STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:	)	CASE NO. 12,873
APPLICATION OF GRUY PETROLEUM MANAGEMENT COMPANY AND WADI PETROLEUM, INC., TO AMEND THE SPECIAL RULES AND REGULATIONS FOR THE WHITE CITY-PENNSYLVANIAN GAS POOL OR, IN THE ALTERNATIVE, FOR APPROVAL OF FOUR UNORTHODOX INFILL GAS WELL LOCATIONS, TWO UNORTHODOX GAS WELL LOCATIONS AND ONE INFILL GAS WELL LOCATION, EDDY COUNTY, NEW MEXICO	)	

ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

June 27th, 2002

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, June 27th, 2002, at the New Mexico Energy, Minerals and Natural Resources Department, 1220 South Saint Francis Drive, Room 102, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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I N D E X

June 27th, 2002
Examiner Hearing
CASE NO. 12,873

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A P P E A R A N C E S

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* * *

ALSO PRESENT:

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* * *

WHEREUPON, the following proceedings were had at 9:30 a.m.:

EXAMINER CATANACH: Okay, we'll call the hearing back to order, and at this time I'll call Case 12,873, the Application of Gruy Petroleum Management Company and Wadi Petroleum, Inc., to amend the special rules and regulations for the White City-Pennsylvanian Gas Pool or, in the alternative, for approval of four unorthodox infill gas well locations, two unorthodox gas well locations and one infill gas well location, Eddy County, New Mexico.

Call for appearances in this case.

MR. BRUCE: Mr. Examiner, Jim Bruce representing the Applicants. I'm also entering an appearance for Murchison Oil and Gas, Incorporated. I have four witnesses to be sworn.

EXAMINER CATANACH: Any additional appearances?

Okay, will the four witnesses please stand to be sworn in?

(Thereupon, the witnesses were sworn.)

ZENO FARRIS,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR BRUCE:

Q. Would you please state your name and city of

residence for the record?

A. Zeno Farris, Arlington, Texas.

Q. Who do you work for and in what capacity?

A. Gruy Petroleum Management Company, and I'm manager of operations and administration in charge of regulatory compliance.

Q. By trade are you an engineer?

A. No.

Q. Okay. Have you previously testified before the Division?

A. Yes.

Q. And were you qualified as an expert?

A. Yes.

Q. And what area?

A. Regulatory.

Q. Regulatory matters?

A. Regulatory compliance, yes.

Q. And are you familiar with the matters from a regulatory standpoint involved in this Application?

A. Yes.

MR. BRUCE: Mr. Examiner, I tender Mr. Farris as an expert in regulatory affairs.

EXAMINER CATANACH: Mr. Farris is so qualified.

Q. (By Mr. Bruce) Mr. Farris, could you identify Exhibit 1 for the Examiner, just very briefly?

A. Okay, what this is is a map of the White City-Penn area and also the South Carlsbad-Morrow area.

Q. The South Carlsbad is in orange?

A. Yes, the South Carlsbad in orange, and the White City-Penn is below with the hach marks.

Q. Okay. Now, the White City-Penn, what zones does that cover?

A. The White City-Penn basically covers from the base of the Wolfcamp all the way down to the base of the Morrow, so it's Strawn-Atoka-Morrow.

Q. Okay, and the South Carlsbad Pool pictured on this map only covers the Morrow; is that correct?

A. Yes.

Q. Okay. What are the well-location and spacing-requirement differences between the two pools?

A. Well, the South Carlsbad are statewide rules, 320-acre spacings with 660 setbacks and one well per 160. The White City-Penn are 640-acre spacings with no more than two wells per 640 and 1650 setbacks.

Q. Why is Gruy requesting the changes in the White City-Penn Pool?

A. Well, in particular, we've got a drilling program going on, and we've acquired some acreage recently from Mallon Operating Company. And so we moved to exploit that acreage, and we noticed that we had sections in the White

City-Penn that we wanted to drill. We have non-operated interests in there with Wadi.

And we entered into a drilling contract with Patterson, about a 20-well package, and in order to do that we needed to move quickly. So when we spotted all of our locations, we really didn't have that many problems with the South Carlsbad. But when we got into the White City-Penn area, we realized that we were going to have to get nonstandard locations and simultaneous dedications.

So we had determined that we would either have to go to hearing for all of our locations, pick them out, which didn't really give us that much flexibility if we wanted a new location, or we would move for a field rule change. So we decided to do the latter.

Q. And on this map there are a number of wells marked. Are those the wells that are involved in this Application or the unorthodox locations and/or infill drilling is requested?

A. Yes. I believe they're not all exactly marked on this map, because we also had a White Baby Com 4 --

Q. Okay.

A. -- that we have in here in our request for an unorthodox location.

Q. And what section is that?

A. That's Section 16.

Q. Okay. And our next witnesses will discuss this, but are these unorthodox locations and the infill drilling necessary to adequately produce the acreage in this pool?

A. Yes, that's what my geologist is telling me.

Q. Okay. Will granting of this Application simplify the drilling of wells not only for Gruy but for the other operators in this pool?

A. Yes, I believe so.

Q. Now, if you'd look at your next exhibit, which is actually Exhibit 20, is that simply a list of all the operators in the pool?

A. Yes.

Q. Have any of those operators informed you that they oppose this Application?

A. No, they have not.

Q. Wadi obviously approves it, does it not?

A. Yes.

Q. And Murchison is here today to testify in support of the Application, is it not?

A. That's correct.

MR. BRUCE: Okay. And Mr. Examiner, Exhibit 21 is simply my affidavit of notice to the other operators in the pool.

Q. (By Mr. Bruce) Now, at least with respect to the immediate offset acreage to the north, if this Application

is not granted or if unorthodox locations are not approved, could there be inequities due to well locations between the two pools?

A. Yes. One thing in particular, the 660 setbacks, or 660 off the lease line, in particular in Section 9 and 15, you know, there could be some inequities in the drainage pattern there. In particular, there's a well in Section 4, the Snow Oil and Gas Elbow Canyon, which is 660 off the lease line, and we feel, and Wadi feels, it's draining their acreage. And we would like to drill additional wells there so that we could recover our reserves.

Q. In your opinion, is the granting of this Application in the interests of conservation or the prevention of waste?

A. Yes.

Q. One final thing, Mr. Farris. Now, you mentioned the White Baby Com wells. Those are in Section 16, correct?

A. Yes.

Q. Now, you've already drilled one of the infill wells, have you not?

A. Yes, we have, we've TD'd the White Baby Com 3 and set pipe and run logs, and we drilled that well as a replacement well in order to get the nonstandard location

approved.

MR. BRUCE: Now, before I forget, Mr. Examiner, that unorthodox location was approved by Administrative Order NSL 4729.

Q. (By Mr. Bruce) Go ahead, Mr. Farris.

A. And we've just recently spud the Wadi Pennzoil 9 Fed Com 3, also as a replacement well. What we did since we had a 20-well package and a rig is, we entered into an agreement with Wadi that we would drill the wells; as soon as we complete them and put them to sales, we'll turn over operations to them and their wells.

Q. Now, these are drilled as replacement wells, so one of the wells on each unit would have to be shut in, correct?

A. Yes, yes.

Q. And more specifically, under Division Rules they should be TA'd; is that right?

A. Right, that is correct.

Q. At this point -- and the wells that have been shut in, for instance, the White Baby Com Number 1, I believe --

A. Uh-huh.

Q. -- are they marginal producers or what --

A. They're marginal, it's about 40 to 50 MCF a day, and the Wadi well is about 60 to 70 MCF a day.

Q. Okay. But as far as TA'ing them, would you like some relief so at least you wouldn't have to TA the wells?

A. Yes, we would like to get some relief or at least get the simultaneous dedications approved so we wouldn't have to TA the wells, because that would just be economically not feasible. It's a waste.

Q. Money spent unnecessarily?

A. Yes.

MR. BRUCE: Okay. Thank you, Mr. Farris.

Mr. Examiner, at this time I'd move the admission of Gruy Exhibits 20 and 21, and I will have another person verify Exhibit 1.

EXAMINER CATANACH: Exhibits 20 and 21 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Farris, the wells that you've got colored in red, those are the wells that you propose to drill?

A. Yes.

Q. And the one in purple is also an infill well that you propose to drill?

A. The one in purple is a Chevron well, and I believe -- I'm not sure if we have an economic interest in that well, I believe we do. I know in Section 21 we have proposed a well that Chevron operates.

Q. Okay, I'm trying to get it straight as to what you're asking for. Your alternative Application here is to be allowed to drill some infill wells and for -- well, just be allowed to drill some infill wells. I just want to get it straight which infill wells we're talking about here. The one in Section 9, right --

A. Yes, sir?

Q. -- the Pennzoil 9 Federal Com Number 4?

A. Right, and also the Pennzoil 9 Federal Com Number 3. I thought you were talking about the purple well down in Section 30.

Q. Oh, I'm sorry.

A. Yeah, that one I'm not too sure about, but it's a proposed infill, so my assumption based on what H.C. has done is, we have an economic interest in that well and we would propose it. The one in Section 9 is a joint proposal with Wadi, and that one is just recently spud.

Q. Which one is that?

A. That's the Pennzoil 9 Fed Com Number 3, and that's one that Wadi was extremely anxious to drill because of the South Carlsbad-Morrow Snow Oil and Gas Elbow Canyon well, which is 660 off that line.

Q. Okay, the Number 4 hasn't been spudded yet?

A. No.

Q. And are there existing wells in Section 9, other

than these proposed 3 and 4?

A. Yes, there are. There's the Pennzoil 9 Fed Com 1 and 2, I believe in unit letter J and K, you can see them down there.

Q. Okay. So at this point you're going to drill the Number 3 as a replacement to --

A. -- the Number 1.

Q. Okay, and the Number 4 will replace the Number 2?

A. Well, hopefully before we drill the Number 4 we'll have some either field rule change or approval for the unorthodox locations and simultaneous dedication.

Q. Okay. Section 16, the situation there is, you've got two wells proposed, White Baby Com 3 and 4?

A. That's correct.

Q. And there are some existing wells on that unit also?

A. There's a White Baby Com 1 and 2.

Q. Okay. And in Section 15?

A. Section 15, there's Pennzoil Federal Com 1 and 2.

Q. And the two proposed are the 2 and the 3 -- wait --

A. Yes.

Q. -- you're proposing to drill the 2 and the 3?

A. Yes, we're proposing to drill the 2 and the 3, excuse me, there's a Pennzoil Federal Com 1.

Q. Okay. And in Section 22 you're just proposing to drill a single Federal 22 Com Number 2?

A. Right, that would be the second well in the 640, and that's just an unorthodox location.

Q. Okay, so where is Gruy's acreage located?

A. In the White City-Penn the operating acreage is in Section 16. We also have an economic interest in Section 15 with Wadi, Section 9 with Wadi, Section 22, I believe, with Wadi. We also have an economic interest in Section 21 with the Chevron-operated block.

Q. I'm sorry, Section twenty- --

A. -- 21.

Q. -- 21.

A. And we've recently proposed a well with Chevron there, and we will drill that well. They chose to go nonconsent.

Q. And Chevron operates in Section 21?

A. Yes, and that's also the second well on the 640, and it will be an unorthodox location but not simultaneous dedication.

Q. You're not asking for that approval here for that well?

A. No.

Q. What you're asking in this case is approval for the six wells that we've just previously discussed -- or is

it seven wells? Two in Section 9?

A. Two in Section 9.

Q. Two in Section 16?

A. Two in Section 16.

Q. Two in 15?

A. Two in 15.

Q. And one in 22?

A. And one in 22. So it's seven.

Q. Okay. And in Section 16 you currently operate the wells?

A. Yes.

Q. And that will continue?

A. That will continue.

Q. Okay, and Section 9, 15 and 22, you'll drill the wells and Wadi will operate?

A. Wadi will operate after we take them to sales, yes.

Q. Okay. Do you know what formation is being produced in the White City-Penn?

A. Well, it's several formations.

Q. Okay.

A. It's...

EXAMINER CATANACH: As far as the notification for this case, Mr. Bruce, you notified all the operators in the White City-Penn?

MR. BRUCE: Yes, I did, and -- I notified all the operators inside the White City-Penn Pool, and I did not see any Morrow-operated wells. I mean, I did not notify the South Carlsbad-Morrow operators.

EXAMINER CATANACH: Correct me if I'm wrong, but doesn't the rule say that you have to notify leasehold owners within a mile of the pool boundaries? Or is that -- I can't recall.

MR. BRUCE: I'll check that, Mr. Examiner. I know I checked operated areas outside, but I'll double-check that.

EXAMINER CATANACH: Okay, I think that's all we have of this witness, Mr. Bruce.

H.C. LEE,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. Yes, my name is H.C. Lee, I'm a geologist employed by Gruy Petroleum Management Company.

Q. Have you previously testified before the Division?

A. Yes.

Q. And were your credentials as an expert geologist

accepted as a matter of record?

A. Yes.

Q. And are you familiar with the geology involved in the White City-Penn Pool?

A. Yes, I am.

MR. BRUCE: Mr. Examiner, I tender Mr. Lee as an expert petroleum geologist.

EXAMINER CATANACH: Mr. Lee is so qualified.

Q. (By Mr. Bruce) Mr. Lee, again referring to Exhibit 1, we've gone over it a little bit, but could you just identify that for the Examiner and, in particular, the green arrows and what they exhibit?

A. Sure. What I'm trying to do in these maps is show where is the boundaries for the South Carlsbad, where is the field covered by the White City-Penn, also post seven additional locations which we request in lease application, plus two green arrows to show the type log for all formations in the area, the other is the type log for the Morrow horizons.

I need to emphasize one thing, I think. The Examiner was asking Section 30, has the red dots and the blue dots. That actually is not location, that's just a legend showing the red dots in there is apply for the unorthodox infill location, the blue color is referred to as the infill location. Those are for legend purpose, not

any location proposed. We have no interest in the second, third --

EXAMINER CATANACH: Thank you for that clarification.

Q. (By Mr. Bruce) Mr. Lee, why don't you move on to your first type log, Exhibit 2, and which section is this in again?

A. This is the green arrow in the northwest quarter of Section 10. This well, what I'm trying to do is show the log in the area. And in this area, you know, White City-Penn areas, we have multiple producing formations which cover the shallow Delaware sand, then you go to Bone Spring, then you also have the Strawn, Atoka and Morrow, various formations.

Q. And what is Exhibit 3?

A. Exhibit 3, I'm taking the advantage, showing in the Morrow formation itself you also can divide into, so-called, the upper, the middle and lower Morrow sections. In each section you also can divide them into different Morrow channel sands. So total to my interpretation we can come up with 12 different individual reservoirs in the Morrow formation itself, which sometimes they are not a sheetlike or continuous reservoir for all areas.

Q. Okay. Now, these logs are from the South Carlsbad-Morrow, but by your interpretation is the same

reservoir continuous down into the White City-Penn?

A. Yes, sir, in the next few isopach maps I can exhibit that that's characteristic for those formations.

Q. At least in the northern portion of the White City-Penn, is the Morrow the main producing zone in this pool?

A. Yes, that's correct.

Q. And could you refer now to your Exhibit 4 and discuss a little bit the production from wells in this area?

A. Yes, sir. Exhibit 4, what I'm doing here is showing this information on the IHS production formation showing, if you see in the orange-color area, which is the South Carlsbad areas, sometimes you can find different formations have individual cums in there, because in the South Carlsbad area Morrow is one reservoir, then Atoka is a separate reservoir. So you can drill wells in twinning each other to getting reserve out.

But when you count the south portion which covers all the White City-Penn areas, you only find one producing reservoir called the Pennsylvanian reservoir, White City-Penn. You do not see the White City-Morrow, you do not see White-City Atoka or Strawn, because they combine as a common reservoir. This is the purpose I'm showing the map in here, showing -- leading this Exhibit 4 to Exhibit 5.

Q. Okay. Now, this map, the cross-hached area is the entire White City-Penn Pool?

A. That's correct, that's correct.

Q. Let's move on to your Exhibit 5 and discuss the zones producing from wells in this area.

A. Okay. As I mentioned prior, the South Carlsbad area, you can distinguish each one formation cum, because they are separated reservoirs. Then when you go to the White City-Penn, the hached area, the production is one number, it's Pennsylvanian reservoir. But theoretically, if you look at the logs you can distinguish them, actually, from the Strawn, Atoka and Morrow in different sections, produced from different formations. But theoretically they're considered as one reservoir.

Q. Okay. But in both the South Carlsbad-Morrow and the White City-Penn, there are Morrow, Strawn and Atoka producers, are there not?

A. Yes, sir. Yes, sir.

Q. Let's move on to your next exhibit, Number 6, and discuss with more particularity the Morrow production --

A. Yes, sir.

Q. -- from these two pools.

A. This map looks pretty complicated, but actually pretty simple. What I'm trying to do is -- Right now, the Exhibit 5, you see actually Strawn, Atoka and Morrow.

Then the Exhibit 6, what I'm trying to do is, in the Morrow horizon itself, they're also producing, each one well, sometimes from different channel sands inside the Morrow formation itself. So by doing so, sometimes, if you only limit two wells per 640 acres, therefore additional channel sands which you cannot penetrate to recover the gas from those particular channel sands.

Q. Now, up in the left-hand side, you personally break down the Morrow into 12 producing zones?

A. That is correct, sir. That is correct, sir.

Q. And you're going to have some isopachs on this, but even just looking at this, as you said, you can have a Morrow zone producing in one well and another location over it's not producing in that particular zone; is that correct?

A. That's correct.

Q. And so additional infill wells would be needed to access all of the Morrow reserves?

A. That's correct, and sometimes you need to also relieve the 1650 setback, become a 660, to compensate where the channel lobe is located.

Q. Otherwise it will just be unorthodox location after unorthodox location?

A. That's correct. That's correct, sir.

Q. Okay. Let's move to your Exhibit 7, your

structure map, and identify that for the Examiner.

A. This is what I'm doing, a middle Morrow structure map, and generally speaking just a regional dip to the east and the northeast, really not reflect any kind of channel sand depositional environment, just a regional dip showing updip to the southwest, downdip to the east and northeast.

Q. Is structure generally important in this pool?

A. I don't think so.

MR. BRUCE: Okay, now let's get into your isopachs. And Mr. Examiner, we have quite a few of them here, so it may be better to take a few minutes and unfold probably the next half-dozen exhibits. I think if you go from 8 through 14, that might facilitate Mr. Lee going through these in a briefer fashion.

Q. (By Mr. Bruce) Now, Mr. Lee, maybe we've got them all out there. If you would start with your Exhibits 8 and 9 together, perhaps, and identify them for the Examiner and go over what they entail.

A. Okay, the Exhibit 8, I'm showing the so-called, what I call the uppermost Morrow sand, which I classify as the C. For C I classify as upper Morrow, the letter B as the middle Morrow, then A as the lower Morrow, by this kind of sequence. The C-3 is the uppermost of Morrow sands, and the B-3 is the uppermost of middle Morrow sands over there.

If we take a look at this map very quick, let's

just concentrate on Section 16. You can see in Section 16 on the C-3 sand, which east half or east two-thirds of the sections, there's no C-series sand exists. It's zero pinchout lines in there. And this will be on the Exhibit 8.

When you go to Exhibit 9, the B-3, B as "boy", B-3, on the Section 16 you can clearly see the B-3 sand actually become much thicker percent in the east two-thirds of Section 16.

So you can see those different channel sands come through different places. Sometimes one well can catch one or maybe four or five different sands, but one well sometimes will not catch all the sands in these areas. So if Section 16, for example, only allows two existing locations, then we only catch the B-3 sand, and other horizons sometimes will not achieve the purpose.

Q. And Mr. Lee, if you looked over to the east in Section 15, although you might get the B-3 sand in those two Wadi-proposed wells, you would not get the C-3 sand, would you, if you --

A. Very doubtful --

Q. -- moved --

A. -- yes, very doubtful. That's very, very doubtful.

Q. Okay.

A. By the same token, if we also do the C-3 map, which is Exhibit 8, versus Exhibit 11 -- I'm sorry to give you a flip-flop. Similar circumstance will occur in Section 16, the northeast quarter section.

Q. Okay. So changing the footage locations in this pool or getting the unorthodox locations is not only necessary because you'd like to get the infill, but you just wouldn't get certain sands if you had to go to a standard location?

A. That's correct, that's correct, that's correct.

Q. Now, Exhibits 10 through 14, those are again all middle Morrow sands?

A. Yes, Exhibit 10 is a middle Morrow sand which I call the B2D. It's the second member of the middle Morrow sand. These sands are much more area, continue from the South Carlsbad all the way, come through to the White City-Penn areas.

Q. Is this really probably the most extensive middle Morrow sand in this area?

A. Yes, I think so, this is the most extensive one, and the second most extensive one I will classify as the member of the B3, which is just the horizon above B2D, Exhibit Number 9.

Q. Okay. Just very briefly if you could go through these next ones, through Exhibit 14, for the Examiner, and

then we can move on to the next set.

A. Okay. And I also need to re-emphasize on the Exhibit Number 10, on that one, for example, the -- areawise, sometimes you're looking at my number on each well. On the right-hand side, the uppermost number, the dark blue color, is the net-pay thickness which is greater than 4-percent porosity.

Then the second number is maroon color or, you know, close to red color, the percentage -- that's the average porosity.

Then the lowermost number is the ϕh times height numbers. I need to emphasize, this one is -- if you look at this area, you can see the porosity sometimes much more ranging between 4- to 11- percent porosity, much more toward averaging 6- to 7-percent porosity. And later on our engineer can testify, you do have thickness, but these kind of low-porosity, low-perm reservoirs, sometimes very doubtful you can drain 320 acres. Sometimes not even 160 acres. So additional locations are necessary for this type sand.

What later on showing -- reservoir engineer can show the same thing too, is, this was not in the White City-Penn but in Section 10, just northeast offset of the White City-Penn. Northeast quarter, we drilled the so-called -- the Number 10 well is the O'Neill Federal B

Number 2 well, and that well on the B2D sand we did establish a 3500-pound middle Morrow reservoir pressure. And the upper Morrow we established a 4193.4-pound reservoir pressure.

Q. And that's still a fairly high pressure --

A. Yes.

Q. -- considering how long the pool has been producing?

A. That's correct, sir.

Q. Okay. One final thing on this map, this extensive sand that this B2- -- what you call the B2D sand that's producing in the White City-Penn, it's the exact same sand that's producing in the South Carlsbad-Morrow?

A. Yes, sir. All those red circles, yellow -- I'm sorry, circles of yellow color on each map, that means that particular well perforated and produced from that sand.

Q. And it is correlatable across the --

A. Yes, sir.

Q. Okay. And Exhibits 11 through 14 pretty much show the same thing, just four different Morrow -- individual Morrow sands?

A. Yes, sir. Try to establish, you know, some different locations to catch different sands if you miss, and that's the whole purpose for all those isopach maps.

Q. And again, they just show how the sand is

lenticular, it comes and goes and it may not be present in all well units; is that correct?

A. Yes, sir.

Q. Let's move on to your Exhibit 15, which is another structure map. What is that?

A. 15 -- Too many maps. The Number 15 is the top of the lower Morrow structure map, similar circumstance, just reflects the middle Morrow updip to the southwest and going downdip to the east and northeast, not really -- not reflect to any kind of sand deposition environment, just a regional map showing the lower Morrow.

Q. Okay. And then what are Exhibits 16 and 17?

A. 16 and 17, pretty interesting. That's the two main members in the lower Morrow sand, which produced in the White City-Penn areas. If you put 16 and 17 side by side, you can see the A4 sand, which is Exhibit Number 16, much more concentrated in Section 8, 9, 16 and 17.

And if you look at the other sand, go to the Exhibit Number 17, they're actually not present in the lower A2 sand areas. And it shows you another reason we need, sometimes, more locations and the relief on the 1650 to 660 setback location.

Q. Just so you can adequately test all the necessary sands?

A. Yes, sir.

Q. Okay. Finally, what is Exhibit 18, Mr. Lee?

A. 18 is -- We can correlate a cross-section for the White City-Penn area, which you can see the red color covers most of the area, B2D sand. And then you can see underneath the yellow color, B1D sand, you have certain areas, in certain wells pinching out. They are not areawide. They are channel-like and not shield-like.

And also the same token for the B1C and also the A4, A2 sand in the area.

Again, the lower upper Morrow sand, the C2, only existing in the right-hand side, those four wells, which does not exist on the left-hand side, those three wells.

Q. Now, this well goes down towards the southern part of the pool. Most of your other exhibits were more concerned with the northern part of the pool. That's where Gruy's acreage is.

A. Yes, yes.

Q. But from what you reviewed, is there any significant difference between the north side of the Lake City-Penn Pool and the south side of the Lake City-Penn Pool?

A. I really cannot see any difference in there.

Q. In your opinion, is changing the White City-Penn Pool rules or, in the alternative, granting the request for the unorthodox and/or infill locations in the interest of

conservation and the prevention of waste?

A. Yes, I sure do.

Q. And were Exhibits 1 through 18 prepared by you or under your supervision?

A. Yes, sir.

MR. BRUCE: Mr. Examiner, I move the admission of Gruy Exhibits 1 through 18.

EXAMINER CATANACH: Exhibits 1 through 18 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Lee, can you again give me your nomenclature on these sands? The A sands are the upper --

A. I'm sorry, I've kind of reversed -- maybe because I'm Taiwan Chinese, reversed -- the A sand actually is the lower member of the Morrow.

Q. Okay.

A. And the B sand will be the middle member of the Morrow, and the C sand will be the upper member of the Morrow sand.

Q. Okay. And the number following the letter would just signify one of the sands in that upper or middle or lower --

A. Yes, sir. Yes, sir.

Q. Okay. With regards to some of the infill wells

that you guys are proposing to drill, say in Section 9, can you give me a specific example of what you're targeting with the infill well?

A. Sure can. The key for the Section 9, the northwest quarter, which is Number 3 well, the key target will be two main horizons. One is what I call the C3 sand, then the second one will be the B2D, which is the second upper member of the middle Morrow, with the B3 sand will be the upper member of the middle Morrow sand as targeted.

The key on the C3 sand is because if you look this location to the north is a Snow Oil --

Q. Which map are you looking at, I'm sorry?

A. I'm sorry?

Q. Which exhibit are you looking at?

A. I'm looking at Exhibit 8, I'm sorry.

Q. Exhibit 8.

A. Yes.

Q. And before you go on, I just want to make sure I understand. You're targeting the C3 sand --

A. Yes, sir.

Q. -- the B2D sand --

A. -- Yes, sir.

Q. -- and you mentioned one other one?

A. B3, B as boy, B3.

Q. B3, okay.

A. This will be the B2D sand, Exhibit Number 10, the B3 sand, Exhibit Number 9.

Q. The C3 would be Exhibit Number 10?

A. Exhibit 8.

Q. I'm sorry, B2D would be Exhibit Number 10.

A. 10, yes, sir.

Q. Okay, go ahead.

A. The Exhibit 8, on the northwest quarter of Section 9 is our proposed Number 3 well. If you go due north, you're seeing a well with a yellow circle, on the right-hand side is 14 feet, 9, 1.26, that well. That well is a brand-new well which was drilled by Devon Energy. Actually after completion they turned over operations to Snow Oil and Gas.

This was started production April, year 2001, and that well targets the C3 sand only right now. It's currently still averaging about 2.5 million cubic feet of gas per day, and there's a 660 setback, which follows these Carlsbad-Morrow sand field rule -- regulations. And that well so far cum'd, I think, close to about 750 million cubic feet of gas.

Q. Okay, so the reason you're targeting that sand in that particular well, the Number 3 well, would be to offset the --

A. Offset, protect and also to produce the remaining

reserves from the C3 sand.

Q. Okay, are you targeting any sands in that well that you can't access by any other well in that section?

A. Sure do. That one, we need to go to the Exhibit Number 16, and that's what the -- is so-called the Morrow A4 sand. A4 is the uppermost of the lower Morrow members. And you can see that's a -- to my interpretation, that's a preferred location for additional reserves produced from the A4 sand.

Q. Okay, but you didn't say that that was one of the targets?

A. Yeah, that's what I called secondary targets, I'm sorry. I can tell you the three main targets, and I have other secondary targets in here.

Q. I've got you, okay. And what you're saying is, that A4 sand can't be accessed --

A. -- to any other locations than that one, to the northern portions. One possible additional location will be in Section 16, northwest quarter.

Q. Okay, let's see. How about the Number 4 well in that section?

A. Okay, Number 4 location, the key target again will be similar to one I mentioned to you, will be Exhibit Number 8, C3 sand; Exhibit Number 9, the B3 sand; Exhibit Number 10, the B2D sand; with additional sandbodies will be

classified, will be Exhibit Number 13, the B1B sand; and also Exhibit Number 12, B1C sand.

In particular, if you don't mind, we can take a look at Exhibit Number 12, which will be the B1C sand. You can see right now -- Exhibit Number 12 --

Q. Number 12.

A. -- the northeast quarter, that location, to my interpretation right now only can be drained by a well which we're proposing, the Number 4 in the northeast quarter, that location. Other areas will not drain Section 16.

Q. So what you're saying on that particular well, the B1C interval, that's the only place you can access that in that section?

A. Yes, sir. Yes, sir.

Q. So you're saying that that zone, as far as you're concerned, has not been produced yet in that section?

A. That's correct. To produce in the southeast quarter of Section 4, north offset, and northwest quarter of Section 10 -- yeah, northwest quarter of Section 10, that's correct.

And that reservoir is also being penetrated at the southwest quarter of Section 10, but that one is slightly tighter than 4-percent porosity, kind of tight. That's the reason Pennzoil never produced, only left one

way to produce for that area, for B1C, will be the northeast quarter of Section 9.

EXAMINER CATANACH: Okay, I'm not going to go through these well by well. I would ask you guys, however, if you would prepare an additional exhibit, Mr. Bruce, that shows the target zones for each of these proposed wells --

MR. BRUCE: Sure.

EXAMINER CATANACH: -- and some justification like we've talked about with this witness, why those sands are -- you know, if those sands can't be accessed by other wells in that section, you might explain that in the exhibit too. And if you would provide that for all the infill wells that you propose to drill --

MR. BRUCE: Sure.

EXAMINER CATANACH: -- it might speed things up here.

Q. (By Examiner Catanach) Mr. Lee, with regards to the Strawn and the Atoka --

A. Uh-huh.

Q. -- in the White City-Penn, that's being produced, right?

A. Yes, to the south portion of the lease, west central portion of the lease. But we do have additional potential for the Strawn and the Atoka.

For example, in Section 16, we just finished and

set pipe in the White Baby Com Number 3 well for the Strawn horizon. We encountered around 10,258 feet original background gas, 300 units. When we passed through here our background gas increased to 1500 units with 19 barrels mud and good shows over there. And that 10,250-foot horizon fractured Strawn reservoir is also -- shows up produced in Section 16 to the northwest in the White Baby Com Number 2 well.

So we do have additional potential in the Strawn. How good, I cannot give you any answer right now, until we complete a well. But if that well is good enough -- and we probably will be facing a producing-methods problems, because the Strawn at the 10,200, is the top of the Strawn, then our Morrow comes in around 11,200, and we're talking about 1000 feet of difference between two producing horizons. May be necessary to efficiently drain the reservoir when you're twinning well. But if we're doing so, then we're facing the rule and regulation problems for the White City-Penn for the area.

Q. As far as the Strawn goes, are we talking about a fairly continuous zone in the Strawn?

A. No, sir, the Strawn -- Let me go to the right exhibit. The exhibit -- best way to see that working will be Exhibit Number 5, Exhibit Number 5.

Exhibit Number 5, my Strawn color code pie shape

will be a bright blue color. So when you come to the White City-Penn area in Section 16, 21, 20, 29, that's the main -- your Strawn-producing horizons.

Then similar token, you go to the White -- no, I'm sorry, South Carlsbad, to the north will be in Section 21, 27, in those areas --

Q. Uh-huh.

A. -- so they are not really all areawise, depending on how -- your fracture system development. That's the key in here. Porosity-wise, they are tight, just spaced on secondary fracture systems.

Q. Okay. So is that zone fairly continuous? You're saying just the porosity differs in those --

A. Yes, yes. We find a good porosity fracture system in Sections 16, 21, 20, 29.

And to my knowledge -- maybe our reservoir engineer can emphasize that one -- I do not think that we can adequately really know what's the cum from the Strawn itself, because this is a common reservoir, Strawn, Atoka and Morrow all combined together as one number. So they possibly have additional potential in there, which later on we can see from our new well. It will probably become Number 3.

Q. So are you saying that to be able to drill additional wells in the White City-Penn, that will benefit

the Strawn too --

A. Yes.

Q. -- because you may encounter porosity --

A. Yes.

Q. -- that you didn't encounter in existing wells?

A. That's correct.

Q. How about the Atoka?

A. A similar circumstance. Atoka only limited -- Section 20, 29, 30, and similar circumstance as the Strawn.

EXAMINATION

BY MR. JONES:

Q. Mr. Lee --

A. Yes, sir.

Q. -- on the mudlogging, when will your mudloggers come on? What depth? Will there be two men mudlogging?

A. Yes, sir, two men mudlogging, they start at 8000 feet.

Q. Which is above the Strawn?

A. Yes, and above the Wolfcamp and the low portion of the Bone Spring, because this area you do have some Bone Spring and Wolfcamp producers in the area. I don't want to miss anything. So we have a two-man crew, 24 hours, starting at 8000 feet, all the way to TD.

Q. And Wadi agreed to that also on their wells you're going to drill for them?

A. Yes, sir, because Wadi -- they are family-owned companies, which they do not have any drilling experience in the State of New Mexico, especially in the Eddy and Lea County areas, so they're using our expertise to help them drill, complete, then turn over operation to them.

Q. Okay. Then the logging suite you're going to run, is it basically the whole suite?

A. Yes, what I'm doing is, I'm using the triple combo, one log including the gamma, dual lateral log, compensated neutron density porosity log, with additional four-way sonic log for the engineer in case they need to frac the well.

In the same token, if the wellbore condition is available for me, we will run the repeated formation tester to see what the potential perm is going to be or what probable pressure is going to be. They are not very accurate but at least give us some indications.

Q. The RFT you're going to run in only a couple of the wells?

A. We tried to with most wells. The first well on Section 10 we did successfully run the RFT. Originally we also want to run the so-called MRIL image log, but unfortunately they're too broken down, so we canceled the idea.

Then the second well we drilled on Section 16,

White Baby Com Number 3, originally we want to do so, but unfortunately at that time we had a lot of gas in the wellbores. In order not to create any problems, that's the reason we did not run the RFT or traditional DST. We went ahead and set pipe, because we found pretty thick the Morrow B3, B2D, B1D and the C2 sands. So we choose to go ahead and set pipe. Also good shows in the Strawn section.

Q. So that sonic, that four-way sonic, you're going to run it in all the wells too?

A. We're trying to do that.

Q. Okay.

A. I know it's kind of expensive, but sometimes you do a -- priority, especially when we have a multi-well program. We better don't be cheap in case later on we said we wish we did that. So we want to get all the necessary information for the engineers, so they can do an adequate frac'ing job for all those wells.

Q. Right. And the coring -- Do you have access to any cores out here?

A. No, sir, I do not. And I checked most wells in the area. I'm not seeing a report of any conventional core.

Q. No sidewall cores either?

A. No, I cannot find any so far.

Q. So on your cutoffs you used for all these maps --

Can you talk about your different cutoffs you used?

A. The majority, I'm using 4-percent porosity.

Q. Four percent?

A. Yes, the reason -- At the time, originally, I was using 6-percent porosity. Then I tried to compensate an old sonic log, acoustic log come back. And the first map we came up with, we had a little problem because the reservoir looks very small, lenticular. So that's the reason, in order to fit into the regional Morrow sands, depositional environment becomes 4-percent porosity.

Q. Okay, so what destroys your permeability out here in the Morrow? Is it --

A. Clay.

Q. -- some secondary migration?

A. Migration, clay, bentonite, very sensitive to the water.

Q. It is very --

A. Yes.

Q. -- sensitive --

A. Yes.

Q. -- to the water.

A. If you see our samples showing clay cement, the last samples in here, especially the lower portion of the Morrow sand.

Q. Okay, was that sensitivity in the Morrow -- is it

better to drill new wells, or -- Completing older wells is more of a risky proposition in the Morrow; is that not --

A. We're looking to potentially doing some maybe refrac'ing or recomplete the older wells, for example, during the 1970s.

But after we looked through their drilling procedures, they have a lot of just running water all the way down to save money, going faster.

Then a lot of wells, when they were treated initially, the frac'ing introduced a 3- to 5-percent KCl water, which we're afraid of that will aid the swelling problems, to reduce your -- further reduce your permeabilities, so you do not have the free-flow gas to the wellbore.

We believe the new method and the -- 3- to 5-percent KCl water will be the best way to get additional reserves out and not damage your wellbore. So we believe the new well method will be a lot better than re-frac or recomplete the older wells.

Q. When Gruy bought into this deal, they targeted fields that they could drill more wells, and you studied this extensively before you bought this?

A. Yes, sir. If we you may -- If I bring up a little bit of history, then you will understand why we targeted the Morrow in here.

We started a new drilling program back in September of 1999, when the State of New Mexico relieve a lot of special field rules, become a statewide Morrow, quarter sections there.

We start in two areas. One is what we call the Shugart areas. That's the 18 South, 31 East areas. We either drill ourselves or we join partners over these closest 10 wells, which come out, I think, above the average. We're pretty happy on that result.

Then we went to the Turkey Track areas, which will be 18 South, 29 East and 19 South, 29 East. Again, we drill or participate with other operators to the extent of 10 wells. We still are drilling wells over there with Ocean Energy right now.

After those new methods we introduced, we learned from other companies, then we said can we use those learning curves, apply to any other areas? Then we found this property was on the market, potentially can be purchased. So we did extensive study for this area. And we also, from the South Carlsbad -- they have a lot of operators already waiting to become the third or fourth wells for those sections, and their reserves, still looking at 1.22 BCF in there.

So that's why we look the similar circumstance of White City-Penn. The only difference between the two

fields is the field-name difference and rules and regulations. We believe this continues, then, in here. That's why we purchased this one for the South Carlsbad and the White City areas, for the Morrow, Atoka, and a backout for the Strawn, fractured, carbonate rocks here.

MR. JONES: Thank you very much.

THE WITNESS: Okay.

MR. JONES: That's all I have.

EXAMINER CATANACH: I think that's all we have of this witness, Mr. Bruce.

DIANNE CALOGERO,

the witness herein, after having been first duly sworn upon her oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name and city of residence for the record?

A. My name is Dianne Calogero. I live in North Richland Hills, Texas.

Q. Who do you work for and in what capacity?

A. Gruy Petroleum Management, as the chief reservoir engineer.

Q. Have you previously testified before the Division?

A. No, I have not.

Q. Would you please summarize your educational and employment background for the Examiner?

A. Okay, I have a bachelor of science in chemical engineering from Texas Tech University. I've worked 22 years as a reservoir engineer, 14 years as an operations analytical engineer, with Arco Oil and Gas; three years as a consultant with Arch Petroleum, EPR and Win Crosby Energy; and the past five years with Gruy Petroleum Management.

Q. Does your area of responsibility at Gruy include southeast New Mexico?

A. Yes, it does.

Q. And are you familiar with engineering matters related to this Application?

A. Yes, I do.

MR. BRUCE: Mr. Examiner, I tender the witness as an expert petroleum engineer.

EXAMINER CATANACH: She is so qualified.

Q. (By Mr. Bruce) Would you identify your Exhibit 19 briefly for the Examiner?

A. Exhibit 19 is an estimated ultimate recovery drainage map.

Q. What did you look at to prepare this map?

A. I looked at, first, the production decline curves, and I calculated out to an economic limit the

ultimate recovery. I used that in conjunction with initial bottomhole pressure data that was found in IHS Energy scout tickets, PI scout cards, well files where -- or wells that we were participants in. And used that along with H.C. Lee's ϕh maps in order to calculate an estimated drainage.

Now, this drainage, because you've got multiple pays, all different pressures, all different sand channel configurations, different combinations of different zones perforated in each well, it's represented here as a circle, because of the complication between all these factors. The overlap is due to the different combinations of different sands producing.

Q. So in other words, that doesn't necessarily mean if you have two circles overlapping they're actually competing with each other, then?

A. Right.

Q. Okay. What conclusions do you draw from your study?

A. The ultimate recovery -- this is if nothing else gets done or drilled, no other changes, that there are still gaps in the production available.

Q. And there will be undrained acreage if infill wells are not drilled?

A. Correct.

Q. Okay. Now, again, the overlaps -- This is an

ultimate drainage map, so it's not the current status?

A. This is ultimate, it's not where things are at this moment.

Q. Okay. And on this map, for instance -- well, pick out any one -- it does identify the particular Morrow zone that is or are producing in each well?

A. Yes, it's the zones that are producing. It doesn't mean that's the only zone that is in these wells, it's just not -- these are the ones that are perforated, that are contributing to that ultimate decline curve.

Q. Okay. Now, this was originally done by you when you were looking at drilling some additional infill locations, was it not?

A. Yes.

Q. So it wasn't prepared just for this hearing?

A. Correct.

Q. It was used to pick out locations that apparently could benefit by drilling additional wells on the unit?

A. Right.

Q. And again, that's why this -- you were looking at your acreage, so it only covers a portion of the pool at this point?

A. Yes, sir.

Q. When it's done -- Would it be fair to state that these drainage circles that you drew, to a certain extent

overstate any overlap among these wells?

A. Yes, definitely.

Q. And that if additional -- either the infill and unorthodox locations are approved or the pool rules are changed, not only in Gruy's acreage but in other areas of the pool, additional wells are needed to adequately produce the reservoirs in these units?

A. Yes, sir.

Q. In your opinion, is the granting of this Application in the interests of conservation and the prevention of waste?

A. Yes.

Q. And was Exhibit 19 prepared by you?

A. Yes.

MR. BRUCE: Mr. Examiner, I'd move the admission of Gruy Exhibit 19.

EXAMINER CATANACH: Exhibit Number 19 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. I'm just curious. Again, could you briefly describe how with multiple pays and zones you calculated reserves in these wells?

A. With everything combined together you've got one production curve, and so you put that out to an ultimate

economic limit. Then I used a combined ϕh to use in the combined bottomhole pressure, because these are all open together, used that pressure to do the material balance to calculate out the area of drainage. And in this case, because of the different configurations of the sand channels, we take that acreage drainage into a circle.

EXAMINATION

BY MR. JONES:

Q. What was your -- in your idea, what was the initial reservoir pressure out here in the Morrow?

A. The initial reservoir pressure, we saw as much as 5400 pounds on some of these wells.

Q. And that was from records you --

A. Yes.

Q. -- the company bought it from, or from the State records --

A. Well, the one I'm looking at is actually -- must have come from a scout card.

Q. Okay. And the abandonment pressure you used?

A. I used 100 pounds, and the idea that as this overall depletes, the pressure in the pipeline will also go down and you will get as low as 100 pounds.

Q. You don't have some abandoned wells already that you can look at and see what abandonment pressure they were abandoned at?

A. The wells that have been abandoned out there were abandoned right off the bat.

Q. Oh.

A. There's no depletion out here yet.

Q. So you can use basically a Q_i minus a Q_l as your reserves calculation, along with the decline curve --

A. Uh-huh.

Q. -- rate-cum, and back those into pore-volume balance?

A. Yes.

Q. So basically, the reserves -- you're attributing your -- different lenticular Morrow members would be based on their different ϕh's, then?

A. Combined together with the total production and the total pressure.

Q. So far we have no additional -- no separation of pressures, but -- at least information on separation of pressures?

A. Not, certainly, on these when they were initially drilled.

Q. But you will have when you run your RMP?

A. Well, that will be the reservoir as of right now.

Q. Oh, yeah.

A. You won't have it back whenever this first came into production.

Q. And the frac'ing of the wells, were they all frac'd to open these Morrow --

A. Not all of them.

Q. Really? Some of them were just --

A. -- acidized, power perfs to get out beyond the drilling damage. It is variable. I know on the last well that we drilled, the O'Neill B Com Number 2, we're going to be -- we frac'd that -- or we acidized that, and the production has been less than hoped for. We will frac it. It's a little bit tighter than we had hoped for.

Q. And the phases of production, is it going to be just pure gas? Is this no associated condensate, or is there water?

A. There is some associated condensate, there is some water.

Q. Is it any kind of water-drive mechanism?

A. No.

Q. So the efficiency -- in other words, the recovery efficiency is going to be not much in the gas in the Morrow zone, you think? Eighty-percent recovery?

A. Seventy-five, 80 percent is usual.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. Just by looking at your ultimate recovery map, is it fair to say that certain of the proration units in this

pool would not benefit from infill drilling? For instance, down in the southern part, in Section 20, you know, your ultimate recovery looks like it covers the entire section for two wells. Now, in your opinion, would that section qualify for infill drilling? Would that benefit at all? Or can you tell from this map?

A. This -- I know the White City-Penn Gas Unit Number 2 has the B2D zone in it, but it is not perforated in that zone. If you look at H.C.'s isopachs, net sand maps, there may be other sands cutting in through the other quarters of that section that these wells don't even see it in them.

Q. Okay.

A. I don't know off the top of my head.

Q. So really, without further analysis and further information it would be hard to -- you can't just use this map to determine --

A. No, this is an example that on our sections that we were specifically looking at, that there is possibilities. And it may not be prudent for an operator for the entire field. But there are plenty of sections that -- fieldwide, that do require the next additional wells.

Q. Let's take specifically, for example, the well in the northwest quarter of Section 9. That looks like -- It

looks like the west half of that section has been pretty well drained, but are you saying that in that well you guys are going to target a zone that has not produced?

A. Yes. If you look at the Abo Canyon 4 Federal, right now it is only producing from the C3 zone.

Q. Okay.

A. And if you look at the Pennzoil 9 Federal Com Number 2, it is not producing from that C3 zone.

Q. Okay. Now, when a well is not producing from a particular sand, is it your opinion that it's been determined that that sand will be not productive in that well?

A. I cannot say that. It may be that just by operationally they decided at that time not to test it. The Abo Canyon well has that pay in five other sands that it's not perforated in.

Q. I'm sorry, that's the well in Section 4?

A. Yes.

Q. It does have pay in for other sands, but they did not perforate it?

A. They did not choose to perforate it at this time. It is a fairly new well.

Q. Have you guys done any kind of analysis to show what might be recovered by each of these infill wells, what additional gas?

A. No, we have not done any. It's all based on analogy.

Q. The locations -- the well locations that you've chosen or the sections you've chosen to drill in, those were -- I assume this information was used to target some of those locations generally, right?

A. Right.

Q. Was geologic information used to pinpoint the locations with the --

A. Yes, it was a combination of our -- or H.C.'s interpretation of the sand channels, combined with Wadi's interpretation of the sand channels.

Q. Now, you didn't do any kind of this analysis for the other two formations, the Strawn and the Atoka?

A. No, I didn't.

Q. But have you looked at that at all, as far as from a drainage or reservoir standpoint?

A. The White City-Penn Gas Unit Number 2, located down in Section 20, is also open in the Atoka. And when I was trying to extrapolate out just the Morrow side of it, I couldn't fit the gas in. It had to have the Atoka. There's quite a bit coming from the Atoka.

Q. So in your engineering opinion, will infill drilling benefit or increase the recovery from the other two formations, Strawn and Atoka?

A. Yes.

EXAMINER CATANACH: I think that's all we have of this witness, Mr. Bruce.

And Mr. Bruce, before I forget, on the additional exhibits that I wanted you guys to prepare --

MR. BRUCE: Yes.

EXAMINER CATANACH: -- could you also discuss the unorthodox locations?

MR. BRUCE: Yes, I've noted that down.

EXAMINER CATANACH: Great.

MICHAEL S. DAUGHERTY,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. Michael S. Daugherty. I'm from Plano, Texas, and I'm a petroleum engineer.

Q. Who do you work for?

A. I work for Murchison Oil and Gas.

Q. And Murchison is here today in support of this Application?

A. That's correct.

Q. Have you previously testified before the Division?

A. Yes, I have.

Q. And were your credentials as an expert petroleum engineer accepted as a matter of record?

A. Yes, they were.

Q. Are you a registered professional engineer?

A. I am.

Q. And are you familiar with engineering matters related to this pool?

A. Yes, sir, I am.

MR. BRUCE: Mr. Examiner, I'd tender Mr. Daugherty as an expert petroleum engineer.

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Bruce) Mr. Daugherty, you've got in front of you Exhibit 1, and before we get into that, Murchison's interests are generally south of Gruy's and Wadi's interests, are they not?

A. Yes, sir, that's correct.

Q. So between their data and your data, it really covers pretty much the entire White City-Penn Pool?

A. Yes, sir.

Q. Okay. Now, looking at this Exhibit 1, could you identify it for the Examiner and discuss its contents?

A. Exhibit Number 1 is a structure map on top of the middle Morrow clastics in the general vicinity of the White City-Penn field. It's color-coded to indicate the various

correlative Morrow intervals in which each well is completed, and also it shows the cum production for each well.

And if you'll look at the map, the legend is down on the bottom left-hand corner, and our geologist went from A -- A's are his shallowest pay, the higher letters in the alphabet are the lower pays.

The intervals that are shown on this map, I have a cross section as an exhibit, which is Exhibit 2, and it will show which intervals are relative to the intervals that are color-coded on this map.

And I think it's important to notice on the map that each of the circles around the well, a lot of them have three and four and five different colored intervals, which means there's quite a few intervals that are producing simultaneously.

Q. And not only from the Morrow, but they're also producing from the Strawn and the Atoka, are they not?

A. Yes, the bright blue color indicates the Atoka zone, and the black indicates the Strawn.

And I might also point out that there's -- in the Atoka interval -- some geologists call that Strawn, some of them call it Atoka. There's an interval in there that's a little bit difficult to -- There's a difference of opinion, what might be Strawn, what might be Atoka. The entire

interval is about 700 to 800 feet thick.

Q. And there have been -- Looking up to the northwest at Murchison's acreage, there have been some substantial producers out of what you call the Strawn, have there not?

A. Well, those two black circles up in Section 29 and Section 20 are -- I'm told they're algal mounds in the Strawn zone, and one of them has recovered 25 BCF and the other one has recovered almost 10 BCF.

Q. So those are kind of anomalies in the Strawn?

A. Yeah, they're anomalous. You'd love to find one, but they're -- that's the only place we've found it.

Q. In your opinion, will allowing more wells to be drilled in the White City-Penn Pool improve the overall recovery of gas from the Pool?

A. Yes, sir, I think it will.

Q. Please identify for the Division what evidence you have prepared to justify your opinion.

A. On my second exhibit -- it's an east-west cross-section and is labeled G-G' on the structure map that I have. And the G-G's are a little bit hard to find, but if you look over in Section 32 of Township 24-26, and then go across to Section 34, it's a four-well cross-section.

The wells that are on this cross-section are the Strong Federal Com Number 1 in Section 34, the Strong

Federal Com Number 1E in Section 34, the White City Com Number 1 in Section 33, and the New Mexico "DD" State Number 1 in Section 32.

The cross-section shows that the Morrow formation in this area is about 750 to 800 feet thick and can be divided up into seven correlative intervals which have porosity and which contain producible gas.

The cross-section exhibits the discontinuousness of the Morrow sands. You can see that the cumulative productions on the structure map that's listed by the wells are very dissimilar, and that suggests reservoir heterogeneity.

It's my opinion, after studying the cross-section and the map, that Morrow reservoir in this pool is comparable to other Morrow reservoirs in New Mexico that are now being drilled on 160-acre spacing.

It should also be recognized that the White City-Penn combines the Morrow, Atoka and Strawn zones. And so many areas, these zones would be split up into separate pools and would have even more wells on them per section.

Q. Have you determined the gas in place and compared that value to the cumulative production?

A. Yes, and -- Do you want me to go on with that or --

Q. Yeah, why don't you --

A. -- do you want to talk about the cross- --

Q. Go ahead.

A. Okay. I prepared Exhibit Number 3. This lists the porosity and the number of feet of pay logged in 13 wells located in a nine-section area of Section 3, 4 and 5 in Township 25-26 and Sections 27, 28, 29, 32, 33 and 34 of Township 24-26.

By weight-averaging the porosity in each well I calculated that the average porosity greater than four percent was 7 percent, and the average feet of porosity greater than 4 percent was 49 feet.

At this time I'd like to introduce Exhibit 4, which shows the calculated gas in place to be 20 BCF per section. I estimate that up to 15 BCF could be recovered per section, however the average cumulative production per section is 3.8 BCF. This suggests that the current well density is not sufficient to recover a significant percentage of the gas in place.

Q. Have you made any other studies of well density versus well recoveries in this pool?

A. Yes, Murchison drilled the Ogden State Number 3 in 1997, which was the third well on that 640-acre proration unit.

Q. Which section was that in?

A. That's in Section 2.

Q. Okay, the darker gray section on --

A. Yes, sir, correct.

Q. -- on Exhibit 1.

A. The average porosity in the new well greater than 4 percent was 7 percent, and the average feet of pay greater than 4 percent was 61 feet. And I'd like for you to look at Exhibit Number 5, which shows that the original gas in place for Section 2 was determined to be 25 BCF of gas and 18.9 BCF recoverable.

The cumulative production to date for the Morrow formation is 4.2 BCF from the Ogden State Number 1, 1 BCF from the Ogden Number 2 and a half a BCF from the Ogden Number 3, for a total of 5.7 BCF. The three wells' combined total production, including the Atoka and the Morrow is 7.1 BCF.

The Ogden Number 3 was the third well in Section 2 and was drilled and completed in 1997. The Number 1 and 2 well were drilled and completed in 1977 and 1982 respectively. The original reservoir pressure was about 5200 p.s.i. in these wells and for the pool, and the measured bottomhole pressure in the Number 3 well when it was drilled was 3958 p.s.i., after a 72-hour pressure buildup.

The buildup analysis showed evidence of crossflow between a couple of zones. It is my opinion that at least

75 percent of the original gas in place has not been recovered after more than 20 years of production. It's likely that some of the perforated intervals even had higher production than measured because of the crossflow.

Q. Higher pressures?

A. Yes, sir. If you have more than one zone open you can only see the pressure in the lowest pressure zone. The higher pressure zones will feed into the wellbore and go into the low-pressure zone, and you cannot detect the pressures of the higher-pressured zones.

Q. Does the Ogden State Number 3 well produce gas that would not have been recovered from the other wells in that section?

A. Yes, the Ogden 3 -- it wasn't a very good well, it didn't have good sand development and it proved to have low permeability. It's been a marginal producer, and it's going to require more time for it to pay out. But the production data doesn't suggest any evidence of interference with the offset wells the Ogden State Number 1. The Ogden State Number 2 is now producing from the Atoka formation and I wouldn't expect to see interference from it.

If you'll refer to Exhibits 6, 7 and 8, they're production plots for the Ogden 1, 2 and 3, and you can look at those curves and see that after the initial production

of the Ogden State Number 3, the other two wells haven't shown any decline in production.

Q. Okay, they're still producing at relatively flat rates?

A. Yeah, one of them is even -- looks like it might be going up a little bit.

Q. Okay. Do you have any other production plots that show similar results?

A. Yes, we drilled a new well, the Black River Federal Number 1, in Section 34. On Exhibits 9, 10 and 11, I have production curves from those wells, and it shows the same thing as we had in the Ogden section, that the new well had come on production -- and it's only been on 16 months, but we don't see any interference in the other two wells. We had a little drop in production on one of the wells, but we returned it to its normal production with some mechanical work.

I would point out that the bottomhole pressure that we measured in the Black River well was 2600 pounds, and that showed to be about 50-percent depleted, but that's after 25 years of offset production.

Q. Okay. In your opinion, do you believe that the evidence shows that additional wells should be allowed in the White City-Penn Pool?

A. I believe that the White City-Penn Pool has

significantly more gas in place that is being recovered by existing wells. And I'm not real sure how much more gas can be recovered economically, but the evidence that I've shown today definitely says that increased well density will result in a higher percentage of recovery of gas in place. The ultimate answer will be when we finally drill the field up and have seen all the cumulative production.

Q. Is that the end of your testimony, Mr. Daugherty?

A. Yes.

Q. In your opinion, is the granting of this Application in the interests of conservation and the prevention of waste?

A. Yes, sir, it is.

Q. And were Exhibits 1 through 11 prepared by you, under your supervision or compiled from company business records?

A. Yes, sir, they are.

MR. BRUCE: Mr. Examiner, I'd move the admission of Murchison Exhibits 1 through 11.

EXAMINER CATANACH: Murchison Exhibits 1 through 11 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Just one question, Mr. Daugherty. Have you guys analyzed what additional recoveries might be anticipated in

these wells, in these infill wells?

A. I believe that all -- yes and no, and I don't have it -- I mean, I have determined ultimate recoveries for these wells for reserve report. I don't have that data here, but I believe that the gas that's being recovered from all three wells is separate gas. I just don't see much interference between the three wells, in each of the three sections where I have evidence of where we've added a well.

And what I'm saying is that the decline curves are relatively linear on logarithmic plots, and I extrapolate that out, and I'm not making allowances for any gas being swapped between the two wells, the three wells.

Q. Okay, so you have data for Section 2, right?

A. Yes, sir.

Q. Where you have three wells?

A. Yes, sir.

Q. And were all three of those wells producing at the same time?

A. Well, the Ogden Number 1 began production in 1977, and it's still producing today.

The Ogden Number 2 was drilled in 1983. It's producing today.

And we drilled the Ogden Number 3 in 1976, and it's still producing today. And if you compare the three

production plots, I think that might answer your question as to, you know, when they've been on production and when they're produced simultaneously.

I need to point out on the Ogden Number 2, it basically went off production in 1990, and that big jump in production in 1991 is when we recompleted it to the Atoka zone. So we really only have one well producing in the Atoka and two wells in the Morrow now. But the Ogden Number 2 produced about a BCF from the Morrow.

Q. It's very complicated because some of these wells may produce from the same zones and some may not. Is there --

A. Yes, sir, if you go back to my -- I think I can address that question if you'll look at Exhibit Number 2 on the cross-section. We colored in, in yellow, what we perceive to be sands greater than 4 percent, and we've also colored in the intervals that are perforated with the little red boxes and circles in it.

And you can see kind of in the middle Morrow A and B section, there's some common production, but those zones don't even line up real well. And when you get down to the lower Morrow and to the upper Morrow, the pay is relatively non- -- it's just non-correlative, it doesn't go from well to well. And I really -- Although my geologist thinks he can map and pick these things out, every time we

drill it's a surprise. I'm glad he's not here to hear me say that.

(Laughter)

EXAMINER CATANACH: It's on the record.

(Laughter)

EXAMINATION

BY MR. JONES:

Q. Mr. Daugherty, all this Morrow gas, is it all the same gravity, all the same source, all the way up and down the Morrow?

A. I can't -- I don't know that I could accurately answer that question. It's a fairly low-gravity gas, between 60 and 65.

You have to recognize that when we perforate four or five of these intervals together the gas is commingled, so I don't -- I can't tell you what kind of gas is coming out of what zone, but I would not think it would be terribly different. The condensate recoveries are very low. You get some condensate initially in the high pressure, and then about the time you fill the tank up twice, that's about how much oil you get, or condensate.

Q. Okay. And also a question about the gathering. Is the gathering pressure -- How has it changed over the years in this field?

A. The gathering pressure has gone down since we

took these wells over in 1990, and the pressures used to be 400 to 500 pounds, and they're down to less than 200 pounds now. There's been a pretty substantial decrease in gathering charges and compression, reduced line pressure.

Q. So the gatherer provides the compression?

A. Yes, sir. Well, he puts the facilities in and then he makes me pay for it, so I don't know how you want to say who provides that.

Q. So you anticipate the pressure to keep on being lower in the future?

A. Yes, sir, I believe so. I mean, if you look at these curves, especially the wells that have been on production for a long time, they're going to be here for a lot longer.

We have -- As one of the other witnesses said, we do experience water production here, and lower line pressure, lower tubing pressures, greatly enhance the ability to keep the well on production with modest amounts of water.

When you look at one or two barrels a day, that can cause the well to go off production. But if you lower the line pressure, lower the tubing pressure, you can increase the velocities in the tubing, and that will carry the water. So the lower line pressure is very critical within this area.

Q. And the water, as far as where it's coming from --

A. It's formation water.

Q. Just different Morrow zones provide the water?

A. Some of them a little more than -- You know, I suspect some of them a little more than others. We generally see -- in this area we see one to two to three barrels a day.

MR. JONES: Thank you.

EXAMINER CATANACH: That's all we have of this witness, Mr. Bruce.

MR. BRUCE: Mr. Examiner, I have nothing further to present.

I checked my records, and I know I did look at the -- with respect to the notice issue, I did look at some acreage, my notes in this file, outside of the pool for notification purposes, but I can't tell exactly what I looked at, so I will get back to you on that.

EXAMINER CATANACH: Why don't you come up here, off the record for a second.

(Off the record)

EXAMINER CATANACH: Okay, back on the record now in this case.

What we'll do is continue this case for two weeks and allow Mr. Bruce to provide additional advice to the

Division at that time whether or not notice has been satisfied in this case.

And with that, this case, 12,873 will be continued to the July 11th hearing.

(Thereupon, these proceedings were concluded at 11:08 a.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 12873 heard by me on June 27 2002.

David K. Catanach, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

I, Steven T. Brenner, 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 transcribed my notes; 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 June ~~30th~~, 2002.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 2002