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

9 May 1984

EXAMINER HEARING

IN THE MATTER OF:

| | |
|---|---|
| Application of Belco Development Corp. for HARDSHIP GAS WELL CLASSIFICATION, Eddy County, New Mexico. | CASE 8178 |

BEFORE: Richard L. Stamets, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

| | |
|---|---|
| For the Oil Conservation Division: | W. Perry Pearce<br>Attorney at Law<br>Legal Counsel to the Division<br>State Land Office Bldg.<br>Santa Fe, New Mexico 87501 |
| For the Applicant: | W. Thomas Kellahin<br>Attorney at Law<br>KELLAHIN & KELLAHIN<br>P. O. Box 2265<br>Santa Fe, New Mexico 87501 |

# I N D E X

CARL M. HOUSER



## E X H I B I T S

MR. STAMETS: We'll call next Case 8178.

MR. PEARCE: That case is on the application of Belco Development Corporation for a Hardship Well Classification, Eddy County, New Mexico.

MR. KELLAHIN: If the Examiner please, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of the applicant and I have one witness to be sworn.

MR. PEARCE: Are there other appearances in this matter?

(Witness sworn.)

CARL M. HOUSER,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Houser, for the record would you please state your name and occupation?

A I'm Carl M. Houser. I'm employed by Belco Petroleum Corporation. I currently work as a production superintendent for the Gulf Coast District, West Texas and New Mexico areas.

Q Mr. Houser, have you previously testified as a petroleum engineer before the New Mexico Oil Conservation Division?

A Yes, I have.

Q And pursuant to your employment by Belco Development Corporation have you prepared certain exhibits and made a study of the well that's the subject of this application?

A I have.

MR. KELLAHIN: We tender Mr. Houser as an expert petroleum engineer.

MR. STAMETS: He is considered qualified.

Q Mr. Houser, let me have you turn first of all to what you've marked as Exhibit Number One and have you identify for us the Morrow field that the subject well is located in.

A This map shows the South Carlsbad Morrow Field. The red dots represents the wells that are currently producing. The blue dots represent the wells that are temporarily abandoned.

This data was taken from the December, 1983 New Mexico Statistical Reports. At this time there were 72 wells producing from the field of which 34 were producing less than 100 Mcf per day.

Q Let me direct your attention, Mr. Houser, to Section 5 in Township 22 South, Range 27 East, and have

you locate for us the subject well that you're applying for a hardship gas well classification for.

A We're applying for a hardship gas well classification on the Union Mead No. 3, which is represented by the red arrow that points to the Union Mead No. 3.

Q What is the 320-acre spacing and proration unit assigned to that well?

A 320 acres.

Q Yes, sir, and how is it oriented in the section?

A It's north/south, or the east half of the section.

Q All right, looking in the southwest corner of Section 5, what is the well identified by the blue arrow?

A That is the Jarvis Mead No. 1.

Q Okay. What is the reason you're seeking hardship gas well classification for the No. 3 Well?

A Because of excessive water production and decreasing productivity in gas.

Q All right, sir. Let's turn if you will, Mr. Houser, to Exhibit Number Two. Would you identify for us Exhibit Number Two?

A Exhibit Number Two is Application for Classification of a well as a hardship gas well.

Q And who's the transporter for the gas produced out of the Union Mead No. 3 Well?

A Llano, Incorporated.

Q Do you have an opinion to express to the Examiner concerning the minimum rate on a daily basis below which the subject well cannot be restricted without causing damage and waste?

A On our original application we requested 850 Mcf but this well can be restricted to less without -- anywhere from, I'd say, 650 up to 700, and --

Q All right, in your opinion if that minimum rate requested is set at 700 Mcf a day would that be a rate sufficient to allow this well to be produced in a manner that's effective and efficient and that would not otherwise damage the formation or the well?

A I think 700 would give us a good production rate for the well.

Q All right, sir, let's turn to the Exhibit Number Two-A, Mr. Houser, and describe for us in some detail what has been the history of the Union Mead No. 3 Well?

A Okay. During February of '84 this well produced at an average rate of 713 Mcf per day with 3/10ths barrel of condensate and 118 barrels of salt water per day on compression.

Now, production tests taken on that well, as shown here in the -- on April the 3rd of '84, the well produced 720 Mcf per day and that is a field calculation for the well with gravity and flowing tubing -- and compressibility and flowing temperature not taken into consideration.

At this same time this well produced 125 barrels of salt water on a 3/4 inch choke with flowing tubing pressure of 200 psig and a line pressure of 600 psig.

Q Would you describe generally in a brief fashion what has been the history of the well insofar as its sensitivity to liquids and to your efforts and ability to produce the well?

A Well, generally, if we allowed the -- if the well starts logging up or anything, we must immediately get it unloaded or get it so that we can retain production. Normally it's gone ahead and log up on us, require a bunch of core swabbing.

Q At some point in the life of the well I believe the operator has attempted to solve the liquid problem in the well by changing out the tubing string.

A This is correct. In November -- I mean October 20, 1980 we changed the -- the 2-7/8ths inch tubing out and replaced it with 2-3/8ths inch tubing to obtain better flowing characteristics.

Q All right, sir, and what happened as a result of that change?

A After swabbing the well in the well has produced considerably better. Now it required 12 days to swab that well in at the time that we changed all this tubing out.

And then we had to alternately flow the thing and unload to keep it going.

Q Do you have an opinion as to whether or not you could change out the tubing size again in this well and minimize the liquid problems in this well?

A Smaller tubing would probably give us a greater velocity and less fallback but at the same time we are looking at friction which is going to begin to take hold and cause us to drop back or have more fallback.

Q In addition you would have to kill the well to make the change out in tubing, would you not?

A That is correct, the way we're mechanically arranged.

Q In your opinion would that cause an unnecessary risk of damaging the well?

A It would cause the possibility of probably not being able to swab the well back in.

Q All right,sir, have you attempted to install compression on the well in order to solve the liquid problem?

A Yes. On January 26th, '82 we installed compression and -- on the well, and during the later part of March of '82 we -- the well did load up on us and die at that point, and at this time it required ten days of swabbing to get this well back in.

And then it had to unload it, just alternately unload and flow to the sales system to keep the well going.

Q All right, sir, do you have an opinion as

to what is the source of the water in this Morrow well?

A Yes. It appears to be coming from the Lower Morrow section.

Q In your opinion would it be reasonable for the operator to attempt to cut off that water flow by recompleting the well in the Upper Morrow section or attempt to take action that would isolate the water flow from the Lower Morrow section?

A No, it would not, because we tried this on the offsetting well, the Jarvis Mead No. 1.

Q This is the well to the west of this --

A West, right.

Q All right, sir.

A No. 1 Well.

Q What did you attempt to do?

A We tried to shut off the -- ran a suite of production logs and determined that the water was coming from the Lower Morrow intervals. So we moved in and set a two tubing bridge plug, dumped cement on it, and then went in with coil tubing, dumped additional cement, and tried to swab the upper portion of the well in.

Well, that didn't work so we had to come out of the hole with the tubing and when we went back to the workover the end result was that it lost practically all production from the Upper Morrow section.

Q How is that well now completed? In what formation?

A Currently we are producing from what would be classified as the Morrow carbonate, which is up above the sand sections.

Q All right, sir. Mr. Houser, is there a market for the gas produced from this well and is there a purchaser if you're allowed to produce at a rate approximating 700 Mcf a day?

A Yes, there is, and this is shown by Exhibit Number Five.

Q All right, sir, who is the purchaser of the gas?

A Llano, Incorporated.

Q All right. Let's go through some of the rest of your exhibits here, Mr. Houser.

Let's turn to Exhibit Number Two-B, if you please, and have you identify that one for us.

A Exhibit Number Two-B is a schematic showing the -- where the casing and all, tubing and everything was set, or what kind of packer we have in the hole, where it's set. Also it shows the perforated interval that we have in the well.

Q All right, and these Morrow intervals do correlate to the Morrow intervals in the Jarvis Mead Well?

A The Lower Morrow intervals you can correlate across.

The Upper Morrow intervals you cannot correlate, but what we call the Upper intervals there, which

you will note show the Mead zone, what we classify as the Mead zone, I believe 7 wells in the area that have that section in it, you can correlate those intervals.

Q All right, sir, and if you'll turn to Exhibit Number Two-C and identify that for us.

A This is the proration unit showing the 320 acres assigned to the Union Mead No. 3.

Q All right, sir, and you also show the Belco Jarvis Mead No. 1 Well down in the southeast quarter in the southwest quarter?

A Correct.

Q All right. All right, sir, let's look at Exhibit Number Two-D. What is this exhibit, Mr. Houser?

A This is a decline curve from inception of the well to -- up through the March, showing our production.

The red line represents the gas production from the well. The blue line represents the water production from the well. The black shows the condensate production. The green represents the flowing tubing pressure from the well.

Q Let me direct your attention to the year 1976 and have you explain what has occurred in the well at that point to cause the break in the production.

A In 1976 it -- our gas contract -- emergency gas contract expired and the well was closed in till we could obtain a market.

Q All right, sir, and later in '76 then you

restored your market and started producing the well again?

A That is correct.

Q If you'll go down to 1980 in July and August, September, October, of 1980, what has occurred at that point in the life of the well?

A At that time we, as you can note on the water production was increasing and it got to the point that we could not keep the well fully unloaded. So after attempting to try to keep the well on-stream, we finally exchanged out the tubing and went to the 2-3/9ths tubing to obtain better flowing characteristics and put the well back on production.

Q All right, sir, if you'll look at the entry in 1982 in April, April and May of 1982, what is the explanation for the sharp up and down action in the production curve?

A This is where we loaded up, after putting on the conversion, loaded up and had to swab the well in.

Q In your opinion, Mr. Houser, has the operator, Belco Development Corporation, taken all reasonable action as a prudent operator to attempt to keep this well producing at a rate that allows it not to be over produced according to the allowable formulas established by the Commission?

A Yes, we have, with the amount of water the well is producing.

Q Have you examined and are you familiar

with the Commission rules concerning the hardship gas well classification?

A Yes.

Q And have your exhibits conformed to the requirements in that order?

A Yes. I tried to make them conform with everything that was requested by their exhibit.

Q All right, sir, in your opinion is this well entiteld to hardship gas well classification?

A Yes, in my opinion this well is entitled to a hardship gas well classification, especially if allowables are going to be cut to such a point that they were in the mid-eighties, '83 there, because we cannot close the well in and we're going to have to produce above these allowables to keep the well flowing.

Q All right, sir, and that minimum rate which will be the minimum sustainable rate at which the well will flow, in your opinion is that range between, I believe you said 680 Mcf a day and 700 Mcf a day?

A Right, that's it, 6 or 700.

Q All right, sir. Let me direct your attention and not have you describe in detail but to identify for us what Exhibit Number Two-D is -- I'm sorry, Two-E.

A Two-E is the monthly pumper's report which shows the flowing tubing pressure; also gives us the size choke, the differential line pressure, the amount of daily gas production, water production, and also the tank

gas.

Q All right, sir, and you have provided one of those monthly tabulations commencing with March of '82 down to the latest one.

A Not -- they're not continuous but we picked out the sheets that would show the better data for the well and what was going on and where we were having difficulty.

Then at the latter part they are continuous.

Q All right, sir, and would you identify for us Exhibit Two-F? What is that?

A Two-F is the -- our daily progress report, which shows what we went in and did on the well when we changed out the tubing, how long it took us to re-establish flow. It shows where compression was set and how long after the well died after -- how long it took us to swab it in.

And then as you progress further through the report, it just shows how much our daily production, water per day, daily production is, what our oil, gas, and salt water production and our flowing pressures.

Q All right, sir, let me direct your attention to the charts, pressure charts, commencing with Exhibit Three, and have you go through those production -- I mean pressure charts with us and tell us what has occurred.

A Exhibit Number Three is a recorder chart.

We put on these recorder charts to show that the well would start loading up with a decrease in choke allowing the water to drop back.

This chart number three, the flowing tubing pressure was 200 pounds on a 3/4 inch choke.

Q All right, sir, and Exhibit Number Three-A.

A Exhibit Number Three-A we reduced the choke from a 3/4 to a 30/64th choke. As you note, there is really no decrease. You can see no decrease in the flowing tubing pressure. It still tracks very well on the 200 pound pressure line.

Okay, for the 24 hours that well flowed at the rate of 700 Mcf per day, zero barrels of condensate and 150 barrels of salt water.

Q Okay, Three-B.

A Three-B shows us we're still reducing the choke. We reduced to 23/64th choke at 6:00 a. m.

At 12:15 a. m. -- or p. m., pardon me, we had a flowing tubing pressure of 235 pounds with a gas volume of 680 Mcf per day.

Our line pressure had dropped upon us and we had 580 pounds of line pressure and from the time the choke was reduced to 12:15 we produced 33 barrels of salt water.

Okay, to 4:00 p.m. we had produced 81 barrels of salt water.

For the day we had produced only 129 barrels of salt water as compared to the previous day of 150.

Q All right, charts Three-C.

A Three-C, the chart was put on at 6:25 a. m.. We're still on a 23/64th choke. At 12:45 p. m. we had a flowing tubing pressure of 235 pounds with a gas volume of 610 Mcf per day, no condensate, and 39 barrels of salt water.

You can note that starting about 12:00 and coming on around, you're beginning to see some fluctuation in your recorder chart; not great but the more up and downs to it.

Then at 2:00 p. m. we gauged everything again and checked it out and at 2:00 p.m. we had a flowing tubing pressure of 210 pounds with a gas volume of 560 Mcf, and we had produced only 41 barrels of salt water, which was two barrels of salt water above what we had at the gauge at 12:45 p.m.

Q What does that tell you, Mr. Houser?

A It tells me that the well was beginning to load up; that we were beginning to drop water back on formation.

Q All right, sir. Would you identify for us Exhibits Four and Four-A?

A Yes, Exhibit Number Four is a gas chart which shows a line pressure entered. It really shows a static and a differential pressure on the well and the period

from before the 23 is shown there. You can observe we are beginning to see a decrease in differential and you're not really seeing a decrease in your static pressure.

Then on the 24th we are -- you can see that the differential is running approximately 10 inches.

MR. STAMETS: What is the difference between the 23rd and 24th on this chart? I see 4-23-84. Is that --

A Yes, that goes into the 24th.

MR. STAMETS: Okay, I --

A And then on the next page you have the 2-24th-84. They had a chart change on us so we had to steal both charts.

Okay, on the 4-24, which will show the full 24-hour period there, I'd say we had ten inches of differential with a little variation in static pressure.

Then on the 25th for some reason the line pressure dropped considerably but also our differential started dropping and there at 2:00 p.m. we opened to a 3/4 chart -- choke, rather, and at this particular point we can come back, I hand calculated that and came up with 456 Mcf where the field calculations showed the volume on the recorded chart at 5-something, 560, I believe.

So there's not too much variance in between the two taking in gravity, flowing, compressibility, flowing temperature, and everything, by hand calculating these volumes at that particular point.

At that point we opened back to a 3/4 inch choke and as you can see we had quite a variance in fluctuation and a continued or -- our line pressure on the following day continued to go down, which would also increase the differential on a well.

Q Mr. Houser, would you identify Exhibit Number Five for us?

A Exhibit Number Five is a letter from Llano, Incorporated, stating that they would take all of the gas from this well.

Q All right, sir, and Exhibit Number Six, a copy of the log of the well?

A Yes. This is a copy of the log and referring back to this log, the -- we show the top of the Lower Morrow section there.

Now this Lower Morrow section from our correlations is in connection which we can correlate it across to the Jarvis Mead No. 1, which is already previously watered out.

Now the Upper Morrow we cannot correlate with anything in the area and that's -- and then you come back up to what we refer to as the Mead zone. Now these zones you can correlate about seven wells in that particular area, and that is just -- they're just located in this, in the area.

Q In your opinion, Mr. Houser, unless this application is approved, will underground waste occur with

regards to the proration unit involved for the subject well?

A Yes, it will. If we cannot keep the well flowing we're going to.

Now I have the reserves and everything, estimated reserves that were presented in the application. It shows how much we expect to recover from the well.

Q All right, sir. Were the exhibits that you've discussed, Exhibit One through Exhibit Six, prepared by you or compiled under your direction and supervision?

A They were.

MR. KELLAHIN: Mr. Examiner, we move the introduction of Exhibits One through Six.

MR. STAMETS: These exhibits will be admitted.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Houser, what other options do you have to take care of this water? Install a beam pump, what else?

A We could install a beam pump but as much in the depth that we will probably be pumping from, I don't think the beam pump will keep us -- will take care of us.

Now, the only other thing that I can really see, that if the well was forced to be closed in and died on us, we would have to install gas lift valves and we'd have to take gas from Llano initially to get the well

to kick off, and we're just hoping it would not damage the Morrow formation enough that we'd lose the productivity during this time that we're going to be down getting all of this done.

QUESTIONS BY MR. CLEMENTS:

Q Haven't you ever talked about a plunger lift, Carl, or Mr. Houser?

A Yes. Not on this particular well. We have some plunger lifts working in the South Salt Lake Field and in the Revelation Field, but none of them are producing the amount of water this well is producing.

This is my concern on it. The well will load up while we're dropping our plunger back and we will not be able to keep the well fully unloaded with just a plunger lift alone.

Q Is this characteristic of this formation to -- over here on your Number Two-D, to have a sudden increase of water production? Is this characteristic of this whole area or --

A On the Jarvis Mead No. 1, when we completed that well it was water free. Within approximately ten to twenty days after putting the well on stream, the water was up to -- running from about 12 to 20 barrels and just shot on up immediately to about 70 barrels a day.

Now I have some figures here that will show how much that Jarvis Mead -- how much water it produced

during its life. We're showing 133,500 barrels of salt water being produced from the Jarvis Mead and it produced approximately 2.8 billion of gas with very little condensate, about 3600 barrels of condensate.

So it seems that the water just moves in on us and we go on up on our -- all of a sudden it moves in and we increase in --

Q And no one that you're aware of in that area has had any -- any type of success with squeezing or -- or blocking off this bottom zone where this water is coming from.

A No one has, to my knowledge, have. They have not -- really, this particular area seems to be the one that is really affected by the water production because as you can note on the Exhibit Number One, very few of the wells in the Morrow currently are producing very much water. The majority of them are showing -- reporting zero water production.

But yet in this particular area our No. 1, Union Mead No. 1, the water production we're noticing our increase in water production on it, which is to the south of this Union Mead No. 3, and we're right on the north edge of the South Carlsbad Morrow Field.

MR. STAMETS: Mr. Houser, has -- do you think that the lower zone has watered out completely in this well?

A No, I do not, because the logs that we

ran on the -- production logs that we ran on the Jarvis Mead No. 1 showed that we still had gas production in some of the lower stringers.

Now there is more stringers in the Jarvis Mead No. 1 than there are in this particular well, but some of the wells were still productive, or some of the stringers, pardon me, were still productive, with the water coming from a stringer near the top of what we classify as the Lower Morrow section.

MR. CLEMENTS: But you are using soap sticks and things of this sort to lighten the load or not with very much success?

A Not too much.

MR. CLEMENTS: All right.

MR. STAMETS: Mr. Houser, do you understand that if this well is authorized a hardship classification that you would not be allowed to produce it at a rate of, say, higher than 700 Mcf a day so long as it remained overproduced?

A That is my understanding on the -- but with the current allowables, this overproduction is going to be cut off of the well, because we're not going to be able to produce what the April allowable for the well was.

MR. STAMETS: What is the April allowable?

A About 1600 Mcf per day.

MR. STAMETS: So at the 700 you

will be making up overproduction.

A We will be making up overproduction.

MR. STAMETS: Okay.

MR. CLEMENTS: What's, primarily what is Llano's line pressure, do you know?

A It will vary from 620 up to 700.

MR. CLEMENTS: 700. Have they -- have they considered setting compressors or in a sense of lowering the line pressure?

A They have some compressors set on the line but not in our --

MR. CLEMENTS: Not in that vicinity.

A -- immediate area, and like I say, this line pressure will vary with -- from day to day as to the takes, what's going on.

MR. STAMETS: Are there any other questions of the witness?

A For April the monthly allowable was 49058. This is the first month we've had high allowables in the South Carlsbad Morrow Field. See, our problem started back in the period when it was 3050 up to about 4000.

MR. STAMETS: Any other questions of the witness?

MR. CLEMENTS: Have you -- have you -- has anyone under these new pumping units that have come in under -- since I've gotten out of the industry, like

the Marco, what is -- what is the maximum producing or pumping bit that they use for a small amount of water comes off --

A A small amount of water we can keep pumped off. We're using a 456 to keep water pumped off of a well in Texas.

MR. CLEMENTS: Uh-huh.

A But it does not make this much fluid. We're only producing about five barrels of condensate and 16 to 20 barrels of salt water.

MR. CLEMENTS: What kind of bits are you talking about there?

A We were producing from -- that well was around a 10/300 and at the time they have now reduced, that Phillips has now reduced their tubing -- I mean their line pressure, but the time we first started off on this we had to go to quite an elaborate stepping box procedure because we were bucking about 800 pounds of pressure at varying intervals throughout that.

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

MR. STAMETS: If there is nothing further, then the witness will be excused and the case 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 that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record 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. 8178, heard by me on 5-9, 19 84.

Richard L. Stamets, Examiner
Oil Conservation Division