STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

3 December 1986

EXAMINER HEARING

IN THE MATTER OF:

Cases in which no testimony was given on this docket.

CASE
9051
9042
9031

Transcript in Case 9051

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Jeff Taylor
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

19 November 1986

EXAMINER HEARING

IN THE MATTER OF:

Cases called on the docket for 19 November 1986 for which no testimony was presented.

CASE 9031 9032

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
Legal Counsel for the Division
Oil Conservation Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. CATANACH: Call next Case Number 9031.

MR. TAYLOR: Application of Yates Petroleum Corporation for a Hardship Gas Well Classification, Eddy County, New Mexico.

The applicant has requested that this case be continued.

MR. CATANACH: Case 9031 will be continued to the December 3rd hearing examiner docket.

* * *

MR. CATANACH: Call next Case Number 9032.

MR. TAYLOR: Application of John L. Cox for an unorthodox oil well location, Lea County, New Mexico.

The applicant has requested that this case be dismissed.

MR. CATANACH: Case 9032 is hereby dismissed.

(Hearings concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of this portion of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9031, 9032 heard by me on Nov 19, 1986.

David R. Catanach, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

17 December 1986

EXAMINER HEARING

IN THE MATTER OF:

Application of Yates Petroleum Corporation for hardship gas well classification, Eddy County, New Mexico.	CASE 9031

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Commission: Jeff Taylor
Legal Counsel for the Division
Oil Conservation Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: David R. Vandiver
Attorney at Law
DICKERSON, FISK, & VANDIVER
Seventh and Mahone/Suite E
Artesia, New Mexico 88210

I N D E X

E X H I B I T S

MR. CATANACH: Call next Case 9031.

MR. TAYLOR: The application of Yates Petroleum Corporation for hardship gas well classification, Eddy County, New Mexico.

MR. CATANACH: Are there appearances in this case?

MR. VANDIVER: Yes, Mr. Examiner, my name is David Vandiver of Dickerson, Fisk, and Vandiver in Artesia, appearing on behalf of the applicant, Yates Petroleum Corporation.

I have one witness to be sworn this morning.

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

MR. KENDRICK: H. L. Kendrick with El Paso Natural Gas Company.

MR. TAYLOR: There are no other appearances?

(Witness sworn.)

JAMES S. BROWN,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. VANDIVER:

Q Mr. Brown, would you please state your name, your occupation, and by whom you're employed?

A My name is James S. Brown. I'm an engineer with Yates Petroleum Corporation in Artesia.

Q And how long have you been so employed?

A About four years and three months.

Q Have you previously testified before the New Mexico Oil Conservation Division and had your qualifications accepted and are they a matter of record?

A Yes, sir, I have.

Q Are you familiar with the application in this case?

A Yes, I am.

Q And have you made an investigation or a study of the well in question and prepared certain exhibits in connection with this case?

A Yes, I have.

MR. VANDIVER: Mr. Examiner, I would tender the witness as an expert.

MR. CATANACH: Mr. Brown is so qualified.

Q Mr. Brown, if I could have you refer to what's been marked as Applicant's Exhibit Number One and ask you to explain to the examiner what Yates is applying for and what that exhibit is intended to represent.

A Okay, Exhibit Number One is the application that was filed in this case.

Yates Petroleum is seeking hardship classification for the Mescal "SE" Federal No. 1. The well has experienced severe difficulties due to the shut-ins imposed by the market conditions. We've been able to produce the well just one day a month for about the last year and we'll -- I'll show during the testimony today that we're having a very difficult time producing the well and that significant waste will occur if we're not granted a hardship classification.

Q You're not applying for an emergency hardship classification, though, are you?

A That's right, I'm not applying for emergency classification because El Paso Natural Gas indicated to us that while this case was being heard we would be allowed to produce the well.

Q When was the application filed?

A Okay, it was filed on October 20th, this

year.

Q If I could ask you to refer to Applicant's Exhibit Number Two and ask you what that is, please?

A Okay, Exhibit Number Two are copies of the letters sent to various -- the offset operators and the District and Santa Fe Offices of the OCD and El Paso Natural Gas, and copies of the return receipts showing that they'd received the application.

Q And were all the offset operators notified of your application for hardship application?

A Yes, they were.

Q Did the notice that you sent them include a copy of the application?

A Yes.

Q And the application contains the minimum sustainable rate which Yates was seeking at the time you prepared the application.

A Yes, that's correct.

MR. VANDIVER: Mr. Examiner, I believe that one of those copies of Exhibit Two is the original return receipts reflecting that those notices were received by all the offset operators and El Paso Natural Gas.

MR. CATANACH: Okay, thank you, Mr. Vandiver.

Q At the time you prepared the application

and notified the offset operators and the purchaser, what was the minimum sustainable rate which Yates Petroleum was seeking for the Mescal "SE" Federal No. 1 Well?

A Okay, and that time we'd not done a logoff test and I estimated at that time 200 Mcf a day.

Q What was the basis for your estimate?

A Okay, another well in that area, the Little Box Canyon No. 2, had had a logoff test done and I based my estimates on that well.

Q And you say that you have since conducted a logoff test on the Mescal "SE" Federal No. 1 Well?

A Yes, we have.

Q When was that test completed?

A It was completed on December the 16th, yesterday.

Q Why was the test not conducted prior to filing the application in this case?

A Okay, due to the market conditions El Paso would not take gas more than one day a month, so we couldn't conduct such a test.

Q I'd like to ask you to refer to Applicant's Exhibit Number Three and tell the examiner what that's intended to reflect.

A Exhibit Three is a plat showing the ownership of the mineral rights in the area surrounding the

Mescal.

The Mescal "SE" Federal No. 1 is located in Unit C of Section 18, Township 21 South, 22 East. The offset operators surrounding the proration unit are shown there on the plat, proration being the north half of Section 18.

The pool that the well is in is the Little Box Canyon Morrow and the wells that are currently producing out of that pool are circled. They are the Box Canyon Unit No. 2 in Section 13 of 21 South, 21 East, and Little Box Canyon Unit No. 5 in Section 7 of 21 South, 22 East.

I'd also like to point out that this gas pool does have a history of a water drive mechanism. The, for example, the Yates Petroleum operated Box Canyon Federal "GJ" No. 1 in the south half of Section 13 of 21 South, 21 East, after producing a cumulative gas quantity of 163-million cubic feet, watered out in April of 1978, and also the Little Box Canyon No. 2 in the north half of Section 13 of 21 South, 21 East, has been classified as a hardship well in Order No. R-8327 on October 29th of this year, the point being that the pool has history of being a water-drive reservoir.

Q Mr. Brown, is the Little Box Canyon Morrow Pool a prorated pool?

A No, sir, it is not.

Q Is the north half of Section 18 in Township 21 South, Range 22 East dedicated to this well, is that a standard proration unit?

A Yes, it is.

Q Who is the -- and I believe you testified there are only two other wells, the Box Canyon Unit 2 and the Little Box Canyon Unit No. 5 Wells that are also producing from this pool.

A Yes, that's correct.

Q And Yates Petroleum Corporation is the operator of those two wells, is it not?

A Yes, sir, that's right.

Q If I could ask you to refer to Applicant's Exhibit Number Four and tell the examiner what that's intended to reflect?

A Exhibit Four is a production history plot for the well, showing gas production, shown by the solid line in units of Mcf per month, and the dotted line shows water production in barrels of water per month.

You'll notice that very little water production occurred in the early stages of the life of the well. Water production actually began, not shown on the chart itself, in January of '83 in very small quantities, but the first sign of significant water production occurred in August and September of 1983, and then you can see that

water production climbed steadily throughout the life of the well to a maximum water production of 5100 barrels of water per month.

Then you can see in November of 1985 was when the market conditions required El Paso to curtail production from the well.

That's all I had on Exhibit Four.

Q All right, if you could refer then to Applicant's Exhibit Number Five and tell the Examiner what that's intended to show.

A Okay. Exhibit Five is a plot of the water-to-gas ratio which was derived from Exhibit Four, and the units are barrels of water per million cubic feet of gas produced as a function of time that the well was producing.

The point here is that you can see that the water-to-gas ratio has been climbing steadily, which is an indicator that the well is producing from a water/gas drive or water drive reservoir, and the second point being that in 1986, as you saw in Exhibit Four, there was very little production and yet the water-to-gas ratio continued to climb quite drastically.

Q Now if you will refer to Applicant's Exhibit Number Six and explain for the examiner what that exhibit shows.

A Exhibit Six is a plot of the production

data day by day for the year 1986. I'm showing gas production in Mcf per day, with data points circled with the gas scale on the lefthand side of the page; then water production, the data points surrounded by a triangle with its scale shown on the righthand side of the page in barrels per day. I'm also showing tubins pressure and the choke size on the same chart.

As you notice there, all during 1986 El Paso had been taking basically one day per month. You can see a few days had two to three days per month, and two months during the year we didn't produce any gas.

Also note that gas production steadily decreased throughout the year; water production steadily increased throughout the year, which resulted in the extremely high and increasing water-to-gas ratios that I showed on Exhibit Five.

Q Have you been advised by El Paso as to the amount of gas they will take if this application is not granted?

A Yes, they have indicated that they will begin taking eight hours of production per month rather than one day of production per month.

Okay, what I'd like to talk about now, referring to the same exhibit, is the difficulty we've had in bringing the well back on to line and the fact that each

time we try to bring it on it's getting worse and worse.

As you notice there, looking at tubing pressure during the first five months of the year, we had fairly good tubing pressure when we brought the well on initially, and you can also notice that tubing pressure is dropping throughout the year there and the first five months.

When we arrived on location on June 28th, 1986, the tubing pressure was 90 psi, which is off the chart on this graph. The well would not come on line in the conventional means by just opening up the choke, so we tried venting the well to the atmosphere to unload the water; that didn't work.

We dropped soap sticks down the tubing, vented the well to atmosphere over night releasing gas to the atmosphere; that didn't bring the well on.

We shut it in for a 48-hour build-up and we didn't get any pressure build-up at all at that point, and July the 3rd, 1986, we ran a static bottom hole pressure bomb in the hole, which I'll discuss in further detail later.

There was no production in June of this year. On July 28th, went back to the well, tried to blow it down and it wouldn't come on line. July 29th we brought in a swab unit and swabbed the well in. The well came in after

four swab runs. We had to clean the well up to clean water out of the wellbore and blew it to atmosphere for 24 hours, lifting 400 barrels of water in that period of time and venting to atmosphere approximately 5-million cubic feet of gas.

Then we were able to produce the well to the pipeline and sell 3.9-million cubic feet of gas. So we vented 5-million and sold 3.9-million cubic feet of gas at that point.

On August the 15th we tried to bring the well back on line again, vented again to atmosphere trying to bring it on, but we were unsuccessful.

On September the 26th we tried to blow the well down to atmosphere, dropped two soap sticks, vented to atmosphere again for two days, shut-in for pressure build-up, and achieved a maximum tubing pressure of 100 pounds at that point; again could not bring the well on line without swabbing, and as you can see there, there was no production during the month of September.

Then on -- from August 10th through the 18th we dropped four soap sticks down the hole, vented to atmosphere again, tried to build the pressure up and blow it down; nothing worked, and on October the 20th, the date that this application was mailed out, we brought a swab unit in, swabbed the well in. We found an initial fluid level in the

tubing at 3525 feet from surface and the well started flowing after nine swab runs at 2:00 o'clock in the afternoon on October 20th.

We flowed the well to atmosphere until 7:45 in the morning the following day and we estimate blowing about 3-million cubic feet of gas to atmosphere and unloaded again about 400 barrels of water during the night.

Okay, the point of all this discussion is to show that we're wasting a lot of gas. We're venting a whole lot more gas to the atmosphere than we're selling, and finally, that it costs us $1,339, approximately, each month when we have to bring a swab unit in to kick off the well, which we do have to do every time we bring the well on, and revenues for one -- for 24 hours production, net revenue is about $1,229, so each month we lose money by keeping the well in operation.

And if we do have to go to eight hours of production, then net revenue will be $410 a month as opposed to $1229 a month.

That's all I have on Exhibit Six.

Q So your testimony is that if the application is not granted and El Paso only takes gas for eight hours a day you'll be losing something like $800 a month to produce the well.

A Yes, that's correct.

Q All right. If I could ask you to refer to Applicant's Exhibit Number Seven and ask you to explain what that's intended to show.

A Okay, Exhibit Seven shows that every time we shut in the well we actually incur wellbore damage.

Exhibit Seven is a deliverability plot with gas flow rate on the X axis in Mcf a day and effectively pressure drop across the reservoir on the Y axis, which is in $Pc^2 - Pw^2$ in thousands of psi. This is the standard deliverability plot that's required by NMOCD Form C-122.

The line labeled A is the original deliverability characteristics of the well when we completed the well and that -- that is exactly the line, the data points that were turned into the NMOCD on Form C-122 when the well was completed.

Since that time we have found that the well has continued to produce under those characteristics and has that deliverability curve and by confirmation on tests on October the 4th, 1984, March the 18th, 1985, and December the 3rd, 1985, the point being that when we're allowed to produce the well the deliverability characteristics of the well have not changed at all, even though we were producing significant quantities of water during that time.

Now, the line labeled B was a deliverability of the well as measured on -- you might make this notation on your exhibit there -- on July 31st, 1986, rather than July 3rd, 1986, as it's shown on your exhibit.

That was after the well had been shut in for approximately eight months and it was taken after we had to swab the well in for the first time and the fact that curve B is to the left of curve A means that at a given pressure drop across the reservoir the well will produce significantly less gas.

For example, if the -- at current pressure drop across the reservoir, if we -- if the well had been able to continue to produce, right now it would be producing about 2.2-million cubic feet a day whereas curve B shows that it was only able to produce about 1.2 to 1.4-million cubic feet a day, and in curve C, which was taken on November 13th of this year, deliverability is clear down to 700-to-900 Mcf per day.

The reason for this reduction in deliverability is the reduction in relative permeability to gas as a result of water coming into the wellbore and causing the reduction in relative permeability.

The equations to the -- to the curve there will indicate that. Since curves B and C have a lower c value in the equation, which indicates the reduction in

relative permeability to gas.

Okay, I need to note that these calculations were done based on the NMOCD procedures for wells with liquid in the hole; however, the NMOCD procedures assume that that liquid is hydrocarbon, which is in the gas phase as it's flowing through the tubing, which condenses on the surface so that the absolute values of these numbers I've shown are probably not correct, although it's -- the conclusions that we derived from the analysis would remain the same. It's the best form of calculation we can do at this time.

That's all I have on Exhibit Seven.

Q Mr. Brown, is the wellbore damage that you have testified to, is that a progressive thing?

A Yes, that's exactly right. As you see, curves A, B, and C were taken chronologically and you can see that since the curves are shifting further to the left, that each time we shut in the well we are getting more and more wellbore damage.

It is progressive and it is also irreparable, which I'll show on a later exhibit.

Q All right. Now if I could ask you to refer to Applicant's Exhibit Number Eight and ask you to explain what that's intended to represent.

A Okay. Exhibit Eight is a standard P/Z

versus cum gas production plot in which the bottom hole pressure divided by Z, which is the gas compressibility, is plotted as a function of the cumulative reservoir gas produced from the reservoir.

This -- this exhibit was also included in the application and there is one change in this exhibit as opposed to what I turned in in the application, and that is that in this exhibit I have included the production from the Little Box Canyon Unit No. 5, which produces from this same reservoir, whereas in the application I included the data points only from this well, the Mesal "SE" Federal No. 1.

So the effect of that is that the total ultimate reserves that can be recovered from the reservoir is 7-billion cubic feet, which initially looked like the Mescal could recover, since the Little Box Canyon Unit No. 5 came on just this year, it is evident that the Little Box Canyon Unit No. 5 will share reserves with the Mescal. So I wanted to make that point clear, that the -- there was a slight error in the application.

I wanted to point out that the three data points that are shown curve upward from the straight line that I've drawn, and that is another indication that the reservoir is producing under a water drive mechanism, and that the line I've drawn is a correct estimate as to the initial gas in place, and since the reservoir is producing under a

water/gas drive mechanism, the recoverable reserves as shown here are somewhat optimistic, but it's, you know, good gas to start out with.

Now, I also wanted to point out that if the Mescal is denied hardship classification, the question may come up as to well, will the Little Box Canyon Unit No. 5 be able to produce all of the reserves that I've shown here. The answer to that is no, it won't at all, and I've estimated that the loss of productive reserves will be about 750-million cubic feet of gas.

The reason for that is that the Mescal is lower on the structure than the Little Box Canyon Unit No. 5. The reserves that would have been produced from the Mescal that are in between the two wells would be produced not by a water drive mechanism but by a straight volumetric gas depletion mechanism.

The -- according to Graft and Hawkins on pages 36 and 37, they have given data from core tests taken and field studies that show that a water/gas drive reservoir will recover only 50 percent of the gas in place, whereas a volumetric reservir would recover about 90 percent of the gas in place. So that effectively, for the gas in between the two wells, we would, if the Mescal were shut in, you would reduce recovered gas from 90 percent down to 50 percent, and I have estimated really with -- I have estimated,

say, approximately 25 percent of the gas in place in the reservoir is between the two wells, and that's how I came up with my number of 750-million cubic feet of gas that would be lost if the Mescal were not allowed to produce. And that number can be, you know, of course, subject to error, but I feel like it would -- the number would be somewhere in the neighborhood of 200-million to a billion cubic feet of gas of lost reserves.

Q That's if the well was prematurely abandoned.

A Yes, that's right.

Q Any other points you'd like to make with regard to Exhibit Eight?

A No, that's all I have.

Q Okay, I'll ask you then to refer to Applicant's Exhibit Number Nine and ask you to explain what that is.

A Okay, Exhibit Number Nine are copies of three bottom hole static pressure measurements taken on the well throughout its history.

The first one, taken on February 3rd, or excuse me, February 4th of 1982, the well did not have any fluid, any liquid in the hole.

The second bottom hole pressure measurement was taken on October 2nd, 1984; again the well did not

have any liquid in the hole.

These two, the first two measurements were before we experienced gas curtailment.

The last bottom hole pressure measurement was taken on July 3rd of this year, 1986, after approximately eight months of curtailment, and as you can see on the page there, we found a water level in the tubing at 3400 feet from surface, which is 4729 feet above the perforations, and it's my contention that the periods of shut-in caused the water to encroach into the wellbore as further evidence that water is coming into the well, raising the water saturation, whch, as I showed on Exhibit Seven, lowers the relative permeability to gas.

You'll find in your Exhibit One, the application, the wellbore sketch and the location of the perforations; perforations being at 8129 to 8134.

Q All right, if you'll refer to Applicant's Exhibit Number Ten, which is the results of the logoff test, and comment on those results.

A Okay. Exhibit Ten is the logoff test that began on November the 12th, 1986, and ended yesterday, December the 16th, 1986, witnesses by the Artesia office of the NMOCD.

You'll see the tabular results of the logoff test here on Exhibit Ten and you'll see them plotted

up on the production plot on Exhibit Six, for your reference.

Okay, and we began the -- began the logoff test, pinching in the choke 1/64th every day, and on November the 20th you'll see that we pinched the well in from 15/64ths down to 14/64ths. Tubing pressure at that point dropped from 800 pounds down to 750 pounds, and as you can see on the Exhibit Six for that date, it was from then on that we experienced more drop in tubing pressure for every time we pinched in the well.

Then on November the 27th El Paso -- let's see here, on November the 25th, rather, El Paso's compressors went down, the line pressure -- pipeline pressure went up, causing our gas production to reduce to about 253 Mcf a day, and the well died overnight.

We tried to increase the choke size from 12 to 13, as you can see there on November the 26th. The well died and we had to swab it back in on November the 28th.

Then for three days, November 29th through December 1st, we opened the well back up to 24/64ths, trying to clean the well back up; then we tried to resume the logoff test, and brought it -- tried to bring it back down to where we'd left off, approximately 650 Mcf a day, and then at that point we continued the logoff test.

On December the 15th tubing pressure was 615 pounds, producing 330 Mcf of gas a day. We pinched the well in to 7/64ths, visited the well that afternoon at 2:30 in the afternoon, and tubing pressure had dropped to 575 pounds and the chart showed that we were losing the well.

We left it on until the next morning at 9:00, where we say tubing pressure of 495 pounds and at that point we decided the well was going to die that day and we brought the well back on line so we wouldn't have to swab it in.

Now, what I would like to state as the minimum sustainable rate is 650 Mcf a day. My reasoning for that is the November the 20th, 1986, drop in tubing pressure from 800 down to 750 pounds indicates that the well started to load up with water. In a dry gas well any time you pinch in the choke you will see an increase in tubing pressure. In fact at that point, and starting at that point and continuing at that point, every time we pinched in the well we saw a decrease in tubing pressure, indicates that the well was loading up, that the water was not being swept away from the wellbore, and I believe that we need to lift 600 and -- we need to lift 300 barrels of water a day by producing 650 Mcf of gas per day.

If you look at the column of water production at that date on November the 20th, we started

producing less than 200 -- excuse me, less than 300 barrels of water per day and before that date we were lifting more than 300 barrels per day.

That's all I have on that exhibit.

Q Mr. Brown, what, give an opinion as to what the result will be if you lift less than 300 barrels of water per day.

A Yes. I believe that the well will eventually die and I believe that lifting any less than 300 barrels of water per day will result in further damage in the relative permeability to gas and will also result in a waste of the recoverable reserves from the reservoir.

And I'd like to show on Exhibit Eleven the fact that this reservoir is exhibiting what's called water cusping and these exhibits, these drawings are taken from Petroleum Reservoir Engineering by Graft and Hawkins, pages 36 and 235.

The first figure shows a typical gas well with the initial gas/water contact below the perforations.

The second figure shows what's called water coning, whereby producing gas at too high a rate will cause water from the gas/water contact to come up into the perforations, cone up into the wellbore.

In a well that's experiencing gas -- that's experiencing water coning, if the well is -- if the

gas production rate from the well is decreased, then that water will also decrease and that water coning will subside.

That's not what we're experiencing in this well. What we're experiencing is the third figure, which is called water cusping, whereby the gas/water contact has actually moved up into the reservoir higher than the perfs and by producing gas at a high rate you're able to cause a depression in the gas/water contact and thereby keep the reservoir rock from the neighborhood of the well from having an increased water saturation. If it gets an increased water saturation, the relative permeability to gas will decrease and eventually the well will die.

So I believe that the exhibits I've showed today prove that the well is under water cusping and that we need to produce gas at at least 650 Mcf a day to achieve water cusping as shown in the third figure on Exhibit Eleven.

Q Mr. Brown, let's suppose that you're only able to produce 150 or 200 barrels of water per day. Do you have an opinion as to how long it would take to kill the well under those circumstances?

A Well, it's very difficult to estimate when a well will die, but I do believe that producing any less than 650-million a day, Mcf a day, or 300 barrels of water a day, will cause a decrease in the amount of cusping

of the water and that eventually the water will come back into the wellbore and kill the well. Just as a rough guess, I would think that in a month or two that we would see the well completely die if we lift less than 650 Mcf a day and 300 barrels of water a day.

Q All right.

A That's a subjective answer.

Q All right. Mr. Brown, if this application is not granted and Yates produces the well only eight hours a day, or eight hours a month, what do you think -- what, in your opinion, will happen to the well?

A The well will be abandoned and I feel like no further reserves will be recovered from the well.

If we cannot produce at the rates that I've mentioned, I believe the well will die.

Okay, in the meanwhile it doesn't make sense for us to lose money evey time we swab the well in and produce for eight hours or 24 hours if we know that the well's going to die. So at that -- if the application is not granted and if we cannot get 650 Mcf a day, I will recommend abandoning the well.

Q All right. Mr. Brown, what -- what things have you done to try to alleviate the problem with -- with this well?

A Okay, we -- I've looked at the logs on

the well. There's about a 53-foot thick pay zone. We are perforated in the top of that zone. There is only one zone producing and I've concluded that there are no perfs that can be squeezed to shut off any water.

I've looked at reducing the size of the tubing to enable us to lift the water, and although we can achieve higher velocities with smaller tubing, that's not going to solve the problem as indicated in these exhibits.

What we need to do is continue to remove that water from the reservoir rock at a rate of about 300 barrels of water per day, and that can be achieved with 2-7/8ths tubing, which we have in the hole right now, so a smaller tubing won't help the problem.

And the same applies to plunger lift and sucker rod pumping.

So I believe we've explored every avenue of solving the problem.

Q Mr. Brown, in your opinion has Yates Petroleum Corporation acted responsibly and prudently in its attempt to eliminate the problems which have resulted from the curtailment of production?

A Yes, we have.

Q Did Yates Petroleum do all that it could feasibly do to alleviate the problem prior to filing the application in this case?

A Yes, we did.

Q Mr. Brown, in your opinion will underground waste occur if production from this well is curtailed below the minimum sustainable producing rate which you've recommended of 650 Mcf per day?

A Yes, we will incur substantial waste in that case.

Q And your testimony previously, I believe, was anywhere from 250-million to a billion cubic feet of gas?

A Yes, that is correct, in addition to the gas that's wasted in venting to the atmosphere when we try to bring the well on after curtailment.

Q And is it your opinion that if this application is not granted it will likely result in the premature abandonment of this well?

A Yes, that's correct.

Q In your opinion would the granting of the application prevent underground waste of natural gas?

A Yes, it would.

Q And would it be in the best interests of conservation of gas?

A Yes, it would.

Q Were Exhibits One through Eleven prepared by you, Mr. Brown, or under your direction and supervision,

and can you attest to their accuracy?

A Yes, they were, and they are accurate.

MR. VANDIVER: Mr. Examiner, the application in this case that was submitted to all of the offset operators and El Paso Natural Gas Company, the purchase, and the Artesia and Santa Fe offices of the Oil Conservation Division requested a determination that the minimum sustainable flow rate is 200 Mcf per day.

Whereas, as testified by Mr. Brown, Yates Petroleum, based on the result of the logoff test, is requesting 650 Mcf per day for the state reasons, in order to be able to lift 300 barrels of water per day and avoid further formation damage and killing the well.

All the offset operators were furnished with a copy of the application indicating 200 Mcf per day and the published notice in this case does not contain the minimum sustainable rate requested.

If you deem it necessary to continue this case, publish notice again, and have us again notify the offsetting operators and the purchaser of production of the minimum sustainable rate, which Yates has requested in this case, Yates would certainly have no problem with that procedure and would be happy to comply by giving notice to the offset operators and the purchaser, but we would request that if this procedure is granted, that based

upon the results of the logoff test and Mr. Brown's testimony today, that a temporary order granting emergency classification be granted giving Yates authority to produce 650 Mcf per day in order to avoid formation damage and killing the well while the matter is pending, and if you -- we'd be happy to notify the operators but we feel that Yates needs to be producing this well to avoid the further damage to it, and I would move the admission of Applicant's Exhibits Numbers One through Eleven, and I have no further questions of the witness.

MR. CATANACH: Okay, Exhibits One through Eleven will be admitted into evidence.

Mr. Vandiver, have you or has Yates heard from any of the offset operators?

MR. VANDIVER: No, sir.

MR. CATANACH: No one has stated any objections to the application?

A No, sir.

MR. CATANACH: Mr. Vandiver, why don't we proceed this way. Why don't you write a letter to the offset operators stating the change in your requested flow rate and advising them that they have an option to re-open the case if they so desire? We'll go that way, and in the meantime we'll probably write you an order and if anybody wants to re-open it, then we'll do that.

MR. VANDIVER: Yes, Mr. Examiner.

MR. TAYLOR: Before you get into that, just while we're talking about the offset operators, I couldn't find any notice to Allied Chemical. Does somebody --

MR. VANDIVER: They're not an operator. That is operated by Yates Petroleum Corporation.

MR. TAYLOR: Okay.

MR. VANDIVER: I think they're just a lessee of record of that particular tract, and I also think that their interest has -- I'm not sure about this -- but I think that their interest has been acquired by Union, who was notified, but in any event Yates is the operator of both the north half and the east half of that section.

MR. TAYLOR: Okay, thank you.

QUESTIONS BY MR. CLEMENTS:

Q I just kind of want to ask you one question, Jim. That --

MR. CATANACH: Could you please identify yourself?

Q Oh, I'm Les Clements with the OCD out of Artesia.

On that 200 Mcf a day, how did you arrive

at that figure, Jim?

A Okay, the Box Canyon Unit No. 2, which went before hearing here earlier this year had -- they did somewhat of a logoff test and it logged off at about 130 Mcf a day with similar water-to-gas ratios as we've been lifting on the Mescal.

Q Uh-huh.

A And I estimated, you know, that we would probably logoff at about the same rate, since we had the same water-to-gas ratio, and with a little cushion, I thought I had some cushion by asking for 200 Mcf a day. I didn't.

Q In other words, you really -- you really hadn't run any --

A No.

Q -- real production histories on this well per se to come up with that figure?

A No, we had never run a logoff test at that point. We --

Q Or daily production rates or water volumes, and so forth?

A Well, of course, we keep water and gas production rates day by day but we had never done a test to see at what rate would the well die. We had never done a logoff test. We couldn't do that until we had put in the

application because we, you know, were curtailed, we could not produce the well before we put in the application. El Paso was -- was nice enough to let us produce and do the logoff test after submitting the application.

So essentially I had to make a guess before I had any data.

Q Well, my question is, you know, that it's kind a surprise to get here and then, you know, you want to jump it up to 650 Mcf a day. I would think that maybe some of the offset operators may not go for that.

This is what's bugging me, that, you know, it's kind of like going on your honeymoon and finding out your brother-in-law's going with you. You expect one thing and you get here and something else comes up.

MR. VANDIVER: That could be, sir, but the only other two wells producing right now, anyway, from -- from the pool, are operated by Yates, and I don't know if anyone -- I suppose someone could object but as far as the producing wells, the operator consents.

A If they objected to that, then why haven't they drilled another well offsetting these wells?

Q Well, I think we go back to the same thing that I said, it's kind of like having a brother in law, a gas well is kind of like having a brother in law, right now you really don't need it. That's one of the

reasons they hadn't done anything.

But how much on this Little Box Canyon Unit 5, you said that this 7 Bcf woudl be shared with that.

A Yes.

Q Have you got any real feelings of just how much recovery that would be shared with it or how far is this Little Box Canyon 5 from your well?

A Okay, on Exhibit Three you'll see a location of --

Q I couldn't read that thing. It wasn't very good, mine wasn't.

A Okay. Let's see, what do you have there, Les? Are you looking in the application?

MR. TAYLOR: There's one back further, Les.

A Keep going, that's part of Exhibit One you're looking at.

MR. VANDIVER: It's right after all those letters.

MR. TAYLOR: There's one for people your age who can't see those figures.

Q Okay, I didn't see that. I like this one a whole lot better.

A Yeah, that's quite a bit better.

Q Yeah, sure is.

A Okay, they're directly offsetting each other.

Q Right. Okay.

A I've compared the logs to the two. They have comparable logs. There is 61 feet of pay in the Little Box Canyon Unit No. 5. There's 53 feet of pay in the Mescal. The top of the pay in the Little Box Canyon Unit No. 5 is at 3618 feet below mean sea level. The top of the pay in the Mescal is at 3,685 feet below mean sea level.

Deliverabilities appear to be comparable. If it were not for the water drive mechanism I would say that the two wells would produce about the same cumulative quantity of gas from this day forward. Of course, the Mescal has been producing since late 1982. The Little Box Canyon Unit No. 5 came on in March of 1986.

So cum reserves, of course, for that reason wouldn't be equal.

Q But for sure we don't know how much reserves would be lost. I mean it's just right at this present time we have --

A We know qualitatively that a large amount of reserves would be lost because of the fact that there would be reservoir rock that would be produced under water drive mechanisms if the Mescal were allowed to be plugged and that same reservoir rock would not be produced under

water drive mechanism, it would be -- since the well is -- well, that same gas would be produced by depletion, by a volumetric type gas reservoir mechanism.

So the fact that there is a big chunk of reservoir rock that would change from the volumetric reservoir to a water drive reservoir means that recovery from that reservoir rock would reduce from 90 percent to the neighborhood of 50 percent. I think the range that Craft and Hawkins gave in the -- my reference there was 25 to 75 percent recovery. So it could be substantially more reserve lost than I've calculated.

Q Is the Little Box Canyon making any water at the present time, or how much water?

A I have some production data in my briefcase.

Q But it is --

A I could look that up.

Q -- producing some?

A I believe it's producing very small quantities.

Q About the Mescal Federal --

A No, it's --

Q -- started, I mean back when it first started early on.

A When it first started, yes, that's right.

Q Okay. It's now working its way up toward it.

A I don't want to answer that, Les, without looking at my papers. I can get them out if you'd like.

Q Okay, no, that's all right.

MR. CLEMENTS: I don't have anything else.

MR. CATANACH: Mr. Kendrick, do you have any questions of the witness?

MR. KENDRICK: No questions. We'd like to make a statement.

MR. CATANACH: Okay.

CROSS EXAMINATION

BY MR. CATANACH:

Q Mr. Brown, the Yates Petroleum Box Canyon Federal No. 1 Well, that's plugged and abandoned, right?

A Is that in Section 14 of --

Q No, in Section 13.

A Oh, the "GJ" No. 1?

Q The "GJ" No. 1.

A I believe it is plugged, yes.

Q That is a Yates well?

A Yes, it is.

Q Do you know how long it produced?

A No, I don't. I know the cum gas that it did produce, which I stated earlier is on Exhibit Three, shown there.

I can certainly provide that information for you, if you'd like.

Q Yes, I would like that.

A Okay.

Q Was that well also completed in the same formation?

A Yes, it was.

Q Mr. Brown, why is it uneconomical to pump the well; to put a rod pump on it or a plunger lift?

A Okay. A pumping unit would cost about $50,000. A rod string would cost about $3.00 a foot times 8000-some odd feet, at least, say, $25,000. So we're looking at, say, $80,000 to put on -- plus electricity, say, $85,000 to put on a pumping unit and a rod string. And the only thing that you buy in that is not having to swab a well in, so once you've pumped the water off the well, the well starts flowing, then you don't need your pumping unit any more. All you have bought is one day's swabbing unit at $655 a day, so it would take many, many days of swabbing the well in to payout pumping that well, and on top of that, the problem is in the reservoir rock, removing water and keeping water, really, from getting down in the cusping area in Ex-

hibit Eleven, keeping water from getting into that area, is what will prevent the wellbore damage and a pumping unit will not cause that prevention.

Q Okay, Mr. Brown, what circumstances would cause cusping as opposed to coning in a wellbore?

A Okay, referring again to Exhibit Eleven, initially in this well we had a situation that looks exactly like the first figure in Exhibit Eleven, whereby the gas/water contact is below the perfs.

In producing the gas and depleting the pressure from the reservoir, the water has swept up through the reservoir to a point where we probably in the early stages of the life of the well did have water coning, which is the middle figure in Figure Eleven.

Now, your question was what makes me think we have cusping rather than coning, is that correct?

Q Right.

A Okay, now we have shut the well in and have seen a build-up in water in the well, whereas, if you had coning and you shut the well in, then you should see a decrease in water in the well. This area in the middle figure in Exhibit Eleven, that shows the water coming up to the perfs, in water coning that area will subside when you shut the well in, and when you cut back the well's gas production rate.

That's not what we saw at all. What we saw was when -- when we shut the well in water came into the wellbore. We saw deliverability damage, which says that the reservoir rock surrounding the well was getting higher in water saturation, not lower. So that to me is proof that we are experiencing cusping whereby we need to produce gas to -- mainly to prevent water from getting in there. Once the water gets in there it's very difficult to remove it. That's why I'm saying that it's -- it would be irreparable damage if we let more water -- you know, the fact that we've let water in there, we suffered irreparable damage and the longer we let this go on, the more damage we're going to get.

So essentially the answer is three figures in Exhibit Eleven are stages of a water drive reservoir.

Q In your logoff test, when you choked that -- or we you turn that choke back down to 7/64ths, you don't show any production for that.

A What date was that?

Q The 15th of December.

A Okay. On te 15th of December we arrived in the morning, at 9:00 o'clock in the morning, and pinched the well back from 8/64ths to 7/64ths and at that time we recorded the gas and water production that's shown there on

your table.

Then that afternoon at 2:30 p. m. we went by the well, looked at and recorded the tubing pressure and the pipeline pressure, and since it was not a full day's production we didn't write down how many barrels of water had been produced in those five and a half hours, nor did we write down what the static and differential on the chart was in order to calculate daily gas production rate; however, on the following day, 24 hours after the last recording of gas production and water production, we did again record gas and water production.

The superintendent of our gas department is the man that went down and witnessed the well on -- 2:30 in the afternoon the 15th and he told me that water production was just a dribble.

That's not too quantitative.

Q So, Mr. Brown, it's your opinion that you have to remove at least 300 barrels of water per day from the wellbore in order for it not to be damaged.

A Yes, and that water needs to be removed by the flow of gas in order to achieve cusping. In other words, a sucker rod pump wouldn't get the job done.

Q Do you feel that anything below 300 would cause damage?

A Yes, sir.

MR. CATANACH: I have no further questions for the witness.

Are there any other questions of the witness?

If not, he may be excused.

Mr. Kendrick, would you like to make your statement at this time?

MR. KENDRICK: Thank you, Mr. Examiner.

H. L. Kendrick with El Paso Natural Gas.

El Paso Natural Gas neither concurs with nor objects to this application for hardship classification of this well.

El Paso believes it should make the Division aware that the relief sought -- if the relief sought is granted and this well is permitted to produce a greater volume of gas than has been produced, that extra volume of gas would be -- would of necessity cause a reduction in the amount of gas taken from other wells in that area.

Also, if granted, El Paso would request that the stipulation be made that the operator of the well is the one that is responsible for the amount of gas produced per day and not the pipeline company, in the

sense that they would be the bookkeepers of how much gas was flowing into the pipeline in accordance with the order that is written in this case and not the pipeline being responsible to say that the well has overproduced or underproduced the amount of gas set as a daily allowable or quote for this well.

MR. CATANACH: Mr. Kendrick, can I ask you a question?

MR. KENDRICK: Yes, sir.

MR. CATANACH: Would approval of this well reduce the takes the Morrow Pool, in this specific Morrow Pool or in just the general area?

MR. KENDRICK: In the general area but it could not be from that one pool alone.

MR. CATANACH: Thank you.

Is there anything further in Case 9031?

MR. VANDIVER: No, sir.

MR. CATANACH: It will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of this portion of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 903, heard by me on 12/17, 56.

David R. Catanach, Examiner
Oil Conservation Division