1	3,475	506
	David Fasken	Felmont Collier Well No. 1	17,222	4556
	Felmont Oil Corp.	State 262 Well No. 1	111,028	3879
		State "F"	137,749	3580
	Charles Gillespie, Jr.	State "A" Well No. 1	51,642	3541
	Pan American Petro. Corp.	State "DC" Well No. 1	-0-	1351
	Stoltz & Company	Bell Well No. 1	6,306	4198
		Gulf State Well No. 1	60,072	6508
		J. D. Guye Well No. 1	44,801	341
		Hissom "A" State Well No. 1	46,123	5435
		Sinclair State Well No. 1	35,[illegible]	3840
		Sinclair State Well No. 2	5,826	3806
		State NBF Well No. 1	76,952	3557
		State NBN Well No. 1	28,384	3314
	Texas Pacific Oil Co.	J. P. Collier Well No. 1	138,180	6391
		J. P. Collier Well No. 2	10,482	5562
		Total		70316



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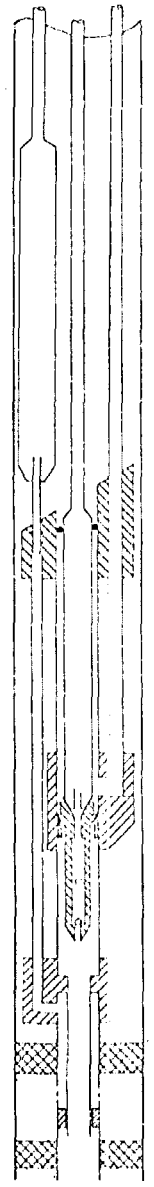

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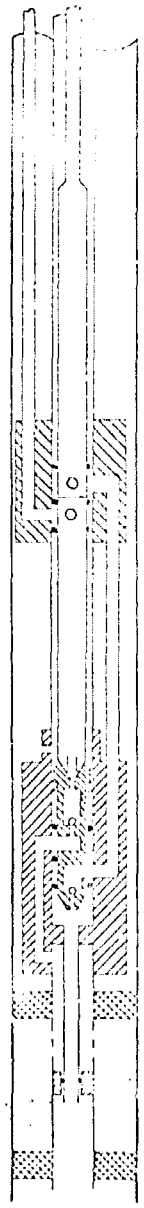

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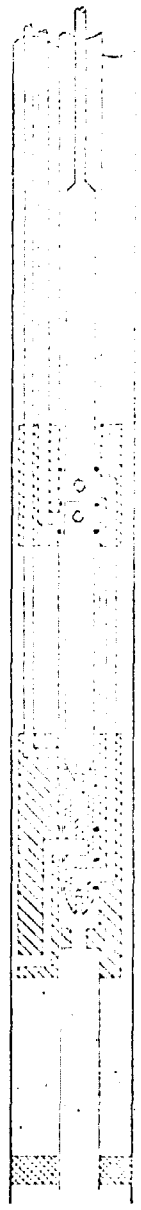

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WT-NA 4-66

AMSCO CLIENT XII

ATTACHMENT XII

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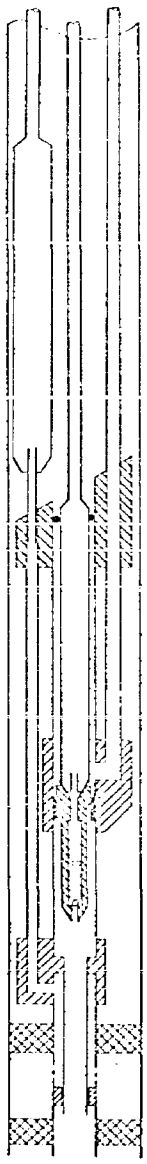

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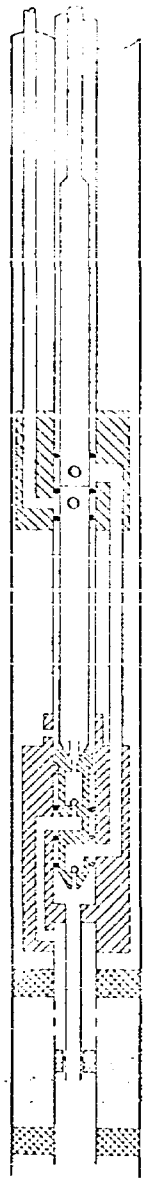

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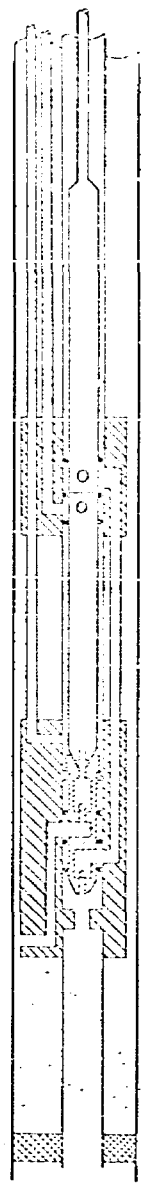

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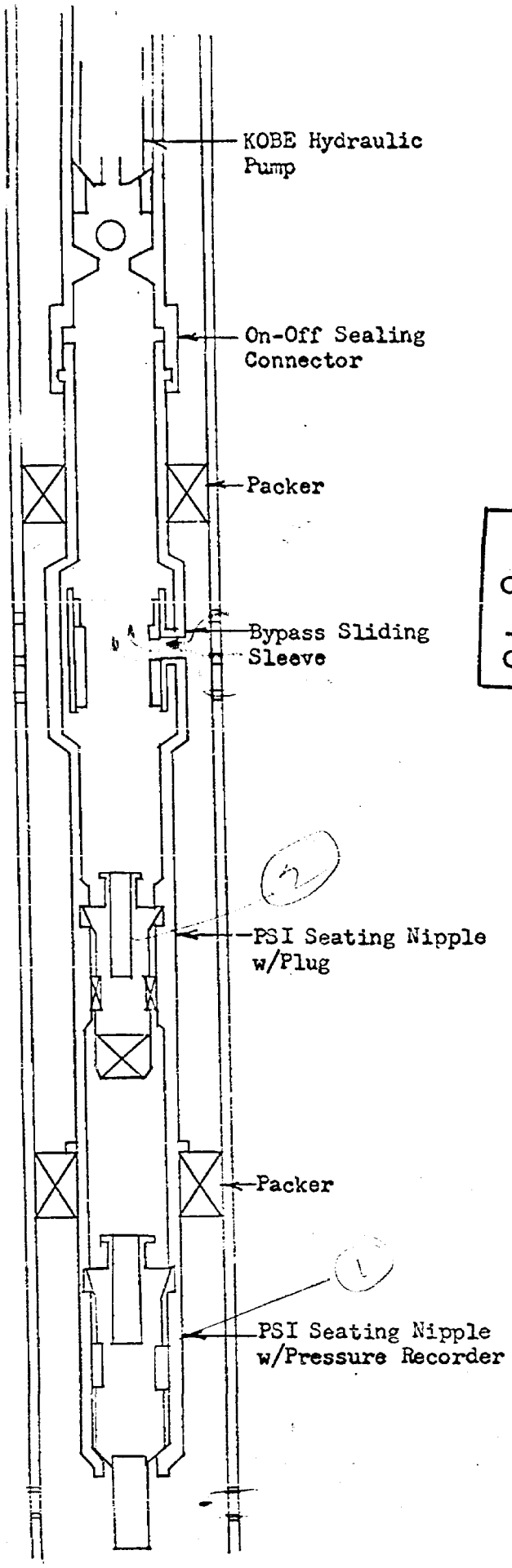


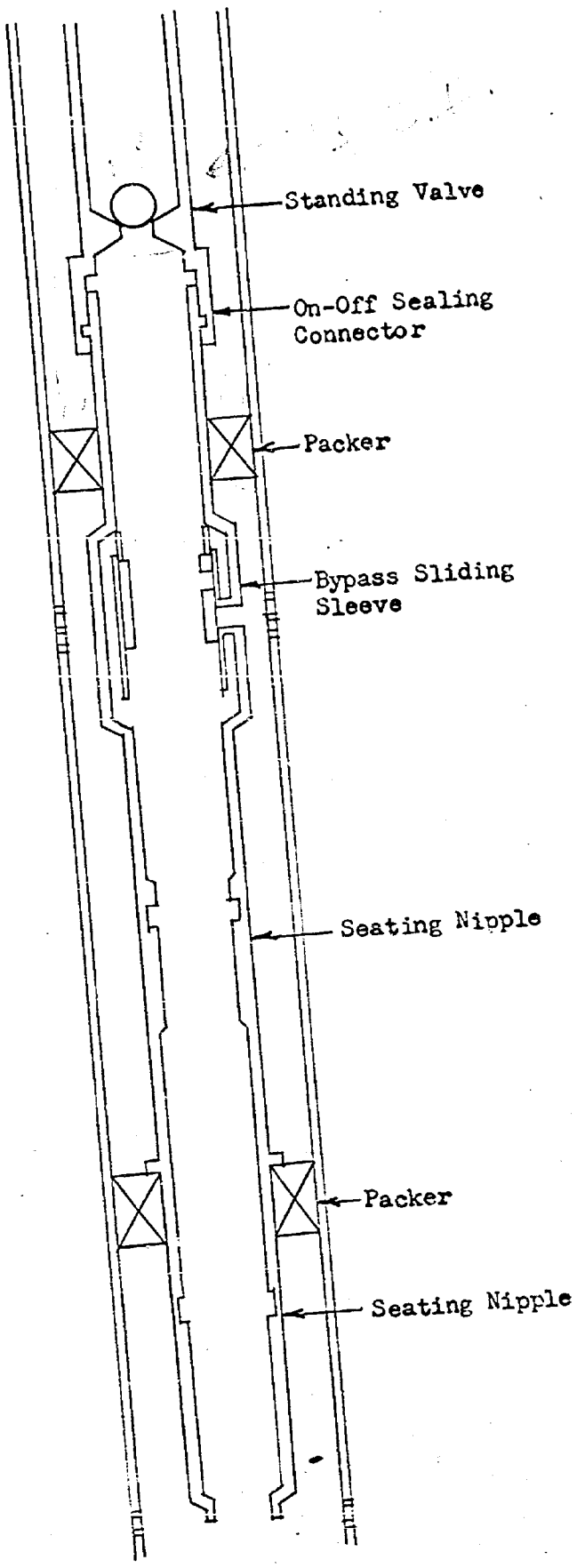
TO LOWER PACKER

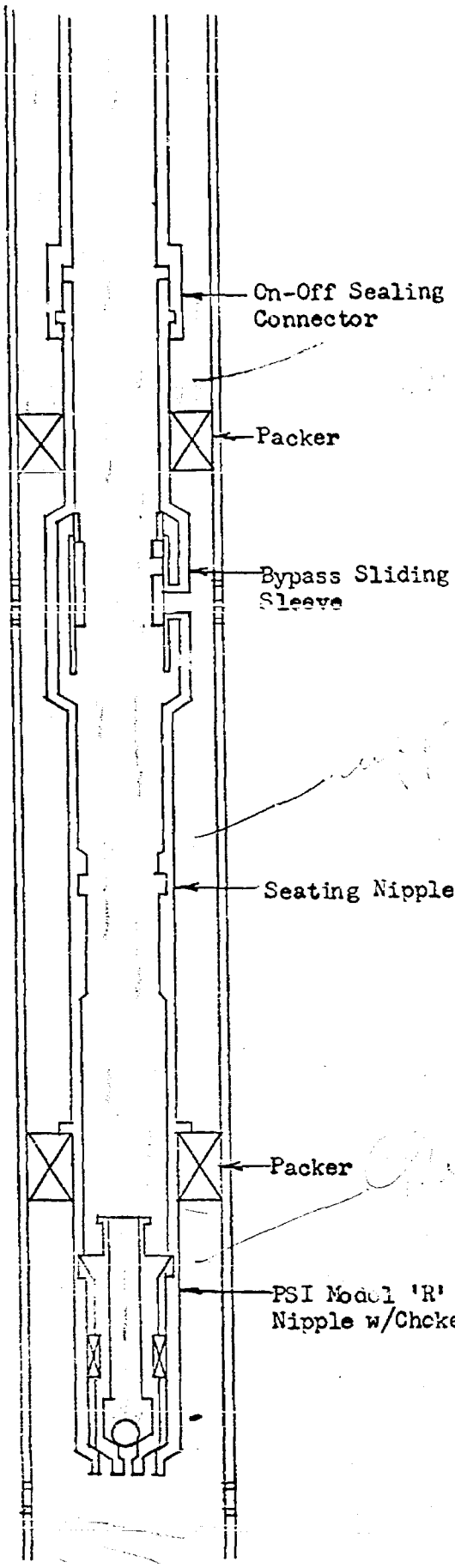
1. Set Wire Line Pressure Recorder in Lower PSI Nipple.
2. Set Wire Line Plug in PSI Model 'F' Nipple
3. Pump Upper Zone with KOBE Hydraulic Pump w/Pressure Recorder.

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
AHPN EXHIBIT NO. B
CASE NO. 3447

TEST UPPER PACKER

Pressure Annulus Above The Top Packer With The Standing Valve in The Tubing Above The Packer.





TEST SEALS AND BACK CHECK VALVE IN LOWER CHOKE

TEST SEALS IN THE CLOSING SLEEVE OF THE MODEL 'G-1' BYPASS SLIDING SLEEVE

Pressure the Tubing With the Bypass Sleeve Closed and the Lower Choke in Place.

Pressure the Tubing with Retrievable Chokes in Both the Bypass Sliding Sleeve and the Lower PSI Seating Nipple.