BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JULY 6, 1960

IN THE MATTER OF:

CASE 2008 Application of Gulf Oil Corporation for a order authorizing a salt water disposal well. Applicant, in the above-styled cause, seeks an order authorizing the disposal of produced salt water through its Lea-State "CR" (NCT-A) Well No. 3, located 3300 feet from the South line and 1980 feet from the West line of Section 2, Township 16 South, Range 32 East, Lea County, New Mexico, with injection to be in the lower Wolfcamp formation in the interval from 9,911 feet to 10,200 feet.

BEFORE:

Elvis A. Utz, Examiner.

T R A N S C R I P T O F P R O C E E D I N G S

MR. UTZ: Case 2008.

MR. PAYNE: Case 2008, Application of Gulf Oil Corporation for an order authorizing a salt water disposal well.

MR. CASTLER: If the Commission please, my name is Bill Castler from Roswell, New Mexico, and I am appearing on behalf of Gulf Oil Corporation. I have two witnesses that will testify in case 2008, Mr. G. J. Savage and Mr. Jim Gibson, in that order.

(Witnesses sworn in.)

GERALD J. SAVAGE

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

DIRECT EXAMINATION

BY MR. CASTLER:

Q Mr. Savage, will you please state your name and what company you are employed by and what your present position is?

A Gerald J. Savage, I am employed by the Gulf Oil Corporation as a production geologist in Roswell, New Mexico.

Q Have you previously qualified as an expert witness in giving testimony on behalf of the Gulf Oil Corporation before the New Mexico Oil Conservation Commission?

A Yes sir, I have.

MR. CASTLER: Mr. Examiner, I submit Mr. Savage's qualifications.

MR. UTZ: He's qualified.

Q (By Mr. Castler) Mr. Savage, are you familiar with Gulf's application in Case Number 2008?

A Yes sir, I am.

Q Would you please briefly state what it involves and why, in your opinion, it is necessary for a hearing today?

A Gulf requests permission to deepen their Lea-State "CR" Number 3 Well located in Section 2 of Township 16 South, Range 32 East of Lea County to inject salt water produced from wells in the Devonian and Wolfcamp wells in the Anderson Ranch Field into the interval below the casing, five and a half inch casing, at a depth of 9,911 feet in the new projected total depth of 10,200 feet. There are two other salt water disposal wells in the

field, but their capacity for salt water is not sufficient for Gulf to join their system.

MR. UTZ: Pardon me, Mr. Savage, do you have a schematic diagram of this application?

A Mr. Utz, as a geological witness, I do not, but our engineering witness does.

MR. UTZ: I wonder if you would submit that exhibit now so we can follow it?

MR. CASTLER: Yes, sir.

MR. GIBSON: That will be Exhibit Number Four.

(Thereupon, the document was marked as Exhibit Number Four for identification.)

MR. CASTLER: If the Examiner please, I would like to introduce Exhibit Number One, which is the lease plat, and then proceed with the further testimony at this time concerning the well and the well's history.

(Thereupon, the document was marked as Exhibit Number One for identification.)

Q (By Mr. Castler) Mr. Savage, I call your attention to the lease plat which has been labeled Exhibit Number One in Case Number 2008, showing Lea-State "CR" NCT-A, Lea County, New Mexico, general layout. Referring to Exhibit Number One, would you please state the location of the well in question which Gulf proposes to deepen and convert to a water injection well?

A This lease plat shows the location of Gulf's Lea-State

"CR" Number 3 Well to be 3300 feet from the south and 1980 feet from the west line of Section 2, Township 16 South, Range 32 East, outlined in red. This lease plat also shows all producing wells within a radius of two miles and all other operators within a radius of two miles.

Q And as well, does it show all offset operators?

A It shows all offset operators.

Q And the only wells that are now producing within a radius of two miles are those that are in either the Anderson Ranch-Wolfcamp Pool or the Anderson Ranch-Devonian Pool as defined by the Oil Conservation Commission of New Mexico?

A That is correct.

Q Is Gulf's Lea-State "CR" Lease, is that a State lease?

A Yes sir, it is.

Q With what as the beneficiary institution?

A The common school fund is the beneficiary institution.

Q Would you please describe the outlines of the lease and also tie them into Exhibit Number One?

A Gulf's Lea-State "CR" Lease consists of Lots 11, 14, 15 and 16. The hundred and twenty acres outlined by means of hashered lines is the lease interest that is pertinent in this case, inasmuch as the well on Lot 16 is part of a Wolfcamp unit with Sinclair Oil and Gas Corporation, which includes that Lot 16 and also Lot 13 of Section 1, of the same township and range.

Q Would you please state the present status of Gulf's

Lea-State "CR" Well Number 3?

A The current status of that well is that it is presently abandoned. It has not been plugged, but it has not been produced since May of 1957 from the Wolfcamp zone.

Q Has it ever produced from any zone other than the Wolfcamp zone?

A No sir, it has not.

Q And now I wish to call your attention to Exhibit Number Two, which is entitled, "Structure plat, Anderson Ranch Field contoured on Wolfcamp Pay Marker.)

(Thereupon, the document was marked as Exhibit Number Three for identification.)

Q (By Mr. Castler) Referring to Exhibit Number Two, Mr. Savage, would you please state what can be seen on this exhibit?

A This is a structure plat contoured on top of the Wolfcamp paying marker, just at the top of the Wolfcamp pay zone, contoured with intervals of fifty feet, and also shows specifically the location of Gulf's Lea-State "CR" Number 3, and the state lease that is concerned in this case.

Q Have you correlated Well Number 3 with other wells bearing directly north and south that are completed in the Wolfcamp pay zone?

A Yes, sir.

Q Now, I wish to call your attention to what is labeled as Exhibit Number 3 --

(Thereupon, the Document was marked as Exhibit Number Three for identification.)

Q (By Mr. Castler) --entitled "North-south cross section, Anderson Ranch Field." Was Exhibit Number Three prepared by you or at your direction and under your supervision, Mr. Savage?

A Yes sir, it was.

Q Will you please refer now to Exhibit Number 3 and explain what is shown on here pertinent to this case?

A This cross section was chosen for our north-south line passing through, or including Gulf's Lea-State Number 3 Well. It shows that the producing wells in this line of cross section are all producing above the original oil-water contact of a minus 5570-foot datum plus or minus ten, and I wish to state that all Wolfcamp producing wells in this field are producing above that original oil-water contact. Gulf proposes to squeeze the existing perforations in this abandoned well and test perforations and drill out to a total depth of 10,200 feet to inject water into a zone that is anticipated to be found at a depth of 10,000 feet. This zone can be correlated across, between Continental Oil Company Number 15, Anderson Ranch to the south of the Number 3 and Gulf Oil Corporation's Lea-State "CR" Number 4 to the north. Gulf encountered a lost circulation zone which gave them trouble at a depth of 9,997 feet to 10,020 feet. I believe that this cross section will show that Gulf's proposed salt water disposal zone will be below the producing zone of all Wolfcamp producers in the

field, and --

Q Mr. Savage--pardon me.

A --it is necessary that this hearing be held, inasmuch as the Wolfcamp is an oil-producing zone, otherwise we would have requested administrative approval.

Q Then is it correct that you are proposing to inject salt water into the lower extremity of the Wolfcamp, into an area where there has been encountered lost circulation?

A That is correct. The water has been recovered from these several zones below the original oil-water contact and there have been no producing wells, and there are not at the present time any producing wells from the zone into which Gulf proposes to inject salt water.

Q Mr. Savage, has the oil-water contact zone been identified on Exhibit Number Three at minus 5570 feet plus or minus ten feet --

A Yes, it has.

Q --as the horizontal line?

A Yes sir, that's right.

Q And has the Wolfcamp pay marker also been shown on this cross section map on Exhibit Number Three?

A Yes sir, this marker has been chosen as a correlation point, and it exhibits the structure of the field as well as the top of the Wolfcamp formation would.

Q Correlating Exhibit Number Three with Exhibit Number Two,

how is the Wolfcamp pay marker shown on Exhibit Number Two?

A I am not sure I understand what you mean by the question.

Q Exhibit Number Two is a structure plat on top of the Wolfcamp pay marker, is that correct?

A That is correct.

Q And in Exhibit Number Three, you have shown the Wolfcamp pay marker?

A That's right, sir.

Q Which one of the contours is correlative with the Wolfcamp pay marker as shown on Exhibit Number Three?

A The Wolfcamp pay marker is found just--in the Lea-State "CR" Number 3 just above 9700 feet, and the subsea datum of that point puts Gulf's Lea-State "CR" Number 3 between the minus 5350 and the minus 5400 feet datum, sir.

Q Further correlating Exhibit Number Three with Exhibit Number Two, Gulf's Number 4 Lea-State well is shown at the top in Lot 11, Section 2, is that correct?

A That's correct.

Q And that is also shown on Exhibit Three on the extreme right hand well, is that correct?

A That's right.

Q And the next well going south is Gulf's Number 3, the proposed water injection well?

A That's right, sir.

Q And the next well going to the left and going to the south

on Exhibit Number Two is Continental Oil Company Number 15?

A Yes, sir.

Q As you progress further, Continental Oil Company Number 12 Anderson Ranch unit is further to the south?

A Yes, sir; I believe your line of questioning is intended to bring out the fact that this cross section shows the structural position of some of the Lea-State wells on the Wolfcamp structure?

Q That's correct.

A All right, sir.

Q Would you care to elaborate any more on either of these exhibits, Exhibits Two or Three?

A I just want to point out the fact, as previously shown, that the proposed zone will be below the original oil-water contact, and there have not been and there are not at this time any producing Wolfcamp wells from this proposed salt water injection zone.

MR. CASTLER: Further testimony as to the method of completion is to be given by Gulf's engineering witness. If there's nothing further, I will move for the entry of Exhibit Numbers One, Two and Three in Case Number 2008 at this time.

MR. UTZ: Without objection, Exhibits One, Two and Three will be entered into the record.

MR. CASTLER: That concludes my questions on direct of Mr. Savage.

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

This injection zone is commonly known as the Lower Wolfcamp?

A Yes, sir.

MR. UTZ: The witness may be excused.

(Witness excused.)

JAMES C. GIBSON

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

DIRECT EXAMINATION

BY MR. CASTLER:

Q Will you please state your name, by whom youare employed, where you reside and what your present position is?

A My name is James C. Gibson, I am employed by Gulf Oil Corporation as a Petroleum Engineer in Roswell, New Mexico.

Q Have you previously qualified as an expert petroleum engineer in giving testimony before the New Mexico Oil Conservation Commission?

A No sir, I have not.

Q Would you briefly review your educational experience as a Petroleum Engineer?

A I earned my Bachelor of Science Degree in Petroleum Engineering from the University of Okalhoma in 1941; from 1941 to 1942, I was employed by Cities Service Oil Company in their junior engineer training program; from 1942 to 1946, I served in the U. S. Armed Services, and in 1946, January, I was employed by the Gulf Corporation. I have remained in their employ since

that time. During those years, I have served as petroleum engineer, working throughout the various fields, in the Permian Basin, West Texas, and in the Panhandle of Texas. During the past three years, I have worked in Gulf's mechanical engineering, production engineering section in their Fort Worth Division Office, and am now located in the Roswell District Office.

Q Have you familiarized yourself with Gulf's proposed method of completion and all other matters involving the application in Case Number 2008?

A Yes sir, I have.

MR. CASTLER: I submit the witness is qualified.

MR. UTZ: The witness is qualified.

Q (By Mr. Castler) Mr. Gibson, Exhibit Number Four has previously been introduced here, which is a schematic diagram of the proposed completion of Well Number 3 Lea-State "CR" Lease; was this exhibit prepared by you or at your direction and under your supervision?

A Yes sir, it was.

Q Calling your attention to Exhibit Number Four, would you please outline Gulf's present casing program, present casing installations, where the cement is circulated and placed and so forth --

A Yes, sir.

Q --and then go on to state what Gulf's proposal is in connection with the deeper completion of this well as a salt water

injection well?

A The diagram shows 13 3/8 inch casing at 626 feet, that was cemented with 650 sacks and the cement is circulated; 8 5/8 inch casing is set at 4204 feet, this was cemented with 2150 sacks of cement which was not circulated, but the top of the cement was found at 85 feet by temperature survey; 5 1/2 inch casing is set at 9911 feet, this casing was cemented with 275 sacks of cement, temperature survey showed the top of the cement at 8470. The original total depth of the well was 9912 feet; at the present time, we have perforations which were squeezed with cement from 9842 to 9864 and from 9876 to 9892 with the cement retainer set in the 5 1/2 inch casing at 9789 feet. We have perforations on that at 9688 to 9707 and 9720 to 9755. Gulf proposes to squeeze off the open perforations from 9688 to 9755 with cement, drill out and test the perforations with 1,000 pounds per square inch, then drill a head through the cement retainer and the cement on the lower perforations and then test the lower perforations. If in any way the perforations do not hold, of course they will be squeezed, then we intend to drill an open hole from the original total depth of 9912 to 10,200 feet. The injection zone will be as stated, below the casing set at 9911 feet to total depth of 10,200 feet. We propose to run 2 7/8 inch OD tubing coated internally with plastic for injection of the salt water; we expect this injection to be under gravity or under low pressure. We intend to prevent corrosion to the inside of the casing and to the

outside of the tubing by loading the annulus with a light oil. If the bottomhole pressure is sufficient, we do not intend to set a packer; however, if it is not sufficient and the packer is necessary, we will set the packer and load the annulus with oil. Injection will be down the tubing and into the open hole interval.

Q Now, Mr. Gibson, calling your attention back to Exhibit Number One, which is the lease plat, can you show what production is to be served by this salt water disposal that you propose?

A Yes sir, we intend to use the disposal well for salt water produced from wells in the Anderson Ranch Devonian and Anderson Ranch Wolfcamp Field. At the present time, we have six wells which we intend to dispose of the water. They are our Lea-State "CR" Number 1 located in Lot 1 of Section 2--this well is a Wolfcamp and Devonian dual. We have the Lea-State "CL" Number 1 located in Lot 7, which is a Wolfcamp-Devonian dual; we have the Lea-State "CR" Number 4, which is a Wolfcamp well, and the Lea-State "CR" Number 2 located in Lot 15, which is a Devonian well. Those six wells at the present time are producing water which we intend to dispose of into our Number 3 disposal well.

Q What facilities for disposal of salt water are presently available to these six wells?

A They are presently disposed in an open pit.

Q Is the salt water increasing or are these facilities becoming inadequate?

A Yes, the water is increasing, which is our reason for

seeking a disposal well.

Q What is the present volume of water that you need to dispose of?

A The present volume is in excess of six hundred barrels per day.

Q All of this water is so-called waste water, it is not fresh water, is it?

A Yes sir, it is definitely brackish water.

Q In the future, do you intend, or does Gulf intend to inject additional water into this well, providing the well is capable of taking it?

A Yes sir, we do; we expect the water production to increase, and as it increases, we intend to dispose of it into this well.

Q Do you have anything to add, particularly concerning the well history of Gulf Oil Corporation's Lea-State "CR" Number 3?

A I might say that the well was originally completed in November of 1955 with an additional potential of sixty-six barrles of oil per day and forty-nine barrels of water per day, swabbing. As our previous witness has testified, that well was presently abandoned in May, 1957 with a cumulative oil production of 5,040 barrels. At the time of abandonment, the well was producing 425 barrels of oil per day and approximately two barrels of water per day, pumping.

Q Mr. Gibson, I notice that on Exhibit Number 4, you show that there's a five and a half inch cement retainer set at 9779 feet; is this the present plug back depth of the well?

A Yes sir, it is.

Q On Exhibit Number Three, it is shown that there is a plug back depth of 9899; would you consider that figure to be in error and the 9779 to be the proper figure to substitute there?

A Yes sir, the correct figure is 9779.

Q In your opinion, would it involve waste of any oil from the oil-producing zone for the Oil Conservation Commission to grant this application and for Gulf to complete this well as proposed for salt water injection purposes?

A No, sir; as explained by the previous witness, we intend to, propose to inject the water below the oil-water contact so that no oil producing well should be damaged.

MR. CASTLER: I don't believe I have any further questions on direct.

MR. UTZ: Mr. Gibson, I believe you said the top of the cement on five and a half inch was 8470?

A Yes, sir.

MR. UTZ: So there will be no cement behind the 5 1/2 from 8478 to the bottom of the 8 5/8, which was 4204?

A Yes sir, that is correct.

MR. UTZ: And on the 4300 feet open behind the pipe, what zones are in this area?

A I do not know, sir. I may refer you to our geological witness.

MR. UTZ: Can you answer that?

MR. SAVAGE: Yes sir, the formations behind the pipe between that depth of 8470 to 4204 would be the San Andres and the Abo Formations.

MR. UTZ: Are they producing in this area at this time?

MR. SAVAGE: No sir, they are not.

MR. UTZ: Have they?

MR. SAVAGE: No, sir, they have not. At the present time, Sunray-Midcontinent is using their State Land 76 Number 2 Well two locations east and one location north of the Lea-State "CR" Number 3 for salt water disposal in the openhole interval of the San Andres through the Abo Section.

MR. UTZ: Mr. Gibson, I believe you stated that you intended to load the annulus between the tubing, 5 1/2, with light oil?

A Yes, sir.

MR. UTZ: Even though you don't set a packer?

A Yes, sir.

MR. UTZ: In other words, the oil will float through the salt water column?

A Yes, sir.

MR. UTZ: How far back up the hole do you think the salt water column will be?

A Well, we don't know yet. We'll have to determine the static bottomhole pressure of the formation, and the injecting bottomhole pressure. We intend to cover practically all the tubing in the casing, certainly below the top of the cement, with the oil.

MR. UTZ: Wouldn't it be better protection to set the packer, in any event?

A I believe Service Engineering and several other operators have used this system of using light oil without a packer. It gives you the same protection and also gives you a control, a controlling record of your injection pressure in case you have injection by gravity, because you can have a surface pressure on the annulus and watch that from that point. Now, if bottomhole pressure is inadequate to sustain that column, then certainly a packer would be provided.

MR. UTZ: Any other questions?

MR. PAYNE: No questions.

MR. UTZ: The witness may be excused.

(Witness excused.)

MR. UTZ: Any other statements in this case?

The case will be taken under advisement.

I N D E X

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

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

WITNESS my Hand and Seal this, the 7th day of July, 1960, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Notary Public

My Commission Expires:

January 24, 1962

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2085, heard by me on 7-6, 1960.

New Mexico Oil Conservation Commission, Examiner