

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION



CASE 3066

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

ANITA LOCKWOOD
CABINET SECRETARY

June 13, 1994

Pyramid Energy, Inc.
10101 Reunion Place
One Union Square, Suite 210
San Antonio, Texas 78216-4156

Attention: Scott Graef

Dear Mr. Graef:

Reference is made to your request dated April 29, 1994, to increase the surface injection pressure on six wells within the West Pearl Queen Unit Waterflood Project. This request is based upon fracture data contained within your request.

The data has been analyzed by my staff and we feel an increase in injection pressure on these wells is justified at this time. You are therefore authorized to increase the surface injection pressure on the following described wells:

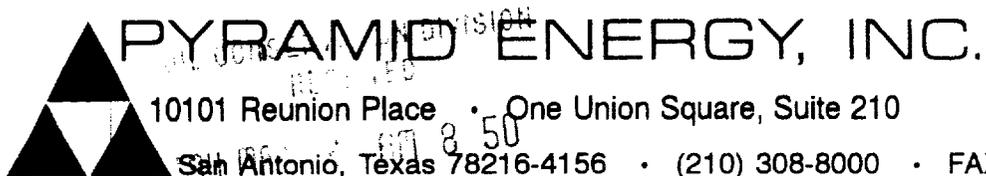
<u>WELL & LOCATION</u>	<u>MAXIMUM SURFACE INJECTION PRESSURE</u>
West Pearl Queen Unit No. 110 Unit H, 29-19S-35E	1800 PSIG
West Pearl Queen Unit No. 119 Unit I, 29-19S-35E	1800 PSIG
West Pearl Queen Unit No. 121 Unit K, 28-19S-35E	1800 PSIG
West Pearl Queen Unit No. 126 Unit M, 28-19S-35E	1800 PSIG
West Pearl Queen Unit No. 128 Unit O, 29-19S-35E	1800 PSIG
West Pearl Queen Unit No. 143 Unit A, 33-19S-35E	1800 PSIG

The Division Director may rescind this injection pressure increase if it becomes apparent that the injected water is not being confined to the injection zone or is endangering any fresh water aquifers.

Sincerely,

William J. LeMay
William J. LeMay
Director

xc: Case No. 3066, OCD-Hobbs,
D. Catanach, R. Brown



April 29, 1994

Energy, Minerals and Natural Resources Department
Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87501

Attention: Mr. David Catanach

RE: Injection Pressure -- West Pearl Queen and East Pearl
Queen Units, Pearl Queen Field, Lea County, New Mexico

Dear Mr. Catanach:

Over the last four years, Pyramid has conducted an infill drilling program on the captioned waterfloods. The idea has been to drill locations inside the original 40 acre spacing pattern and recover reserves from areas that have not been effectively swept by waterflooding. To maximize the recovery in the new wells, additional wellbores were permitted and converted to injection service. The permit for the new injection wells set their maximum injection pressure at approximately 1000 psi with the stipulation that higher injection pressure could be approved by running step rate test to determine the frac gradient for the reservoir. However, the older injection wells still active in both units are not subject to any injection pressure limitations. It is not reasonable that the older wells which were permitted under less stringent regulations be allowed to inject at unlimited pressures while the new wells are limited to less than 1000 psi. Pyramid is requesting that the maximum pressure for all injection wells in the West Pearl Queen Unit and the East Pearl Queen Unit be raised to 1800 psi and that all wells not currently limited on injection pressure be subject to the 1800 psi cap.

Several attempts were made at running step rate tests on wells in the field by pumping into the reservoir at various rates and accurately recording the surface pressure at each rate. Using published frictions factors for the tubing strings, a bottom hole pressure was calculated at each rate. In all cases it appeared as though we were unable to reach the fracture pressure before exceeding the working pressure of the wellhead and other surface equipment. Halliburton was requested to review the computer data generated during fracture stimulation in three of Pyramid's new wells drilled on the West Pearl Queen Unit and to calculate a fracture gradient from that data. Attached is a letter from

*6-West
6-East*

Mr. David Catanach
April 29, 1994
Page 2

Halliburton showing the results of their calculations for the wells. Using the lowest of the three gradients calculated .959 psi/ft and density of injected fluid at 9.2 ppg, it would take a surface pressure of 2283 psi to fracture the formation at 4750; (4750' is the approximate top of the injection interval). The injection wellheads and surface equipment are only rated to 2000 psi working pressure. The current injection pressure in field is around 1750 psi. Therefore, there is only a 250 psi pressure range in which a step rate test can be safely conducted. This small pressure range along with the fact that the fracture gradient cannot be reached because of pressure limitations will make the information obtained from the tests unreliable and may lead to wrong conclusions.

Pyramid feels that the gradients calculated by Halliburton are representative of the Pearl Queen reservoir and that the maximum pressure of 1800 psi requested is almost 500 psi below the actual frac pressure. Please review this matter and see if you can authorize the injection pressure increase based on the information presented. If you have any questions or need additional information, call me at (210) 308-8000.

Sincerely,

PYRAMID ENERGY, INC.



Scott Graef
Operations Manager

SG/tlw

cc: Jerry Sexton



HALLIBURTON ENERGY SERVICES

8610 N. New Braunfels / Suite 614 / San Antonio, TX 78217 / Tel: 210-824-2471 / Fax: 210-824-1172

January 26, 1994

Mr. Scott Graef
Pyramid Energy Inc.
10101 Reunion Place, Suite 120
San Antonio, TX 78216

Re: WPQU Lea County, NM

In regards to your request, I have reviewed the frac data from each of the wells submitted, in order to determine the fracture gradient. The results are as follows:

Well#	Ave Depth Perf (Ft.)	ISIP (psi)	Calc. Frac Grad.
WPQU-191	4843	2660	.987
WPQU-193	4809	2509	.959
WPQU-194	4875	2821	1.016

If I can be of further assistance please advise.

Respectfully Submitted

A handwritten signature in black ink, appearing to read 'Ronald L. Cooper', written over a horizontal line.

Ronald L. Cooper



PYRAMID ENERGY, INC.

10101 Reunion Place • One Union Square, Suite 210

San Antonio, Texas 78216-4156 • (210) 308-8000 • FAX: (210) 308-8111

FAX TRANSMITTAL

DATE: MAY 25, 1994 TIME: 4:45

PLEASE DELIVER ATTACHED PAGES TO:

NAME: DAVID CATANACH

FIRM: OIL CONSERVATION DIVISION

FAX NUMBER: (505) 827-5741

DEPARTMENT: _____

FROM: SCOTT GRAEF

MESSAGE: _____

TOTAL PAGES: 2 (INCLUDING COVER SHEET)

**PYRAMID ENERGY, INC.**

10101 Reunion Place • One Union Square, Suite 210

San Antonio, Texas 78216-4156 • (210) 308-8000 • FAX: (210) 308-8111

May 25, 1994

Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504-2088
Attn: David Catanach

Dear Mr. Catanach:

Below is a list of wells for which Pyramid Energy, Inc. is requesting an increase in allowable injection pressure.

West Pearl Queen Unit #110-H, 29-19-35
West Pearl Queen Unit #119-I, 29-19-35
West Pearl Queen Unit #121-K, 28-19-35
West Pearl Queen Unit #126-M, 28-19-35
West Pearl Queen Unit #128-O, 29-19-35
West Pearl Queen Unit #143-A, 33-19-35

East Pearl Queen Unit #23-G, 28-19-35
East Pearl Queen Unit #25-E, 27-19-35
East Pearl Queen Unit #34-I, 28-19-35
East Pearl Queen Unit #35-M, 27-19-35
East Pearl Queen Unit #41-C, 34-19-35
East Pearl Queen Unit #43-E, 34-19-35

If you should have any questions, please feel free to contact me.

Sincerely,

Scott Graef
Operations Manager

SG:dkh

MR. NUTTER: We will call 3066.

MR. DURRETT: Application of Gulf Oil Corporation for a Unit Agreement, Lea County, New Mexico and Application of Gulf Oil Corporation for a waterflood project, Lea County, New Mexico.

MR. NUTTER: Cases 3065 and 3066 will be consolidated for the purpose of testimony.

MR. KASTLER: Mr. Examiner, our two witnesses in this case will be Mr. Don Bilbrey and Mr. Bates Boles. I would like to have them sworn.

MR. DURRETT: Would you stand and be sworn, please?

(Witnesses sworn.)

MR. KASTLER: I would like to have these marked for identification as Applicant's Exhibits One through Four; and I would like to submit those at this time.

(Whereupon, Applicant's Exhibits One through Four marked for identification.)

DIRECT EXAMINATION

BY MR. KASTLER:

Q Please state your name and address, for whom you work and what is your current position?

A My name is Don Bilbrey and I reside at 1201 W. McGaffey in Roswell, New Mexico. I work for Gulf Oil Corporation in Roswell as a Petroleum Engineer.

DEARNLEY-MEIER REPORTING SERVICE, Inc.

ALBUQUERQUE, N. M.
PHONE 243-6691



Q Would you briefly outline your educational and professional background?

A In 1953, I was graduated from the University of Texas with a B.S. in Geology and a B.S. in Petroleum Engineering. After two years in the Service I returned to the University of Texas and entered graduate school in 1957. I received my Masters Degree in Geology. In May of 1957 I went to work for Gulf in Roswell as a geologist. I worked fourteen months in that capacity in both Roswell and Hobbs. At that time I was transferred back to Roswell where I was in the Reservoir Engineering Section as a Reservoirs Engineer and I have worked as a Reservoir Engineer since that time in Hobbs, and now in Roswell.

Q And have you worked closely with the West Pearl Queen Producing Unit Agreement, and are you thoroughly familiar with all of the geological and engineering aspects of it?

A I have done very little else besides work on the Queen. So, I think I am fairly well familiar with it.

Q Will you briefly outline the purpose of this Hearing?

A Gulf, as major interest owner and prospective unit operator, would like to unitize 2,520 acres in sixty-three wells in the western portion of the Pearl Queen Pool which is located in Township 19 South, Range 35 East, in Lea County, New Mexico. The purpose of this unit would be to waterflood portions



of the Queen formation underlying this area. If you will please look at Exhibit One, which is a fold out map, (plat), you will see the Unit Area proposed outlined in yellow. The injection wells are shown in circles, two circles will be dual wells, one circle will be just a single zone injection well. We will discuss that later.

Q Are there any other unitized waterflood projects in this pool?

A Yes. Directly east of our outlined flood here, you will see, not shown nearly as brightly, but outlined nevertheless, the Shell East Pearl Queen waterflood unit. It is my understanding they have been injecting water there since early in February.

Q Will the two units cooperate?

A Yes, we have already discussed that with Shell. As soon as they are unitized, we will make line agreements and cooperate with Shell. The flood, by the way, is on the same pattern on the Shell unit and it will make it easier to cooperate with them.

Q Will you describe the geology pertinent to this project?

A Referring to the data over here on the first page, the Pearl Queen is located on the western edge of the Central Basin Platform. Wells are completed in one or more sandstone



stringers within the Queen formation. The depth, ranged from 4,800 to around 5,000 feet in the West Pearl Queen Unit Area. These stringers generally are composed of gray, fine grained dolomitic and anhydritic sandstone rocks and are interbedded with gray to tan, dense, anhydritic and shaly dolomitic rocks. The maximum net pay, I should say, for each zone ranges from eight to fourteen feet, but generally in no bore hold is the maximum net pay in each zone encountered.

Q Do you have an Exhibit which shows the subsurface structure?

A Yes, Exhibit Number Five is a structure map on what we will, in a minute, describe Zone One which is the uppermost zone we plan to flood. That structure typifies, the structure of all zones which we plan to inject water into.

Q Exhibit Five?

A Exhibit Five shows a northeast-southwestward trending monoclinial nose which plunges toward the southwest at about fifty feet per mile.

Q Is this a stratigraphic or structural trap?

A We think structure probably plays very little part in the trapping of the hydrocarbons here, in fact, we consider it primarily a stratigraphic trap with the up-dip productive limits being determined by porosity deterioration. The down-dip limits in most of the zones are determined by oil water contact.



Q How many stringers, or zones, are productive in the West Pearl Queen Unit Area?

A Well, I refer back to Exhibit Number Four in the booklet, and colored in yellow, you will see four zones on a typical radioactivity log. Zone One, "Stray", Zone Two A, and Zone Three A; and in Exhibit Number Six, which is a cross section, an east-west cross section across the same zones which have been again colored in yellow. You can see that Zones One, Two A and Three A are rather continuous over the entire area.

What we have defined, the "Stray" is limited to the southwest portion primarily as shown on Exhibit One but it is a good zone and we plan to waterflood it along with the more widespread zones, One, Two A, and Three A.

Q Do those Zones One and Two A constitute most of the secondary oil?

A We believe so. I personally believe that probably, maybe as much as 75% of the secondary oil comes from Zones One and Two A.

Q In isolated instances where wells are open stringers, those are extremely open and limited in aerial extent?

A That is right. There are several individual wells, I would say not over two or three down in the southwest corner that have open zones, rather thin zones other than the ones I have outlined here in yellow. Generally, I would say in all



instances these are not even found in the adjacent or offsetting wells and probably will call for little secondary recovery.

Q Will any attempt be made to flood them?

A No, with no connection from one well to the next, I don't believe there will be any value in trying.

Q Not initially, at least?

A No.

Q What will the unitized interval be?

A That will be from the top of the Queen formation to fifty feet below the bottom of Zone Three A.

Q Can you describe the Queen Reservoir rock and fluid properties?

A Yes, I will just refer back over here to the data sheet again. The average porosity in all but the "Stray" zone is 16.7% and ranges from 10 to 22.8%, what we consider the net pay. Average "K" is 22.8 millidarcies ranging again from one to 244 millidarcies. The original reservoir pressure was 1,776 psi and the bubble point pressure is 1,400 per square inch. Reservoir temperature is 100 degrees Fahrenheit and the formation volume factor was 1.176 at original reservoir conditions. Oil gravity is approximately 35 degrees API.

Q Briefly summarize primary operations in the West Pearl Queen Unit Area.

A The first well in our area was drilled in January of



1958 and since that time there has been a total number of sixty-three wells, or holes, drilled. Four of these have been dry in the interval we plan to unitize. Fifty-nine have been productive. In something like six years the approximate production from these is 2,200,000 barrels of oil. There are no dual completions in the unit area.

Q What is the present state of depletion?

A We anticipate in the fifty-nine wells that the ultimate recovery for the Unit will be 2,686,000 barrels. With cumulative production to date of 2,200,000 barrels, it appears that the reservoir is right at 80% depleted. The fact we are late in the life of this pool is further evident by the fact that the average production per well per day is only nine barrels.

Q What type of drive is the pool producing under?

A Solution-gas-drive, 100% solution-gas-drive. It looks like we will only get 11.8% through primary oil operations. This means that nearly 90% of the oil will be left in the ground unless secondary recovery project is instituted.

Q In waterflooding this area, how many injection wells will there be and what flood pattern will be used?

A Well, I think I briefly touched on that already. It is an eighty acre five-spot; and out of fifty-nine producing wells, thirty of them will be made injection wells.

Q What volumes of water do you plan to inject and what



pressures do you anticipate?

A Initially, we plan to inject up to five hundred barrels every day per well. Based on what we know about the East Pearl Queen Flood injection wells, we should encounter initial pressures of 1,500 to 2,000 pounds per square inch. We anticipate the maximum pressure of around 2,500 pounds per square inch. We are designing our installation for 3,000.

Q What kind of water will you inject and where is the source of this water?

A We will inject fresh water which we will pipe approximately six miles from Shell Oil wells in Section 3 of Township 19 South, Range 36 East which is east of the Pearl Queen Pool.

Q Does Gulf have a vested interest in this water?

A Yes, Gulf, as does Shell and Trainer, owns one-third interest in water Easement W-306 which I believe is dated April 29, 1963 and was issued to Kemac Potash covering all of Section 3-19 South - 36 East, Lea County, New Mexico.

Q Now, Gulf owns one-third, Shell owns one-third, and C. W. Trainer owns one-third?

A Shell and Gulf both purchased the third interest, purchased it from Cornell.

Q All right. Proceed.

A We also, at the same time, purchased a third interest



converted. We think 375 barrels will be adequate because we have re-cycled water. We have to reduce our injection probably to balance production with allowables and such.

Q How do you plan to inject water into the Queen Reservoir?

A I would like to refer you now, to Exhibits Seven through Eleven, I believe, which are diagramatic sketches of several possible means of injection.

Exhibit Seven shows a typical single zone injection well, where we will simply set a packer on tubing, inject down tubing -- the tubing by the way, will be coated for corrosion. We will inject below a retrievable tension type packer, in this instance as shown here, and will be into the open hole, but it might equally well be into perforations, if it calls for it. Right now, it looks like we are going to only have one single zone injection well.

Q What well will that be?

A That is the Cactus-Aztec State Number Six down there in the southwest corner on Exhibit Number One.

Q Is the location in Section 31, 19 South, 35 East?

A That is correct.

Q That is the single injection well, but it would be into Zone One and --

A In this particular well, this is marked as a typical



single injection well. It is actually a diagrammatic sketch of the well I have mentioned but if through further study and when we get ready to convert these wells, we decide that three, four, five or more will not have, say Zone One of sufficient size there, it may be economically advisable to dual. We will just try to watch down there into it, and all of the rest of them and try to cut down some of our cost. In other words, if we think it is advisable to dual inject, we will, and if further study says is necessary, we might have three or four more wells we want to treat in the same manner.

MR. NUTTER: You talk about single injection wells, and dual injection wells; what do you consider to be the dividing point, the Zone One as against Zone Two, and what is the other one?

A Right. The three lower zones.

MR. NUTTER: Two A and Three A?

A Right. We will wash it into the three lower zones and try to put it into Zone One.

MR. NUTTER: In other words, into two?

A The "Stray" is limited down there into the --

MR. NUTTER: Zone One is the other zone?

A Zone One is -- well, many people consider it the main Queen pay in this area. As I pointed out before, we think maybe 75% of the oil secondary and primary are in Zones One and



Two A, therefore, we want to separate the stream of water and be sure we get those two zones flooded.

MR. NUTTER: These are the two important zones?

A Right. We think that is important to dual inject the water.

MR. NUTTER: Primarily to keep Zone One and Two A apart?

A Right. That's correct. If you look at Exhibit Number Eight, this I have listed or have designated as a typical dual injection well, which I think it's rather straight forward two strings of coated tubing, with a dual packer above Zone One and a permanent drill able production packer between Zone One and the "Stray" or the Two A, which ever one happens to be open in the particular well, but anyway separating Zone One from the lower zones, and I don't think there is --

MR. KASTLER: The remaining twenty-nine wells will be completed for this dual injection such as is shown on Exhibit Eight?

A Possibly, I have another exhibit which is Exhibit Number Ten. After our field people looked at this and gave us cost estimates, they found that when we had to go to two strings of tubing which were rather limited because of the size of our casing which in most instances is four and a half and five and a half, we would have to take out at least the 2 3/8 tubing.



We would have to coat them; that would run the cost up. We would have to run a dual packer in each one and that would run the cost up. It would cost us many more thousand dollars per acre to go this way than possibly it would cost us to go this way as shown on Exhibit Ten. The particular set-up for the injection well is very similar to the single zone injection with a retrievable tension type packer to separate Zone One from the lower three zones, but from this instance we inject down both the annulus and tubing. The tubing would be the same as we have in the hole right now. I might say here that, of course, our treating cost for the water would go up by this method but we still think it would be cheaper in the Pearl Queen to go this method.

Q I believe that you had about four primary features that this method of dual injection would achieve. Would you outline those?

A Yes. Let me be sure I get this right. It would eliminate the need for additional strings of tubing, eliminate the need for dual packers, eliminate the need for coating the tubing and it would allow the use of larger tubing with which I believe we could inject higher volumes at lower pressures.

Q Have you discussed this proposed alternative method as shown on Exhibit Ten with the State Engineers Office?

A Yes, we came up here in April and talked to Mr. Irby



about injecting this method down the annulus and the tubing system. He indicated then that if proper precautions were taken and the Santa Rosa Sandstone was adequately protected by cement he would go along with this. I went back to Roswell and made a special trip to Hobbs to the OCC Office there to check all of the cementing programs and I found out there is only three of the thirty injection wells that are cemented across the Santa Rosa. So, because of the monetary savings we thought we could save by going this method, I sat down and tried to go into more detail on this program and think of how we could protect that Santa Rosa. I then wrote a letter to Mr. Irby which is Exhibit Number Twelve in which I outlined our proposal for protecting the Santa Rosa and assuring it is protected, and yet still allow us to go down the annulus with the injection water. Mr. Irby, by return mail, sent us a letter which is Exhibit Number Thirteen in which he indicated that he would not object to our proposal provided that certain statements that had been included in my letter were entered into the record at this Hearing.

Q That is the purpose of your incorporating these as Exhibits Number Twelve and Thirteen?

A Right. I specifically point out which statements and paragraphs he would like to have in. Of course, they are in the letter and included in the exhibits we have here.

DEARNLEY-MEIER REPORTING SERVICE, Inc.

ALBUQUERQUE, N. M.
PHONE 243-6691



Q Which plan of dual injection do you favor at this time?

A We still haven't made up our minds. We think we did save a lot of money personally on the initial investment by going down the annulus; but also, we realize the treating the cost of water to protect the casing over a period of years would run up in cost too. We are still working on it to see if one is better to our way of thinking than the other. We might have to take so many producing and keep such a close eye on it it is not worth it to us. We would like to have permission to go either way because of the possibility of the great savings in money and equipment that we have already invested in.

MR. NUTTER: When do you think you will make the determination which direction you will go?

A Well, I think possibly within the next week or two. We have our Hobbs office working up details, information and such, and I think they are going to give us a final recommendation here soon.

MR. NUTTER: Off the record.

(Whereupon, a discussion was held off the record.)

MR. NUTTER: On the record, please.

Q (By Mr. Kastler) What does Exhibit No. 9 consist of?

A Well, Exhibit No. 9 is simply an injection well detail.



Since we have thirty injection wells, we do not include a diagrammatic sketch of each well as such, we use this diagrammatic sketch, and these then, on these tables we have tried to give you the surface casing, production casing, size, data and etc., the cement program, and also the tubing, packers, perforations and all items such as that that will be permanent to each injection well in the unit. Likewise, on Exhibit No. 11, we have done the same thing, which is pertaining to the diagrammatic sketch in Exhibit No. 10, same type of information.

Q When do you expect to start work on the project?

A We would like to start work on July 1st; we are shooting at July for target date for this unit. As soon as it is unitized we will start to work. Shell is waiting for us to start injecting before they move down their line and expand their flood to full.

Q All materials and equipment are on order, I take it?

A No, they are not on order.

Q In stock?

A Not in stock. We are in the process of designing the equipment, what pumps and etc. that we will need.

MR. NUTTER: You don't know yet what equipment to order?

A No, not specifically in the way of tubing, we don't know which way we are going.



Q (By Mr. Kastler) When do you start expecting the initial response?

A We expect, with dual injection planned, that we will get a kick within probably six months. That rate will increase rather rapidly, I thin, up to about 2,500 barrels per day per unit and it will hold there for maybe two or three years and taper off by 1974.

Q What in the way of increased oil recovery do you anticipate as a result of these flood projects?

A We anticipate about 150% of primary and this --

Q In numbers of barrels?

A Number of barrels; that is 4,029,000 barrels of additional oil because of the waterflood operations.

Q Does Gulf seek approval of a project area recovering the entire unit as authorized under 701-E?

A Yes, we do.

Q Do you believe that this unitization for the purpose of waterflooding this area is in the best interest of conservation and prevention of waste?

A Yes, as I stated before, it looks like we are going to only get 11.8% through primary operations. We think we can increase that by 150%, or a total of 30% of the original oil in place. Through the secondary recovery of the area, 80% depleted, the wells are down nine barrels, average, and we think it is



imperative we start with the flooding as soon as possible.

Q Has the primary and secondary oil been agreed upon among other operators in this pool, or in this proposed area?

A To my knowledge, with one exception.

Q And will all steps be taken to protect correlative rights by any owner?

A Yes.

Q Were Exhibits One through Eleven prepared by you or under your direct supervision?

A They were; yes.

Q And are Exhibits Twelve and Thirteen copies of correspondence between you and the State Engineer's Office?

A That's right.

MR. KASTLER: That concludes my examination.

MR. NUTTER: Does anyone have any questions of the Witness?

MR. DURRETT: I have one question, please.

CROSS EXAMINATION

BY MR. DURRETT:

Q Mr. Bilbrey, I believe you stated that the average production at this time was approximately nine barrels per day per well?

A That's right.

Q What are your wells making in there?



DEARNLEY-MEIER REPORTING SERVICE, Inc.

ALBUQUERQUE, N. M.
PHONE 243-6691

A There are some still down on the Aztec State Cactus Lease that are making, I believe, their top allowable.

Q How many?

A They are recent completions.

Q Those are recent completions?

A Yes, sir.

Q How many of those would you estimate that there are that are close to top allowable wells?

A There are nine wells on the lease, I believe.

Q Referring now to Exhibit Number One?

A Right. I would believe that maybe at least half of them are capable of making top allowable, based on the last production figures I know of, which figure may be I believe the last I had access to for them.

Q Is that in Section 31?

A Section 31, Cactus Drilling and Aztec State Lease.

Q And you think there are four or five of those, you say?

A I think that is probably about right, those wells -- I will put it this way: Cactus has made a practice of going in there and drilling continuously; they drill a well every six months, or a year, or something like that, and they are still -- well, you can see there is one well No. 10 there that they have since gone in and started drilling. I understand that now, for



the record, that this is a dry hole.

Q This Number Ten?

A That Number Ten is a dry hole. They are always reworking their wells and as I say, there are four stringers, and they have gone down in many of the wells and opened one zone and depleted it and go back and open another and deplete it, and they have managed to keep their production kind of up and down, and it is kind of hard to work with concerning this equity in their Unit and they have since agreed to their equity as given.

Q I believe I understand they have definitely agreed to commit this interest?

A We have a telegram that says they will commit; they have four tracts, the Aztec State they were holding up on for a while because of another reworking they went through several months ago. I think production has fallen off rather rapidly in some of those wells that they have worked over and they have since said that they will commit that acreage along with the other.

Q And you do believe that these are the only wells that are making close to top allowable?

A I believe so. I think you will find the older wells up here along the east line already at the peak limit, one, two, three barrels a day, quite a few wells.



Q What is the allowable per day on these wells on this Aztec State Lease?

A Well, it is in the neighborhood of thirty-five, thirty-six, thirty-seven.

Q That is just the normal unit allowable?

A Yes.

MR. DURRETT: I believe that's all I have.

MR. NUTTER: Mr. Kastler, what is your other witness going to testify on?

MR. KASTLER: He is going to testify to the form and style of the unit agreement and the process of the completion and execution.

MR. NUTTER: And testify as to the perimeter of it?

MR. KASTLER: Mr. Bilbrey is more familiar with that and I might ask him just to outline what the percentages are.

MR. NUTTER: I would appreciate that, what they are based on.

MR. KASTLER: For each lease we have prepared -- Mr. Bilbrey, you may need to refer to any agreement or anything else which is not yet in evidence.

MR. BILBREY: Well, I had not intended to present this in evidence; that was prepared for the operator in this unit to unitize; and I will refer to it just as my notes.

REDIRECT EXAMINATION



BY MR. KASTLER:

Q Mr. Bilbrey, what was the formula used and agreed upon for the remaining primary participation after unitization?

A Sixty percent primary reserves, forty percent current rate, the current rate being April through September of 1963; based on those months of production. The ultimate primary is determined from performance curves setting the ultimate primary and then, of course, subtracting from that the cumulative production, giving the primary reserves.

Q And it is my understanding; that the working interest owners in this proposed unit area have formed operators and engineers committees?

A That's right.

Q And that these formulas were derived from the working of that committee and by agreement of all parties whose signature appear on the unit?

A Yes.

Q And have they been reviewed and approved in preliminary form, at least by the United States Geological Survey in Roswell and Washington?

A They have.

Q And have they been studied and approved and explained to the Land Commissioner?

A That is right. We covered that on the same trip when



when we talked to Mr. Irby in April.

Q What were the number of barrels remaining on October 1, 1963?

A Remaining primary reserve total units?

Q Yes.

A Five hundred eighty seven thousand.

Q And as soon as this number of barrels has been produced since October 1, but actually since whatever lesser amount now remains from the effective date to the first of the month after which that number of barrels has been produced, is the cut off time from the primary participation?

A That's right.

Q And in calculating the rate, what six months period did you use?

A April through September of 1963.

Q Up to October 1, 1963?

A That's right, it includes September.

Q And is that formula written into and subscribed as a part of the Unit Agreement?

A That is right.

Q Now, what is the percentage of participation of each tract during the secondary --

A It is based on 100% of the tracts primary ultimate recovery as determined from the same curves that I previously



discussed.

Q In other words, if one operator had certain proportions of the entire pools production in primary --

A If he had --

Q If he had that same percentage?

A If he had ten percent of the primary he would get 10% of the secondary.

Q And acreage wasn't considered as such?

A That's right.

Q And rate of production for secondary recovery was not considered?

A It was not considered. Of course, it is used in your interpretation of your performance curve, and in that respect it comes into play.

MR. KASTLER: I believe those are the only questions I needed to ask.

CROSS EXAMINATION

BY MR. NUTTER:

Q Let me see if I understand this: Your participation is divided in two phase systems?

A First phase and second phase.

Q The first phase is based on 60% primary reserve and 40% current rate as determined April through September of last year?



A That's right.

Q And the primary reserves were determined from production decline curves less production up through --

A The primary ultimate was determined through the use of the decline curves.

Q Right.

A And from that we got the reserves.

Q Your primary reserves less your cumulative production through what date?

A I believe it is October 1st, let me check for sure, though. Primary reserves as of 10-1-63.

Q October 1, 1963, and at that time you calculated there were 587 plus, remaining?

A 585.

Q And as soon as that 585 is produced it goes into the secondary recovery and that is --

A And that is from this date of 10-1-63, not from the date of unitization.

Q As soon as 587,000 barrels have been produced after --

A October 1st.

Q -- October the 1st, then it goes into the secondary phase and that is 100 percent?

A 100 percent.

Q Of primary --



A Primary.

Q -- ultimate recovery.

A Yes.

MR. KASTLER. I can think of one other question that should be asked.

REDIRECT EXAMINATION

BY MR. KASTLER:

Q Does this 587,461 barrels cover the remaining reserves for the entire Unit Area?

A That is right, for this outlined in the yellow on Exhibit Number one.

Q Now, in the event less than all tract owners should commit their interests to the Unit, would that be reduced in proportion to the primary reserves of the non-consenting or non-committing tracts?

A That's right.

Q And is such production provided for in the Unit Agreement?

A It is.

RECROSS EXAMINATION

BY MR. HUTTER:

Q Now, Mr. Bilbrey, you stated that you had not actually determined yet which means you should use for the casing tubing program on the dual injection wells. Exhibit Number Nine which

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showing cementing and other detailed information on these wells indicates that at the time it was prepared you were thinking of the dual tubing. What was this thinking based on?

A Yes. Well, after I talked to Mr. Irby and he said if the Santa Rosa was protected he would permit this other method, I went back and found out there weren't too many protected in that manner. I had just personally about given up the idea of going down the annulus and thought we would just have to go with the two strings of tubing; and I would say that for several weeks of my work I just assumed that was the way we would go. And then Hobbs came up with some preliminary estimates on the casings, and the management in Roswell thought we had better consider this other method, if we could do it, and I have since gone both ways because of this.

Q Then your Exhibits Eight and Ten are the two possible means of using these two injections wells?

A Yes, sir.

Q Now, these are the two methods that were offered in your letter of May 19th, to Mr. Irby; that is correct?

A That letter of May 19th to Mr. Irby, I was still under the impression that we would go -- I was under the impression we were to try at this Hearing to go with this one method as shown on --

Q Ten?



A -- Ten; that is the annulus method, and then there had been some talk from Hobbs and Roswell since that time that indicates that the treating cost might near offset any savings on the equipment; so therefore, we still haven't made up our mind.

Q Now in his letter of May 22nd, you referred to a diagramatic sketch you furnished him; was that the same as Exhibit Ten?

A That's right.

Q He also says he can refrain from objecting to your proposal providing that Statements One through Four in the Paragraph following Statement Four, and the diagramatic sketches are entered into the record for the Oil Conservation Commission without change; do you subscribe to Paragraphs 1 through 4, or Section 1 through 4 and one Paragraph following One through Four, and submit that you would follow this program without change if you went this route?

A If we do go this method we will do this as pointed out in the letter.

REDIRECT EXAMINATION

BY MR. KASTLER:

Q Which method of dual injection is Shell using in the Queen?

A They are dual injecting but they are going through two



strings of tubing, I don't know whether they are form fit or not, but they use -- for the most part I think 5 and 1/2 is their smallest, whereas half of ours is -- half of our casing is 4 and 1/2.

MR. NUTTER: You have got everything from 4 and 1/2 to 7"?

A All the way, yes. Cactus drills a lot of their wells with 7".

Q (By Mr. Kastler) But their plan is outlined in Exhibit Eight is it not?

A Yes, that is my understanding that is Shell's program, Exhibit Eight.

Q If 2,636,000 barrels is 11.8, how much original oil was there in place, have you calculated that?

A Forty four million something. Let me refer to my engineering report here, I could do it better with a slide rule, I believe. No, I double it, 22,657,000 originally in place.

Q And you expect that the secondary recovery would be 150% of the primary, or approximately four million barrels?

A Right, I think actually 4, 029,000; this is off of the record, but we are hoping that by the time 1974 rolls around, maybe we can find some way to get the remaining oil.

Q A little higher than that 150 percent?



A We are hoping that we will actually get more than 150 percent.

Q Do you anticipate we put all --

A It won't be like shooting a shotgun and ranning them out, once we cooperate with Shell and just move along from the east and --

Q From east to west?

A Yes, from east to west.

Q Now, you stated from as far as you knew the Cactus Lease over there on the west end was declining rather rapidly at this time, so you would anticipate by the time you got to that end of the unit, with conversion, that they would have fallen off?

A That has been our impression. When this engineering report was prepared we stated just that, that the better wells were down there on the Cactus Aztec State, and by the time we got down there we felt their production would be down to such that we could start flooding.

Q About how long do you think it will take if you start conversions on the Unit down below on the east and start moving west, how long will the entire program take for conversion?

A I don't think I can intelligently answer your question, I don't know how fast our people down in Hobbs can work.

Q Now, the water source facilities and the water



injection plant will be built for ultimate --

A For thirty injections --

Q Initially, was it?

A Right.

Q It will just mean a matter of laying the line and converting the line?

A The water supply itself from the Shell system is already at our boundary and ready to be used, so all we have to do is start converting plant and facilities.

Q Can it be stated that by the working interest owners interest in this that such completions will be done with all due haste?

A I will see to that. Our production is going to pot.

REXCROSS EXAMINATION

BY MR. NUTTER:

Q I don't suppose Shell has had any response?

A I don't believe they have. They started in February, February, March, four or five months. I don't think they are injecting theirs. I might state this: Not having kept too close a tab on this, but they started injecting up in the north-east, away from our line, and they have a so-called zone Four which we do not have down in our other, and we started injecting in our zone first, and I am not too familiar with that zone.

Q They have commenced injection in their wells that are



immediately east of your Unit Line?

A No, they have not started on the line, to my knowledge.

Q And do you anticipate that you will be able to start injection at the same time they are ready to start injection in their wells?

A I assume we will, yes.

MR. NUPPER: Are there any other questions of Mr. Bilbrey? You may be excused.

MR. KASTLER: We will call Mr. Bates Boles.

* * *

B A T E S B O L E S, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KASTLER:

Q Please state your full name, title and employer?

A Bates Boles, District Clerical Supervisor, Gulf Oil Corporation at Roswell.

Q What is your educational background?

A I have a degree from Oklahoma State University and School of Business with an accounting major, I graduated in 1947.

Q Would you state your professional experience?

A I have approximately seventeen years with Gulf in various clerical capacities, five years were spent at Hobbs and five years at Odessa, as Area Clerical Supervisor, three



years at Houston, and the past year at Roswell as District Clerical Supervisor.

Q Are you familiar with the Unit Agreement, the Exhibit for the Unit and Unit Operator Agreement and the status and royalty interest owners classifications?

A Yes.

Q Would you give the status of the working interest owners sign up?

A To date, we have signed ratifications on sixty-five percent of the working interest owners, and we have verbal approval of 30 percent, which is, we feel we have 95 percent approval.

Q Have any owners stated they would not sign the ratification forms?

A Yes, Hammon, who owns approximately three percent has a tract over the east side, has stated that he will not join the Unit Agreement at this time.

Q And are matters being considered concerning either the working interest owners purchasing his land or entering into a cooperative Line Agreement with him in the event the purchase breaks down?

A Yes, there will be an attempt to purchase this tract. However, Mr. Hammon stated that he would cooperate with his tract.



MR. NUTTER: Now, Jake Hammon tract comprises the northwest quarter of Section 28 and has four wells on it?

A Yes. Now, the whole tract has approximately three percent, Hammon has -- There are a couple of other working interest owners.

Q (By Mr. Kastler) You would expect those working interest owners to go along with Jake Hammon?

A Yes, we have a letter from the other working interest owners stating that being as Mr. Hammon is not going to sign they will not sign at this time either.

Q Would you state the status of the royalty owners signup?

A There is only one fee tract within the Unit Area, and we have signed ratifications for 47 and 1/2 percent of the royalty, the remaining 52 and 1/2 percent is owned by three members of one family, and one of the members of this family was in the office last week and stated that they would sign, and we're expecting their ratifications in the next day or two.

Q Therefore, you have every reason to expect by the effective date you will have 100 percent royalty on the commitment?

A Yes.

Q Has the West Pearl Queen Unit Agreement been drafted after approval of the oil and gas leases involved?



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A Yes, the working interest owners formed a committee which met and drafted the instruments to the satisfaction of all the leases involved.

Q Does this follow the ordinary prescribed form for waterflooding Unit Agreements involved in State and Federal Lands?

A Yes.

Q Have instruments been submitted of the Unit Agreement to the State Land Office for their approval?

A Yes, sir, and representatives of Gulf at Roswell enlisted the Unit division in connection with these instruments.

Q And has Gulf received approval and consent, preliminary approval from the State Land Office?

A Yes.

Q Has the Unit Agreement been examined by the USGS, both in Roswell and Washington?

A Yes, and the acting director gave his preliminary approval to the Unit Area by his letter dated April 30, 1964.

Q Does the Unit Agreement provide for expansion of the Unit Area?

A Yes.

Q Does the unit agreement provide for selection of a successor unit operator in the event of the removal of Gulf so to insure continued responsibility of operations?



A Yes, a successor operator will be selected by 75 percent of the voting interest subject to the approval of the Commission and Director.

Q What does the Unit Agreement provide for non joinder and subsequent joinders?

A On non joinder, any tract which failed to qualify on the effective date, the Unit Operator will recompute the tract participation using the original formula, and will revise Exhibit "A" and "B" to the Unit Agreement which will be effective upon approval of the Commissioner and Supervisor.

Q Subsequent?

A Subsequent joinders, any tract committed after the effective date will be on such a basis as negotiated by the working interest owners and the owners of this tract, and will be subject to the approval of the Commissioner and Director.

Q Were Exhibits Fourteen and Fifteen, are they two copies of the Unit and Unit Operating Agreements respectively which are being finally approved and executed at this time?

A Yes.

Q And do you understand that the order of the Commission will be so worded that your effective date and your approval will not become effective without the preliminary or the final approval, the preceeding final approval by the Commissioner of Public Lands and the Director of the USGS?



A Yes.

MR. KASLER: I think this concludes the questioning of the witness.

MR. NUTTER: Are there any questions of Mr. Boles?

MR. DURRETT: I have a question.

CROSS EXAMINATION

BY MR. DURRETT:

Q Mr. Boles, if Jake Hammon doesn't commit his acreage here, which is the northwest of Section 28 and you will have a forty acre tract here, I believe, belonging to Skelly; and in Section 21, which is the southwest of the southwest which would be continuous only by a corner; isn't that correct?

A That's right.

Q And that still would remain within the Unit?

A Well that, of course, is a dry hole, and Skelly, of course, has already ratified the instruments, and we have discussed this matter, but to my knowledge, we haven't been, as Jake Hammon will cooperate, we have not decided to take it out of the Unit.

Q It would still participate then?

A To my knowledge, yes.

Q Who owns the east half of the south half of Section 20 it's undesignated on the previous Exhibit here; is that Fee Land?

A Which one is that?



Q I am referring to Section 20, the southeast of the --
I mean the east half of the southeast, 80 acre tract directly
offsetting the Skelly tract to the east?

A I don't know. Do you have this tract, that is Skelly,
the same lease, that is the same lease?

MR. KASTLER: It is undeveloped.

A It is undeveloped.

Q (By Mr. Durrett) Is it uncommitted, then?

MR. KASTLER: No.

MR. DURRETT and Jake Hammon has stated he will enter
into line agreements at any rate and cooperate with the flood;
is that correct?

A Yes, we have a letter from Hammon to that effect.

Q (By Mr. Durrett) Thank you. That's all I have.

CROSS EXAMINATION

BY MR. NUTTER: Just as a matter of curiosity, since this
participation formula is based on primary reserve and primary
rates, how do you compute that tract participation since it was
a dry hole?

A Well, you know, it is a --

MR. BILBREY: It has no participation.

Q (By Mr. Nutter) So, that tract is actually not par-
ticipating?

MR. BILBREY: That's right, same with three other



wells.

Q Put in the case of the three other wells there was some production on the lease, so the lease would be participating?

MR. BILBREY: That is the same lease as the Skelly tract down here, the two 80 acre tracts directly offsetting the Hammon on the west; that is the same Skelly "J" Hobbs State.

A They are both tracts.

MR. BILBREY: Wells 1, 2 and 3, same tracts.

Q So that lease will be participating on that 40 acre tract, and likewise the 40 acre tract in Unit C of Section 31 where that dry hole is.

MR. BILBREY: And that just to the northeast Number 4 there is a gas well in the Phillips straight tract down in the southwest of Section 32 that was drilled to the Queen, is non productive in the Queen, it came up to the Seven Rivers.

Q So it is not participating?

MR. BILBREY: Right.

Q Now, Mr. Boles, you said that you had all the royalty committed except a couple of members of one family. In other words, you are assuming that you have the approval of the Commissioner of Public Land and the approval of USGS and then the one tract that is Fee land is that Parks tract?

A That's right. And part of the Park's tract has agreed to it.



Q And some of the family just hasn't signed the papers?

A Yes, we have, of course, our records where we were corresponding with Sam Mopper, and originally -- as we corresponded we found out he had given it to three of his children, so we had in turn to go to them, that is the reason we are late on that, but one of the children was in the office and they said they would sign, and he has signed in another waterflood that we have, so we feel sure that he will.

Q You feel that you will get his signature on this?

A Yes.

Q And then your working interest, you have 65 percent signed, 30 percent with verbal consent, 3 percent that say they will not sign; where is the two other percent?

A One of the tracts is this BIA Tract Number 1 which is the federal tract.

MR. BILBREY: It is the 40.

A Now, WTA represents twenty-four working interest owners, and he is in the process of trying to sign his twenty-four before he will sign with us, and he hasn't gotten all of them yet, so I really don't know what his progress is.

Q I see, you are hoping that that tract will come in and be signed?

A He feels sure he can get the working interest.

Q And that will account for 100 percent of the working



interest?

A Yes, sir.

Q Are there any further questions of Mr. Boles? You may be excused.

MR. KASTNER: I would like to move for the Exhibits One through Fifteen to be introduced into evidence or admitted into evidence at this time.

(Whereupon, Applicant's Exhibits One through Fifteen were offered into evidence.)

MR. NUTTER: Gulf's Exhibits One through Fifteen will be admitted into evidence.

(Whereupon, Applicant's Exhibits One through Fifteen were admitted into evidence.)

Do you have anything further? Does anyone have anything they wish to offer in Cases 3065 and 3068?

We will take the case under advisement and call a fifteen minute recess.

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

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

Witness my Hand and Seal this 14th day of August, 1964.

Charles Floyd Walker
NOTARY PUBLIC

My Commission Expires:
March 25, 1968.

I do hereby certify that the foregoing is a complete record of the proceedings in the Exam. or hearing of Cases No. 3065-3066 heard by me on June 10, 1964.

[Signature], Examiner
New Mexico Oil Conservation Commission

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