NEW MEXICO OIL CONSERVATION DIVISION

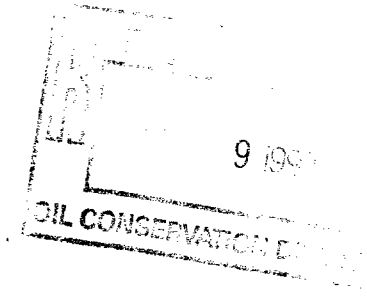
STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10804

IN THE MATTER OF:

The Application of Collins & Ware, Inc. for special pool rules, Eddy County, New Mexico,



BEFORE:

MICHAEL E. STOGNER

Hearing Examiner

State Land Office Building

August 26, 1993

COPY

REPORTED BY:

SUSAN B. SPERRY
Certified Court Reporter
for the State of New Mexico

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I N D E X

E X H I B I T S

EXAMINER STOGNER: If this hearing will come to order, I'll call the next case, No. 10804.

MR. STOVALL: Application of Collins & Ware, Inc. for special pool rules, Eddy County, New Mexico.

EXAMINER STOGNER: Call for appearances.

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe law firm Campbell, Carr, Berge & Sheridan. I represent Collins & Ware, Inc., and I have two witnesses.

EXAMINER STOGNER: Are there any other appearances?

Will the witnesses please stand to be sworn?

CURTIS A. ANDERSON

After having been first duly sworn under oath, was questioned and testified as follows:

EXAMINATION

BY MR. CARR:

Q. Will you state your name for the record, please?

A. My name is Curtis Anderson.

Q. Where do you reside?

A. In Midland, Texas.

Q. By whom are you employed?

A. By Collins & Ware, Inc.

Q. What is your current position with Collins & Ware?

A. I'm a geologist.

Q. Mr. Anderson, have you previously testified before this Division?

A. Yes, I have.

Q. And, at the time of that prior testimony, were your credentials as an expert witness in petroleum geology accepted and made a matter of record?

A. Yes.

Q. Are you familiar with the application filed in this case by Collins & Ware?

A. Yes, I am.

Q. Have you made a geologic study of the portion of Eddy County, New Mexico, that's involved in this case?

A. Yes.

MR. CARR: Are the witness's qualifications acceptable?

EXAMINER STOGNER: They are.

Q. (By Mr. Carr) Mr. Anderson, could you briefly state what Collins & Ware seeks with this application?

A. We seek temporary special field rules for the Happy Valley-Delaware Field, including oil allowable of 160 barrels a day, and a gas-oil ratio of 10,000 to one.

Q. Have you prepared certain geologic exhibits for

presentation at this hearing?

A. Yes, I have.

Q. Could you refer to, first, what has been marked as Collins & Ware Exhibit No. 1? Identify this and review it for Mr. Stogner.

A. Exhibit No. 1 is working interest ownership map, covering the Happy Valley-Delaware Field. Collins & Ware is the operator of the wells currently producing in the field.

Q. Mr. Anderson, to help us get oriented as to what we're talking about, could you identify for the Examiner the current pool boundaries of the Happy Valley-Delaware Pool?

A. Yes, sir. It is, the current boundaries include 40 acres, being the northeast quarter of the northwest quarter of Section 33, 22 south, 26 east, Eddy County.

Q. Now, there are how many wells currently completed in this pool?

A. Two.

Q. One is the well in the center of that 40?

A. It's at a legal location within that 40.

Q. And, then, there is a well due south of that?

A. That's correct, the chief drill No. 3.

Q. But the pool has not yet been extended to pick that up?

A. That's correct.

Q. Are there any other operators in this pool, other than Collins & Ware?

A. No.

Q. Are there any other Delaware wells within a mile of the pool boundary?

A. No, there are not.

Q. What is the closest present or past Delaware production in the area?

A. There are two, located in the southeast of the northeast in Section 29, is an old Delaware gas well. This well was plugged out in 1976.

Q. Who was the operator of that well?

A. C & K Petroleum.

Q. And --

A. The other well is located in the southwest of the northeast of Section 34, operator being Texaco. And this well is currently temporarily abandoned, and will maintain that status until December of this year.

Q. And those wells are slightly more than a mile from the pool boundary?

A. That's correct.

Q. Is the C & K well currently operated by Yates, or is that property currently operated by Yates?

A. Yes, it is.

Q. And notice of this hearing was provided to those interest owners, simply as a courtesy, since they are close to a mile from the pool boundary?

A. Yes, sir.

Q. What is the status of the current Collins & Ware drilling program in this area?

A. We currently have completed our second deep test waiting on pipeline connection for the Morrow formation in it. Currently drilling a third Delaware test, and building a location for a fourth.

Q. On Exhibit No. 1, there are a number of circles surrounding the pool. Are those proposed Collins & Ware locations?

A. Yes, they are.

Q. And those wells are going to be drilled during what general time frame?

A. We anticipate being able to finish all of those locations in 1993.

Q. Let's move on, now, to what's been marked Collins & Ware Exhibit No. 2. Can you identify and review that, please?

A. Exhibit No. 2 is a cross-section that I constructed, covering the Delaware formation within the Happy Valley-Delaware Field.

Q. Mr. Anderson, is there a trace for this cross-

section in your exhibit?

A. Yes, sir. This trace is located both on Exhibits No. 3 and No. 4.

Q. All right. If you'd like to, review the cross-section in conjunction with Exhibits No. 3 and 4, and in so doing, review the general geologic characteristics of this pool for the Examiner.

A. I will. First off, some general notes on each one of these exhibits. As I said, the cross-section expands the Delaware formation from the top, which is the top of the Bell Canyon formation down through the top of the Bone Spring formation.

All of the wells that comprise the cross-section are operated by Collins & Ware. Of particular note and purpose for this cross-section, is to note the red that is colored on the logs, which make up the cross-section, red is indicated pay within zones in the Delaware. This pay was defined by electric logs, mud logs, and rotary sidewall cores.

The emphasis here is going to be the multiplicity of pay zones within this field. Generally, the scale of this cross-section, vertical scale is one and a half inches for 100 feet. The total thickness of the Delaware formation in this area is roughly 3400 feet.

Exhibit No. 3 is a structure map drawn on top of

Basal Brushy Canyon sands. Now, this is important because the top of the Basal Brushy Canyon sands is the top of our Happy Valley sand, which is productive in this field.

I have indicated on that map the zones that those particular wells are producing from, and the pay that is indicated behind pipe in the various wells. The scale is 1 to 2,000.

And the cross-section trace can seen A-A^{1}, A being on the south, or left to the cross-section, A prime being on the north, or the right of the cross section. Of particular note on that exhibit is that what we're dealing with in the field here is a positive structural nose that's developed in the field.

As we go to Exhibit No. 4, which is on the top of the Cherry Canyon formation, which is up the section from the Basal Brushy, we can see that the structure contours form a closure. These are characteristics typical of Delaware oil fields in southeast New Mexico, in that when you get a structural closure, that can create the opportunity for many different sands to trap and collect hydrocarbons.

Now, going back to Exhibit No. 2, the cross-section, I will just briefly walk through, chronologically, how this field developed.

The well on the extreme right was drilled by

Exxon. It was completed back in 1986, completed in the Morrow formation and is currently producing from the Morrow formation.

Collins & Ware has purchased this wellbore from Exxon, and now operates it. The well information that we have, and, in this case, mud logs and electric logs, indicate numerous pay zones in the Delaware.

We had this information when we drilled the Sheep Draw No. 1 Well, which is the second well from the right on the cross-section, or located in the northwest of the northeast quarter of Section 33. This is a Morrow test that we have completed currently in the Strawn formation, is a gas well.

We targeted it at least one Delaware sand for a drill stem test in that well, you can see that drill stem test is roughly at 2500 feet. Although the packer failed after the initial shut-in on that test, we did recover enough quantity of fluid to establish that there's oil in that reservoir.

We drilled it down and completed the well in the Strawn, also noting mud log shows from what we call the Happy Valley sand down towards the base of the cross-section, IDE sand, which we DST'd up roughly at 2500 feet. The Sheep Draw sand, which is roughly at 2400 feet, and the BC or Bell Canyon sand, which is at the top of the

Delaware mountain group interval.

With these shows, gave us enough incentive to drill an offset just to the Delaware formation. That would be the No. 2 Sheep Draw, which is the center well in your cross-section. We took it to a depth sufficient to drill into the Bone Spring formation and test all of the Delaware sand interval.

This was the first well that we utilized sidewall cores, or rotary sidewall cores, which is a common practice nowadays with Delaware operator to identify pay.

This well was drilled down. We ran pipe and we did start completing the well from the bottom up, which we started in the Basal Brushy Canyon zone. And you can see the perforations marked in both what I call the Birdcreek sand and the Brantley sand. These sands are equivalent to sands that produce in other fields, such as Sand Dunes, Cabin Lake, Loving East, et cetera.

Our intent here was to open three or four different zones down here, acidize these zones separately, and fracture treat them later. We did perforate the Birdcreek, swabbed an oil show, Brantley, swabbed an oil show, and then came up to the Happy Valley sand.

We isolated those two lower sands because we did get a stronger show out of the Happy Valley sand when we

did drill it. So we perforated and put a rather small acid treatment on it, and it came on natural. Rather than risk adding the zones below it, we just produced it at that point.

Currently, that is the only zone producing in the Happy -- or, in the Sheep Draw No. 2 Well.

We then moved to the south and drilled a No. 3, No. 3 Sheep Draw in the southeast of the northwest, Section 33, that being the second well from the left on your cross-section.

We completed initially in the Happy Valley sand, established it as a producing and commercial reservoir, temporarily isolated it. We wanted to see what kind of pay we had up in what we call the IDE sand, which is, the top of which is the datum for this cross-section. We did perforate and treat that sand up there, and did establish commercial production on it.

Now, engineering testimony will be given later in this case that will show what kind of production this is. You can see that also we had other red zones within this wellbore that indicate further pay.

We then moved to the south, drilled the Ram Ewe Federal No. 1 in the northwest of the southeast quarter as a Morrow test. It is currently completed in the Morrow formation waiting on pipeline connection, which should be

this week sometime. We again had indicated pay.

Now, this gives us a north/south cross-section through the area, which fairly well defines the extent of our Delaware field. Of course, additional drilling here is going to, is necessary to define the eventual limits.

We are currently -- and we can review, or move to Exhibit No. 4. We are currently completing the Sheep Draw No. 4, and our current operations there are perforations, and we are actually pumping, pump testing that well in what we call the Brantley sand.

We are currently drilling the Sheep Draw No. 5, which is located in southwest of the northwest of Section 33, and are approximately at 1200 feet. We are building location at the Sheep Draw No. 8, located in the southwest of the northeast, and we will move the rig that's on 5 over to that location when the 5 is finished.

The other locations that you see with the small circles are all staked and have been approved as locations that we can drill, and we intend to drill these just to keep this rig busy throughout, to the end of the year.

Q. Mr. Anderson, can you summarize the conclusions you've reached from your geologic study of the area?

A. Yes, sir. I think we have here a similar situation that we see in other Delaware fields when you do have a structural, positive structural feature, that we do

have reservoir quality sands, either draped up on the flanks of, or developed over the top of this feature.

And when you get a feature like this, generally, like Avalon and other fields, have multi-pay situations.

Q. Is Exhibit No. 5 an affidavit and copies of letters providing notice of today's hearing to both Texaco and Yates?

A. Yes, it is.

Q. And Collins & Ware will call an engineering witness to review that portion of this case?

A. Yes.

Q. Were Exhibits 1 through 4 prepared by you?

A. Yes, they were.

Q. And Exhibit 5 is the affidavit?

A. Yes.

MR. CARR: Mr. Stogner, at this time, we would move the admission of Collins & Ware Exhibits 1 through 5.

EXAMINER STOGNER: Exhibits 1 through 5 will be admitted into evidence.

MR. CARR: That concludes my direct examination of Mr. Anderson.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Anderson, referring to Exhibit No. 2, again,

the highlighted yellow, red areas, what is your minimums on that showing?

A. My minimums or parameters?

Q. Parameters, yes.

A. Okay. The yellow is to highlight that particular interval that we consider mappable. The yellow does not indicate total pay; it just indicates a depositional event that we can map.

Now, the red, the parameters that we used to define the red, include porosity -- well, in the upper zones, say, in the Cherry Canyon and Bell Canyon, porosity in excess of 16 percent. We have sidewall core analysis with fluorescents in excess of 40 percent, and oil shoals in excess of 5 percent. Mud logs shows are relative from well to well, and there are really no particular units that you can attach to a mud log shoal.

The lateral log is a difficult evaluation tool because of the nature of the Delaware sands being laminated, and these laminations within each sand body can either contain oil or water. And a lateral log is an average of several feet of readings throughout the Delaware, and will average water laminae with oil laminae.

So, there's no particular zone cut-off that we use for that. Basically, looking for shoals in the mud

log, core analysis, porosity over 16 percent.

Now, down in the Basal Brushy, we use a porosity better than 12 percent.

Q. On the No. 2 well, the Sheep Draw No. 2?

A. Yes, sir.

Q. You show the perforated intervals. Are those all completed and producing at this time?

A. No, sir. Those perforations in Birdcreek sand and Brantley sand are isolated, and I put a little X up there by it, just above, well, within the Westall sand, which is a cast iron bridge plug, which temporarily isolates those zones.

Q. And, for the No. 3 well, I show you have perforations up in the Happy Valley sand and up in the IDE. Is that --

A. I did not finish my testimony on that.

Q. Oh, I'm sorry.

A. Well, you reminded me here; I forgot. We did have that upper sand temporarily -- or, to get meaningful tests, we isolated this upper sand from the lower sand.

Several weeks ago, we pulled the retrievable, or the cast iron bridge plug, and have commingled those two zones at the current time. And that will come up in the engineering testimony.

Q. So, the Bell Canyon in this particular exhibit

may have the potentials, but no tests; is that correct?

A. That's correct.

Q. Nor were there any tests run on outside of the pool boundaries on these other Delaware tests that you mentioned previous, is that correct, in Sections 29 and, what you did say, 34 or 33?

A. 34. Now, the well in Section 29 is from a stray gas sand that was C&K drilled, and it's, of course, now plugged and abandoned. That's a stray gas sand that was at approximately 4500 feet, 4600 feet.

The well down in Section 34, which is temporarily abandoned, until the end of this year, is perforated in Birdcreek sand and is a marginal well.

Q. What did you use as your indicator, showing the boundary of the Bell Canyon and the Cherry Canyon?

A. Okay. I feel like Cherry Canyon of the map, Exhibit No. 4, boundary of -- of course, now, the Cherry Canyon involves two different sands that could be productive. One, we've demonstrated productive, which is the IDE sand; the other, which is the Indian Draw sand.

And these are, of course, have different depositional fairways. And, to eventually define the limits is going to, of course, require more drilling than we have.

But what information we have now is the well

that's located, which Collins & Ware also owns and we purchased from Exxon, over in the northeast of the southwest Section 32, shows a structural position flat to our producing wells.

So, at the present time, unless other drilling condemns this, we can assume that these Cherry Canyon zones are going to be productive that far to the west.

Now, as the Bell Canyon sand, there again, it's depositional, and there's two sands in there, the primary one, the BC sand, which, the one we get our primary and best shoals out of. Sheep Draw sand is also good, I think is going to be isolated to the higher parts of the structural configuration.

But located under the Capitain Reef, as we are here, we have lost approximately 50 percent of the Bell Canyon formation, in that it has already fingered into the reef in a basinward direction.

A structural map on top of the Bell Canyon is both hard to correlate in this area, and is going to be controlled more by the base of the reef than it will by the sand. So, it's a hard one to interpret.

In other words, it will probably follow along with where the Cherry Canyon high is, but the markers up in the Bell Canyon don't allow for a good correlation for a structure map.

Q. Looks like, to me, you use the top of that Indian Draw sand as your marker?

A. Yes. You'll notice right above the top of Indian Draw sand, there are two limestones that are developed. This is regionally known as a two-fingers marker, and this can be carried from the shelf edge or the hinge line, which is just to the northwest of here, all the way through the basin down through Texas.

It's an excellent marker and is used for top of the Cherry Canyon throughout that area.

EXAMINER STOGNER: I don't think I have any questions of Mr. Anderson at this time. Maybe later on, after hearing some of the engineering testimony.

Do you have any questions, Mr. Stovall?

MR. STOVALL: No.

EXAMINER STOGNER: You may be excused.

MR. CARR: At this time, we would call Rex Howell.

REX T. HOWELL

After having been first duly sworn under oath, was questioned and testified as follows:

EXAMINATION

BY MR. CARR:

Q. Would you state your name for the record, please?

A. Yes, sir. My name is Rex Howell.
Q. Where do you reside?
A. Houston, Texas, sir.
Q. By whom are you employed?
A. Collins & Ware.
Q. In what capacity?
A. I'm a consulting petroleum engineer, and I'm appearing for Collins & Ware as an engineering witness in this case.
Q. And, what is the name of your consulting firm?
A. Just Rex T. Howell.
Q. Have you previously testified before this Division?
A. Yes, sir, I have.
Q. At the time of that prior testimony, were your credentials as a petroleum engineer accepted and made a matter of record?
A. Yes, they were.
Q. Are you familiar with the application filed in this case on behalf of Collins & Ware, Inc.?
A. Yes, sir, I am.
Q. And, have you made a geologic -- or, an engineering study of the area that is involved in this case?
A. Yes, I have.

MR. CARR: Are the witness's qualifications acceptable?

EXAMINER STOGNER: They are.

Q. (By Mr. Carr) Initially, Mr. Howell, could you tell us, what are the current production limitations under New Mexico state rules for wells in this portion of the Delaware?

A. Yes, sir. They are operating under state-wide rules, which provides for 80 barrels a day top allowable, and a limiting gas oil ratio of 2,000 cubic feet per barrel.

Q. Have you prepared exhibits for presentation here today?

A. Yes, sir, I have.

Q. Could you refer to what has been marked for identification as Collins & Ware Exhibit No. 6, identify this, and then review it for Mr. Stogner?

A. All right, sir. Exhibit No. 6 is just a plot of the daily production tests on Collins & Ware Sheep Draw Well No. 2. Shown in green on this well, plotted first, is the time, is the daily oil production rates from this well from just the Happy Valley sand, which is one zone in the Brushy Canyon. Shown in red is the gas-oil ratio and MCF per barrel on this.

What I've done is plot the daily production

data, oil and gas-oil ratios since the well was completed in late 1992, and showed the days on production. Reviewing the green curve, the well initially potentialed and flowed at a rate of about 100 barrels of oil per day, following with just an acid stimulation.

The well continued to produce this, and was allowed to decline until about Day 122 on this curve, at which time the pumping unit was installed on this. You can see the oil production had declined from about 120 barrels a day, down to about 70 to 80 barrels of oil per day.

The gas-oil ratio had increased from about 2,000 cubic feet per barrel, and it was erratic, but gone up as high as 10,000 cubic feet per barrel.

The pumping unit was installed on Day 122, production jumped back up to about 70 to 80 barrels of oil a day, gas-oil ratio was in the vicinity of 2,000 to 4,000 to 1.

The well then continued to decline until about Day 242, at which time it was fracture stimulated with 10,000 gallons, and the oil production increased to about 120 barrels a day, and has continued to be pumped at 120 barrels a day, declining down to about 70 to 80 barrels a day.

And the production is erratic and jumps around,

but you can see that the well has been quite productive out of just this one zone of the Brushy Canyon.

Q. Let's move now to Collins & Ware Exhibit No. 7. Can you identify and review that?

A. Yes, sir. Exhibit No. 7 is the same type of data, showing the daily oil production and gas-oil ratio from Collins & Ware Sheep Draw Well No. 3. This is just from the one zone in the Cherry Canyon, the IDE zone, which occurs at the depth of about 2500 feet.

And you can see that this well has produced for about 50, 45 to 50 days at a rate between 50 and 80 barrels of oil per day, pumping with a gas-oil ratio of about 250 cubic feet per barrel, from just the one sand in the Cherry Canyon.

Q. All right. Let's go to the next exhibit, Exhibit No. 8.

A. What I did on Exhibit No. 8 was assume that both of these zones had been put together. For example, I took the production from the Happy Valley zone of Well No. 2, since the well was fracture stimulated, producing about 110 barrels of oil per day, and just mathematically added to it the production from the IDE zone to see what the combined capacity of the two zones together.

And, as you can see, the capacity or the production, producing ability of this well, would be from

100 to 170 barrels of oil per day, if those zones were put together and behave as they did when they were tested individually.

Q. Are you also producing substantial volumes of water from the well?

A. Yes, sir. These wells all produce about 50 percent water cut, particularly after they are fracture stimulated.

Q. Now, if we look at your Exhibits 6 through 8, you really are looking at producing capability of only two zones in the Delaware?

A. That's correct. The Exhibit No. 6 is just one zone in the Brushy Canyon. Exhibit No. 7 is just one zone in the Cherry Canyon. And, as Mr. Anderson has shown there's multiple zones out here, but these were just two of the production tests from two of the zones.

Q. How many zones do you anticipate might be producible in any one wellbore?

A. Just looking at Mr. Anderson's cross-section, and you can see that there's potential of oil, four to eight zones being capable of producing in each one of the wellbores, indicated by log analysis, core analysis, and other production testing.

Q. Have you totaled the number of producing zones shown on Exhibit No. 2?

A. Yes, sir. If you just look at this map and look in colored red with inside the yellow there on these five wells is a total of about 35 zones that are indicated to be capable of production, either by electric logs, by mud logs, by rotary cores, and so forth.

I might point out only five of these wells, five of these zones have been truly tested, though. So, while there's a lot of indication that there is a lot of pay to be produced there, we only have production tests out of five of the 35 zones.

Q. Why are you only testing five zones out of 35?

A. As we have shown here, we're limited by the top allowable of 80 barrels a day here, and the zones that we've tested so far, particularly in the Well No. 2, in the Happy Valley zone, has been capable of producing at top allowable, and the IDE zone in Well No. 3 has been essentially capable in producing the top allowable.

Q. Let's go now to Exhibit No. 9. Could you identify this Exhibit for Mr. Stogner?

A. Exhibit No. 9 is just a list of parameters that I've pulled out from what I would say is four of the predominant zones of this area: the BC zone, which is the upper zone in the Bell Canyon; the Sheep Draw, which is a zone that exists, shows to exist in all of the wells; the IDE zone, which is the zone in the Cherry Canyon; and,

finally, the Happy Valley zone, which is zoned in the Brushy Canyon.

And I've just looked at all the parameters on this thing, trying to come up with what I thought might be the capability of productivity of this well. A lot of these parameters are derived from log analysis, measured temperatures, and then some of them are just kind of judgment factors, because we don't have a test on them.

For example, the solution gas-oil ratio that I've shown from the BC and the Sheep Draw wells, I've just estimated at 203 cubic feet per barrel. There's really not a basis for that, other than it's the same solution gas-oil ratio that the IDE zone is, where the Happy Valley has a solution gas-oil ratio of 1456.

The productivity index, barrels per day per PSI, which I really used to calculate the initial productivity of these wells, again, is just an estimate based on the core parameters, the log analysis, and just a judgment factor. Whereas the productivity index of 0.058 barrels a day per PSI in the Happy Valley is actually a measured test. It's just taking the daily production and divide it by the pressure draw down.

We ran fluid level shots to indicate the wells were pumped down, so we could calculate a Delta P and calculate a productivity index, and did the same thing for

the IDE zone in the No. 3 well. But the productivity index for the other two zones are just pure estimates, based on log parameters.

But I've used all these to come up with what I think might be the initial productivity from these zones, and if all these zones were productive in any one wellbore, and produced at these rates, you can see that we would have a capacity to produce in the vicinity of about 200 barrels of oil per day.

Q. Mr. Howell, do you have an opinion as to what is the reservoir-drive mechanism in this Delaware pool?

A. Yes, sir. Based on what we've seen, which again is limited performance, I believe it's a solution gas-drive reservoir. We're seeing declining oil productivity; we're seeing increasing gas-oil ratios; we're not seeing any increase in water production; and, looking at the logs, I do not expect a water drive.

And I believe, therefore, I believe it's a solution gas-drive reservoir.

Q. If this application was granted on a temporary basis, approving a higher oil allowable and a higher gas-oil ratio, do you see any potential for reservoir harm?

A. No, sir, I do not.

Q. In your opinion, is the production in any way

related to the rate at which the hydrocarbons are produced?

A. No, sir. If this is truly a solution gas-drive reservoir, which I believe it is, it's not dependent, ultimate recovery is not dependent on the rate that the wells are produced.

Q. If multiple zones are open in a wellbore, do you see any potential for cross-flow, or backwater flooding of any of the zones?

A. No, sir. If we can continue to keep these wells pumped down, which would require more allowable, then I don't -- and can keep the wells in a pumped-off condition, I don't see any reservoir damage occurring from commingling the zones in the wellbore.

Q. Mr. Howell, it would be possible to simply produce these zones one at a time, would it not?

A. Yes, sir, that's correct.

Q. And what would that do to the producing life of the well?

A. It would just extend the life of the well.

Q. And, what would that do to the economic value of the property?

A. It would decrease the economic value of the properties.

Q. In view of that, can you explain to Mr. Stogner

why Collins & Ware requests both a higher gas-oil ratio and a higher oil allowable?

A. Yes, sir. The higher oil allowable is really to decrease the life of the field out here. We believe that, as Mr. Anderson has shown, many of these well zones are productive, but the top allowable of 80 barrels a day, we would have to deplete them over a longer period of time.

The gas-oil ratio increase, the current one is 2,000 to 1 gas-oil ratio, and from the early indications from, particularly the Brushy Canyon zone, it's going to have a gas-oil, producing gas-oil ratio considerably higher than this, just being solution gas-drive reservoir.

And, therefore, we think we need both a higher oil allowable and a higher gas-oil ratio limit to allow these wells to be depleted in a fairly short life.

Q. How many additional wells does Collins & Ware anticipate drilling this year in this pool?

A. Several wells, as you can see. I think there's about one well being drilled now, a location being built on another well, and six or seven more locations permeated.

And, depending on good economic results, all those wells will be drilled this year.

Q. Will you drill those wells and complete them in

all of the zones shown on Mr. Anderson's Exhibit 2?

A. It would depend on the results of this hearing, yes, sir.

Q. And, why is that?

A. Well, if we don't give the top allowable increased on all these, then, of course, the wells would not be, we would not perforate all of the zones, we would just perforate zones sufficient to get top allowable and be able to produce the top allowable until they decline.

Q. Now, in drilling these wells in the future, the remainder of this year, will Collins & Ware take all of them down to the lowermost zone indicated on the cross-section?

A. There's some question on that. Particularly the lower zones there, the deeper zones, you can see the majority of our zones are above 2600 feet, with the exception of the Brushy Canyon. And we've got some zones down around 4600 to 5,000 feet, which would require another 2,000 feet of drilling to be done in these wells.

Indications are that the western portion of the Brushy Canyon may not be productive down there. And, if didn't get top allowable, I'm not sure we would take all those wells down to that depth at this time.

Q. Would you anticipate that it would be economically prudent to drill to those lower zones at a

later date, after the upper zones have been produced?

A. No, sir, I would think not.

Q. If those zones are not drilled and developed at this time, is it fair to say that the reserves in those zones could be permanently lost?

A. I believe they would, sir. Yes, sir.

Q. And, without a higher allowable, there's no reason to go that far, because you may not be able to produce it once you get there?

A. That's correct.

Q. Collins & Ware is planning to drill as many as seven additional wells this year?

A. That's correct.

Q. How long would you anticipate it would be until you would have better information, so you could come back to the Division and make a recommendation as to permanent rules, or a change in temporary rules?

A. I believe if we collect data for a year, we'll know enough at the end of a year here to make a proper recommendation on the field reserves of this field.

Q. And, again, you've indicated you see no potential for reservoir harm during that period of time?

A. No, sir. I see none.

Q. Were Exhibits 6 through 9 prepared by you?

A. Yes, sir, they were.

MR. CARR: Mr. Stogner, at this time, we move the admission of Collins & Ware Exhibits 6 through 9.

EXAMINER STOGNER: Exhibits 6 through 9 will be admitted into evidence.

Q. (By Mr. Carr) Mr. Howell, in your opinion, would approval of this application on a temporary basis be in the best interest of conservation, the prevention of waste, and the protection of correlative rights?

A. Yes, sir, it would.

Q. Will approval of these temporary rules, in your opinion, result in the recovery of oil that otherwise might not be recovered?

A. Yes, sir, it will.

MR. CARR: That concludes my direct examination of Mr. Howell.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Howell, is it your opinion that each one of these zones, potentially productive zones, is its own separate common source of supply?

A. Yes, sir. I believe there's vertical separation between these zones, yes, sir.

Q. And, is the drive mechanism, in your testimony today, that all of them are solution gas drive?

A. Well, it's based on my belief on the production of course, of just two of the zones which we truly have a history on, to make such a judgment.

But, based on my experience of how the Cherry Canyon and Bell Canyon produces in this area of the field, it's my opinion that they'd all be solution gas drive, yes, sir.

Q. In comparing your Exhibits No. 6 and 7, there definitely appears to be a variance, at least that's what pops out first in looking at them, and definitely two common source of supply and two reservoir characteristics, although it's in the same pool; is that correct?

A. Yes, sir, that's correct.

Q. Would it be prudent to, perhaps, split this pool up into two pools, one Brushy Canyon, one Cherry Canyon?

A. No, sir, I don't believe it will, because we don't know where these zones are going to develop. And I think if we split up, which would require either the drilling of individual wells, or dualling the wells, and, based on the erratic nature of these pays here, I'm not sure that this can be justified whether we separate drill or dually complete these wells.

Q. Did I hear you right, you're requesting a temporary period of one year?

A. Yes, sir, one year.

Q. And, would you be prepared, then, to come back at that time?

A. I think we'd come back and either recommend that the rules be extended, or that they go back to the state-wide rules, or some modification of what we thought our data showed was appropriate for the proper depletion of this field.

Q. What kind of data would you anticipate to occur that would make you, as a reservoir engineer, or us, as a regulatory agency, to go back to state-wide rules and regs?

A. I think productivity or some anomalous production showing, maybe, harm to the reservoir, if that was to occur, I think we would, as operator, would recommend to go back. But, it would allow us to collect the data to arrive at this conclusion.

Q. Are Exhibits 6 and 7 the only production data that you have at this time?

A. On Well No. 3, as Mr. Anderson pointed out, we have pulled the bridge plug about ten days ago, and we are getting production data from those commingled zones, which would be the IDE zone and the Happy Valley zone in Well No. 3.

This production has been going -- we pulled the bridge plug, we drilled it out, lost a lot of fluid in the

hole. We've been pumping, and the productivity of that zone has varied from as high as 211 barrels of oil a day, down to 40 barrels a day.

But, since it is a commingled zone, I did not show that because it's still being tested, and we have not been able to pump the well off at this time.

No. 4 is being tested now.

Q. Do you see any pressure differences between that Cherry Canyon and Brushy Canyon?

A. Oh, I think all these are going to be just normal pressure gradients out here, and yes, sir, I've estimated, you know, different bottom hole pressures. I think it would be a normal .45 gradient out there. And I would suspect, as we've shown on Exhibit 9, that the bottom hole pressures can vary, based on the hydrostatic head.

And, none of those pressures have been measured on the second line there; they've just been calculated based on a .45 gradient.

Q. What would be the casing head gas allowable, according to your formula?

A. If the top -- if the gas-oil ratio limits increased to 10,000, and the oil allowables to 160, I guess it would be 1.6 million per day.

Q. Is either one of these wells capable of making

that much?

A. No, sir; it has not demonstrated that to date.

Q. What is the maximum casing head gas that's been demonstrated to date?

A. Probably about 400 MMCF, on just the one zone in the No. 2 well from the Happy Valley.

Q. What was that, again?

A. I believe it was about 400 MMCF.

Q. And, calculating back, what kind of a GOR would that be?

A. Going back to the daily tests, the daily tests would vary, but I find one as high as 491 cubic feet, 491 MMCF, which was, at that time, was GOR of 4200. That was following a fracture stimulation of the well.

Q. Why such a high GOR at this time? That seems a little excessive, I guess.

A. If we go back, and again, we have limited data here, based on the initial gas-oil ratio of the Happy Valley and the Well No. 2, was 1456. If we believe that is solution gas-oil ratio, and I don't have any reason to believe that it's not the initial solution gas-oil ratio, in using 42 gravity crude on this thing, you will calculate a reservoir volume factor of about 1.6, which is a fairly volatile crude.

And, going through and making some calculations

on this thing, you would say that the average producing gas-oil ratio over the life of this field, just based on those parameters, is going to be about 7,000 cubic feet. That's the average gas-oil, producing gas-oil ratio.

And, so, with it starting out at about 1500, predicted to average 7,000 feet, I expect, you know, in a fairly short time, based on depletion drive here, that the gas-oil ratio could be approaching 10,000 to 1.

Q. What is being done with the casing head gas out there at this time?

A. It's being sold.

Q. Through pipeline?

A. Yes, sir.

Q. What kind of pipeline pressure is it?

A. We have all these wells on compression. The Morrow wells and everything is going to this. The wells are being compressed and going into, I believe it's our own collection line that's being sold on the spot market.

Q. And, not much water production at this time, you say?

A. Yes, sir, it's making about 50 percent water, particularly after we frac a well. You know, they're fairly low production until we frac them, and, of course, it's pretty typical of the Delaware here that fracs grow out a zone and picking up some water on them.

But the water production is, it's about 50 percent water.

Q. And, what is being done with the water?

A. It's being disposed of.

Q. I would hope so.

A. Trucked off right now.

Q. In what manner?

A. We're trucking it right now, and, of course, I guess, first dry hole, that will happen, we'll make an on-site disposal with it. But it's being trucked at this present time.

EXAMINER STOGNER: Anything further, Mr. Stovall?

MR. STOVALL: No.

EXAMINER STOGNER: Mr. Carr, do you have anything further?

MR. CARR: Nothing further, Mr. Stogner.

EXAMINER STOGNER: Witness may be excused.

MR. CARR: We have nothing further of this case.

EXAMINER STOGNER: If nobody else has anything further in Case No. 10804, this case will be taken under advisement.

(And the proceedings concluded.)

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10804, heard by me on 26 August 1993.

Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

I, Susan B. Sperry, Certified Court Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL September 5, 1993.

Susan B. Sperry

SUSAN B. SPERRY, RPR, CM
CCR No. 156