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. 12,734
APPLICATION OF RICHARDSON OPERATING COMPANY TO ESTABLISH A SPECIAL "INFILL WELL" AREA WITHIN THE BASIN-FRUITLAND COAL GAS POOL AS AN EXCEPTION FROM RULE 4 OF THE SPECIAL RULES FOR THIS POOL, SAN JUAN COUNTY, NEW MEXICO	

ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: MICHAEL E. STOGNER, Hearing Examiner

Volume I: November 13th, 2001

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, MICHAEL E. STOGNER, Hearing Examiner, on Tuesday and Wednesday, November 13th-14th, 2001, 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

November 13th, 2001
Examiner Hearing
CASE NO. 12,734 (Volume I)

(Continued...)

SAN JUAN COAL COMPANY WITNESSES:

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E X H I B I T S

Applicant's	Identified	Admitted
Exhibit A-1	25	50
Exhibit A-2	25	50
Exhibit A-3	27	50
Exhibit A-4	30	50
Exhibit A-4 (i)	30	50
Exhibit A-5	32	50
Exhibit A-6	32	50
Exhibit A-7	33	50
Exhibit A-8	33	50
Exhibit A-9	34	50
Exhibit A-10	36	50
Exhibit A-11	36	50
Exhibit A-12	37	50
Exhibit A-13	38	50
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Exhibit A-16	44	50
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Exhibit B-6	85, 89	83
Exhibit C-1	94	139
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Exhibit C-3	106	139

(Continued...)

E X H I B I T S (Continued)

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(Continued...)

EXHIBITS (Continued)

San Juan Coal Company	Identified	Admitted
Exhibit 1	162	178
Exhibit 2	167	178
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Exhibit 17		
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* * *

A P P E A R A N C E S

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* * *

(Continued...)

A P P E A R A N C E S (Continued)

ALSO PRESENT:

STEVEN HAYDEN
Geologist
Aztec District Office (District 3)
New Mexico Oil Conservation Division

* * *

WHEREUPON, the following proceedings were had at 8:20 a.m.:

EXAMINER STOGNER: This hearing will come to order. At this time I will call -- Well, first of all, please note today's date, November the 13th, 2001, Docket Number 38-01. I'm Michael Stogner, appointed Hearing Officer for today's case.

And at this time I'll call Case Number 12,734, which is the Application of Richardson Operating Company to establish a special "infill well" area within the Basin-Fruitland Coal Gas Pool as an exception from Rule 4 of the special rules for this pool, San Juan County, New Mexico.

Call for appearances.

MR. KELLAHIN: Mr. Stogner, Mr. Brooks, my name is Tom Kellahin, I'm with the Santa Fe law firm of Kellahin and Kellahin. I'm appearing on behalf of the Applicant.

MR. BRUCE: Mr. Examiner, James Bruce of Santa Fe, representing San Juan Coal Company. I'm appearing today in association with Charles E. Roybal of San Juan Coal Company and Larry P. Ausherman of the Modrall law firm in Albuquerque.

EXAMINER STOGNER: Any other appearances?

How many witnesses do we have?

MR. KELLAHIN: Mr. Stogner, we've listed three possible witnesses on our prehearing statement, and they're present this morning and ready to be sworn in.

MR. BRUCE: And we have three also, Mr. Examiner.

EXAMINER STOGNER: Before I swear the witnesses in, do we need any prehearing statements at this time or any review of motions?

MR. KELLAHIN: Subject to your decision, Mr. Examiner, on Friday we filed a prehearing statement. Included with the filing was a Motion to Dismiss the protest of the San Juan Coal Company for lack of standing in this case, and we're prepared to argue that motion if and when you deem it appropriate. We are here prepared to put on our evidentiary case, but we would like also to discuss this Motion to Dismiss.

MR. BRUCE: Mr. Examiner, I have a short opening statement with respect to the Motion to Dismiss. We did get it late Friday. We did not have a chance to get a written response to you. Mr. Ausherman is prepared to argue against that motion on behalf of the San Juan Coal Company.

MR. AUSHERMAN: Mr. Stogner, we would prefer to have the opportunity to submit a written brief in response to the motion that we received late Friday, but if you would prefer to proceed with oral argument today, we'll be happy to do that as well.

(Off the record)

EXAMINER STOGNER: We'd like to proceed today to hear the evidentiary portion of the case and then have written arguments concerning the matters brought by Richardson on the standing in this case. So with that, let's proceed with the evidentiary portion.

At this time I want all six witnesses to please stand.

(Thereupon, the witnesses were sworn.)

EXAMINER STOGNER: As far as the evidentiary portion, is there any need for prehearing statements or --

MR. KELLAHIN: I'd like to make an opening statement, Mr. Stogner.

EXAMINER STOGNER: Okay, you may.

At this time I'd like to recognize a member of the Division's Aztec Office. Mr. Steve Hayden, the geologist up there, is present in the room today, and if you gentlemen would provide him with a copy of the exhibits that will be greatly appreciated.

Mr. Kellahin?

MR. KELLAHIN: Mr. Stogner, if you'll open the binder that I've provided to you, you'll find in the pocket on the left, there are two maps. If you'll take those out, let me orient you as to what the issue is involved in the case.

We're going to present three witnesses to you this morning. There will be a land presentation, a geologic presentation and a petroleum-engineering presentation.

The maps you're looking at will be sponsored and discussed by Mrs. Cathy Colby. Mrs. Colby is Mr. David Richardson's landman. When we talk about Richardson Operating Company, we're talking about David Richardson. Ms. Colby will talk to you about the significant points on the map and what the various color codes mean.

To help you see the issues involved, if you'll look at the first map you'll see it's color-coded. It's the one that's got the blue and the green outlines. And if you'll unfold that, I can show you what the issue is involved.

On the display there is a hached black boundary. If you see that, that is the Richardson-proposed special infill area. And the coding will identify for you various leases. When you take the green and the blue area collectively, those represent oil and gas leases that are in conflict with coal leases.

You can also see on the far eastern side, there's a column of sections starting with Section 16, proceeding downward. They're stacked five, one on top of the other. That represents Richardson's gas leases that are immediately adjacent to the eastern boundary of what San

Juan Coal Company calls the Deep Lease Extension.

When you look at the map, if you'll look at the Section 17, you look down four sections, then you look at Section 18 and look down four sections. Those represent the leases in the Deep Lease Extension. And if you continue in those kind of columns as you move west, then Section 13 and 14 and the sections underneath those represent what is characterized as the deep coal leases. So you're looking at the deep coal leases, and then you're looking at the Deep Lease Extensions.

In addition to the federal leases, there are some state tracts. My recollection is, Section 16 up in Township 30 North, 14 West, is a state tract, and I believe if you'll look in the next township to the west, Sections 36 and 32 are normally the standard state leases.

So that's a quick visual relationship. Mrs. Colby will talk to you in detail about the development, the current status of the wells.

She's also going to talk to you about the chronology, and let me give you a sort of an executive summary of the chronology.

Richardson has consolidated federal and state oil and gas leases. With the exception of one 80-acre tract which is in conflict with a coal lease, all of those Richardson Oil and Gas leases that David Richardson now is controlled predate the coal leases. You're going to find out that he started substantial exploration and development of the coal in 1996.

And then about 1997 the BLM, in response to the San Juan Coal Company's desire to lease the coal for the Deep Lease Extension, asked the BLM to go through the procedure and process to put the coal up for lease. As part of that process, in April of 1998 the Bureau of Land Management prepares what is called a resource management plan, and they begin to circulate that plan. At every appropriate time and opportunity, Richardson has objected to the leasing of the coal, which is in conflict with the oil and gas leases which have priority, and has objected to the resource management plan.

In December of 1999 the BLM issues a notice that they're going to go ahead and lease the coal, and the coal is the Deep Lease Extension that we're talking about. Richardson again protests these -- the sale of the coal, and the BLM advises in February of the year 2000 that the BLM will take all reasonable action to ensure protection of valid existing gas rights during the development of the coal resource. And they say protection of valid existing rights is essential in the development of these resources.

So the BLM, in issuing the coal lease, puts special stipulations in it, which are included in the

Motion to Dismiss, but they're very specific. They were in the notice of sale of the lease, they've been talked about extensively when San Juan Coal Company took the Deep Lease Extension, they knew of the special stipulations. And the special stipulations were a concession or admission by the Coal Company that their coal lease is subject to all prior existing rights, including the rights of the oil and gas operators.

In addition, the evidence will show that the lessee, the coal lessee, is going to be solely responsible for the coal lease and not the responsibility of the BLM to clear from any coal tract any legal encumbrances or pre-existing land uses that would impede or prevent coal mining on the tract.

So this is not like the potash-oil conflicts. In this area the BLM, the evidence will demonstrate, has already committed to Richardson to give him the opportunity to produce the gas, and subsequently, then, the inferior right is the Coal Company's.

The evidence then will go on to demonstrate to you that beginning in the fall of the year 2000, last year, the BLM wants to provide an opportunity for the oil and gas lessee to expedite the drilling. They believe it's a valuable resource, and they want to encourage that that oil and gas development exploration be expedited.

In January of the year 2001, in response to the BLM's request and without any legal obligation to do so but as an accommodation to the BLM and to San Juan Coal, Richardson then files 13 applications for permit to drill in the area of concern. Those APDs are held by the BLM. The coal lease is issued in March of the year 2001. And then Richardson files in June and July four specific APDs, and we'll talk about those.

The APDs were approved by the BLM in Farmington, San Juan Coal files an objection, the BLM temporarily rescinds the approvals while they investigate the Coal Company's concern. And the Coal Company's concerns to the BLM are the ones they've expressed to you in the prehearing statement; they have to do with mine safety.

In response to their protest, BLM Farmington reviews in detail all the documents that San Juan Coal has presented to the BLM in Farmington on their issue about mine safety. And on September 25th of this year BLM approves the APD, denies the safety claims of San Juan Coal Company and authorizes Richardson to go ahead with these four APDs and then drill the wells.

We are here before you today because we want to accommodate the BLM and San Juan Coal Company by increasing the well density to four wells a section, and that's permitted under the Division's Fruitland Coal Gas Pool

Rules under Rule 4. The Rule details that if you want to infill drill your 320 gas spacing unit in the coal you can drill the optional infill well, and you provide notice to the oil and gas operators that are affected by your Application, and we've done that.

So we're proceeding under Rule 4 to show you our reason to expedite the drilling. It's an accommodation. We want to do so in order to prevent waste of hydrocarbons. And the threshold issue for you is, will we be provided that opportunity? The issue is, what's going to happen to the coalbed methane? It's already in the coal, you've got to do something with the methane. And the issue is, will San Juan Coal Company be able to vent the coalbed methane and waste it, or will Richardson be afforded his right to produce and sell the coalbed methane before the coal is mined?

And so we want to go ahead and drill these additional wells and produce the coalbed.

In addition, you'll see from the map that there are some Pictured Cliff wells that can be recompleted into the Coal, and we want to utilize those wellbores. A number of the wellbores are already here in the ground. The Coal Company is going to have to deal with those. But there are rules and regulations that are imposed upon them for dealing with wellbores in a coalbed, and we believe they're well aware of those obligations.

So what we're asking you to do today is to approve our infill special area, let us proceed with the increased density, and in the way of technical presentation we're going to give you a geologic overview that is site-specific for this special-use area. In addition, we're going to give you a detailed reservoir engineering presentation on the coalbed methane by one of the recognized experts in that field, and he will demonstrate to you that there is a substantial opportunity to avoid the waste of coalbed methane if you allow us to proceed.

We want to present you with the evidence this morning, this afternoon, however long it takes to make that presentation, but we hope that you will give us due consideration to the Motion to the Dismiss, which we think is dispositive of the entire case because of the Coal Company's agreement and concession that we have priority in time. It's a position that the BLM continues to agree with. Those issues are on appeal, there is a federal appeal process for which the parties are pursuing.

There are dozens and dozens of documents, hundreds of pages of information, but we've attempted this morning to synthesize it for you so you get a taste of what we're trying to do in order to make this accommodation to our opponents who are now protesting this proceeding

EXAMINER STOGNER: Thank you, Mr. Kellahin.

Mr. Bruce?

MR. BRUCE: Mr. Examiner, Mr. Kellahin has in part briefly argued the Motion to Dismiss, and after my brief opening is through I'd ask for permission for Mr. Ausherman to say a few things about the first-in-time, first-in-right argument that Richardson is making.

With respect to San Juan Coal Company being here today, I would note that Division Rule 1212 states that full opportunity shall be afforded all interested parties at a hearing before the Commission or Division to present evidence and to cross-examine witnesses.

In its Application Richardson complains that San Juan's mining plans are the reason for this Application, yet asserts that we're not an interested party and lack standing, and I just don't think that's right.

But as to our evidence, Mr. Examiner, this is a unique case. Because of San Juan's underground coal mine, there are serious safety issues related to the drilling of the wells, the frac'ing of the coal and the possibility of spontaneous combustion. These problems will be addressed by Jacques Abrahamse, a mining engineer.

In addition, it's San Juan's position that the Application does not meet the requirements of Rule 4 of the Special Rules and Regulations for the Basin-Fruitland Coal

Gas Pool. We assert that this is not a defined area of the pool, as contemplated by the rule and by the testimony at the prior Fruitland Coal pool rules hearings. It consists of several oil and gas leases and is based on land, not science. The science available shows that this Application is premature and unnecessary. This will be discussed by Paul Bertoglio, our petroleum engineer.

A third matter is the public interest. San Juan will show that the value of the coal far exceeds the value of the coalbed methane. In that regard, San Juan is not trying to run roughshod over the rights of the oil and gas lessees; San Juan is willing to compensate them for the reasonable value of their loss when the area is mined. San Juan believes that the coal operator and the gas operator can co-exist, but they need to cooperate. Lynn Woomer of San Juan will discuss these issues.

Based on the evidence it will present, San Juan will ask that the Application be denied and, in the alternative, if the Application is granted, restrictions must be placed on new well locations and how existing and new wells are completed.

Thank you, Mr. Examiner. And with your permission, if Mr. Ausherman could address the first-in-time, first-in-right argument.

MR. AUSHERMAN: If I may, Mr. Examiner --

(Off the record)

EXAMINER STOGNER: Please go ahead.

MR. AUSHERMAN: Thank you.

First, I'd like to make two points of clarification with respect to Mr. Kellahin's argument. The first one is that the expedited drilling program that he proposes is not, in our view, an accommodation to San Juan Coal Company. In fact, we strongly oppose it.

There was a time that we thought that drilling in advance, well in advance, of coal -- coalbed -- coal mining would be an appropriate way to resolve the conflict. As Mr. Abrahamse will testify today, further study shows that there are significant dangers and risks associated with doing so.

And so for Mr. Richardson to develop the coalbed methane wells is not an accommodation to our coal mine, it's a danger, and it could cause significant amounts of coal to be bypassed.

The second clarification that I would like to make is that San Juan Coal Company absolutely does not concede that the gas leases have the superior right. It is true that by simply looking at a chronology the gas leases were issued before the coal leases, but the question of which lease has superior right is a question that is currently at issue before the BLM.

I'd like to say a few things about that.

The issues that the BLM is considering are different than the issues that the OCD is called upon to consider today. The BLM is considering the issuance of APDs, applications for permits to drill, on their federal leases. On Monday next week, there is a hearing before the State Director of the BLM where she will be considering and making decisions on the question of whose leases are superior.

And so, it's our position that that decision is more appropriately left to the BLM. It's the BLM's leases, the BLM crafted the stipulation. Let the BLM decide whose lease is superior and which company has superior rights.

There's one thing that I'm certain BLM will not be doing, and that is deciding the infill well Application, and that's what's before the Examiner today. We'd like to focus the evidence on that and not upon the issues before the BLM.

Thank you.

EXAMINER STOGNER: Mr. Kellahin?

MR. KELLAHIN: Yes, sir.

EXAMINER STOGNER: Do you wish to get started at this time?

MR. KELLAHIN: Yes, sir.

Call Mrs. Cathy Colby.

CATHLEEN COLBY,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mrs. Colby, for the record, ma'am, would you please state your name and occupation?

A. Cathleen Colby.

Q. Where do you reside?

A. Excuse me?

Q. Where do you reside?

A. I reside in Denver, Colorado.

Q. And what is your current occupation?

A. I am the land manager for Richardson Operating Company and Richardson Production Company.

Q. How long have you held that position?

A. I'm going to estimate ten years.

Q. I'm going to ask you to unfold the maps that you have prepared so we can talk about some of that information. When we look at Richardson's proposed Exhibits A-1 and A-2, are these documents that were prepared under your supervision and direction?

A. Yes, they are.

Q. And when we look at the documents that are contained in the exhibit book that are about to be discussed, are documents that you have collected from your files with regards to this Application?

A. Yes, they are.

Q. Have you been principally responsible to Mr. Richardson for the activity concerning the leases, the filing of objections and the processing of your Applications?

A. Yes, I have.

Q. That has been done in association with technical people, in order to comply with the various rules, regulations and requirements --

A. That's right.

Q. -- not only of the OCD but of the BLM?

A. Yes.

Q. On prior occasions have you qualified as a land expert before the Oil Conservation Division?

A. Yes.

Q. And you continue to perform expert petroleum land duties for your company, do you not?

A. I do.

MR. KELLAHIN: We tender Mrs. Colby as an expert petroleum landman.

EXAMINER STOGNER: Any objections?

MR. BRUCE: No, sir.

EXAMINER STOGNER: Mrs. Colby is so qualified.

Q. (By Mr. Kellahin) Let me direct your attention, Mrs. Colby, to Richardson Exhibit A-1. Find for us how you have indicated the area that you have applied to the Division for a special infill area. Is it identified by a color code or a black boundary or some other indication?

A. It's indicated by the cross-hached black boundary. We outlined the area where Richardson has gas leases that overlapped with the coal lease, and we went out one mile as a buffer area.

Q. Okay, I'm going to come back to Exhibit A-1 for more detail, but let's go to Exhibit A-2 and look at these together.

A. Okay.

Q. When we look at Exhibit A-2, what's the significance of the yellow color code?

A. The yellow indicates where Richardson owns oil and gas leaseholds.

Q. Okay. How do we find the symbol that's associated with the coalbed methane wells?

A. Well, in the legend are the symbols for the various types of wells. The coalbed methane -- the second one down is the symbol for the Fruitland Coal-Pictured Cliffs downhole commingled, and that is what our intent would be, is where we're currently permitted to have a Pictured Cliffs well, to also be allowed to open up the

Fruitland Coal in the same wellbore.
Q. Was that Richardson's plan of development and operation before the coal leases were a topic of discussion?
A. Yes, in the two locations within the section, the northeast quarter and the southwest quarter, where we're permitted to drill a Coal well and a Pictured Cliffs well, this is the procedure that we do, we would go ahead and downhole the two formations.
Q. That rule is part of the Division's Basin-Fruitland Coal Gas Pool Rules, is it not?
A. Yes.
Q. Where you drill the -- either the northeast quarter or the southwest quarter of the section?
A. That's correct.
Q. When we look at Exhibit Number A-2, what is the significance of the red dots?
A. The red dots indicate the locations where we are requesting to recomplete in the Fruitland Coal.
Q. Can you generally describe for us, looking back at Exhibit A-1, what is characterized or known as the coal Deep Lease Extension?
A. The coal lease -- Deep Lease Extension, is a federal lease that is located in 30 North, 14 West, Sections 17, 18, 19, 20, 29, 30 and 31. The Section 32 is

a State of New Mexico coal lease.

If you move to the west is the -- what the Coal Company calls their Deep Lease, and that is the south half of 13, 14, 23, 24, 25, 26 and 35, with the State coal lease being in Section 36.

Richardson does not have any overlapping leases in the federal Deep Lease. We do have the overlapping oil and gas lease in the State Section 36, and then our other federal leases are in the Deep Lease Extension, and then we have two small leases in the State Section 32.

Q. Let's turn to the exhibit book. We'll leave the maps as locators for us, but if you'll turn to Exhibit Number A-3 out of the binder, what does A-3 represent?

A. A-3 is a summarized chronology of events that have occurred since January of 1996.

Q. Did you prepare this chronology?

A. Yes, I did.

Q. This doesn't include every event, does it?

A. No, it does not.

Q. We're trying to summarize certain of the issues that may be helpful or relevant to the Division in deciding what to do, correct?

A. Yes.

Q. All right, let's start with 1996. Starting with the first caption, what are you representing or discussing in 1996 concerning Richardson's -- what he calls the West Farmington Prospect? What's going on?

A. Well, it was back in January of 1996 that we actually identified the West Farmington prospect as a geologically feasible area to drill natural gas wells. Prospect development begins with researching ownership of oil and gas rights in the county, state and federal records, and we began making proposals for leases, farm-in agreements, mineral purchases.

In June of 1997 we drilled our first well, which was the Bushman Federal 6-1, located in the southeast quarter of Section 6 in Township 29 North, Range 14 West.

Q. All right, let me ask you this. By the time that the issue of the extension of the coal lease into what we call the deep extension -- just prior to that, was there an exploration plan by Richardson to develop and explore and produce the coalbed methane?

A. Well, our plans to develop, explore and produce began in 1996, and by the fall of 1997 we were very much into it. And we went to the BLM and the Coal Company to let them know where our leases were, where we planned to drill and where our pipeline system was going to be.

Q. When we look at Exhibit A-2, there are some lines that connect the coal gas wells. What do those represent?

A. The majority of these lines are our natural gas gathering system and our water-gathering system. There's a couple of lines that are shown on here that are actually outside parties' gas lines.

To be specific, what is not a Richardson line is the one that goes from the northwest to the southeast through the Western Gas San Juan Plant, which is a Western Gas Resources line. And then starting in Section 1 and going to the southwest is the El Paso main line.

Other than those two lines, the rest of the system is the Richardson gathering system.

Q. All right. The map indicates a date of preparation of November of this year.

A. Yes.

Q. And so is it current as of November?

A. Yes.

Q. Does Richardson have in place an extensive system for the gathering of coalbed methane?

A. We do.

Q. Is the special infill area part of that system?

A. Yes.

Q. Do you have a disposal well to dispose of the water associated with dewatering of the coal?

A. Well, we actually have one disposal well in the northeast quarter of Section 1. It's listed on here as the Richardson Salty Dog. And we have just gotten an approval on the Salty Dog Number 2, which we plan on very soon commencing. It's located in the southeast quarter of Section 5, in 29-14.

Q. All right. Let's keep the chronology handy, Mrs. Colby, and let's go through some of the documentations so that you can identify several points, one of which is the first topic. I want you to summarize for us the Richardson position concerning the BLM's resource management plan. What position has Richardson taken concerning the plan?

A. At every opportunity we've protested the plan because it did open the door for the first step to allow the coal lease to be offered. And as you can tell by the chronology, we spent a year trying to get people's attention that we had valid existing oil and gas leases and that we were in the process of developing the coalbed methane gas reserves.

Q. Is Exhibit A-4 one of the documents by which Richardson communicated its protest to the Bureau of Land Management?

A. Let's see, actually it's A-4.

Q. I'm sorry, I meant to say A-4. A-4 is one of the documents or letters of protest?

A. Yes.

Q. All right. Let's turn to what's associated with that exhibit. It's marked as Richardson A-4 (i). What does this represent?

A. This is resource management plan amendment which was actually approved in October of 1998.

Q. This is not the entire RMP, is it?

A. No, it's selected pages from it.

Q. Now, is Richardson a consenting or assigning party to the resource management plan?

A. We're not a consenting party, we objected to it.

Q. All right. Has, to the best of your knowledge, San Juan Coal Company consented to the resource management plan?

A. Yes.

Q. In terms of development of the oil and gas in relationship to the development of the coal, what does the plan propose?

A. Well, if you look toward the end of the exhibit, the last three pages are protocol for mediating adverse impacts on oil and gas revenues. This was drafted by the Coal Company. And on the first page, the last paragraph, General Principles, they specifically that "Valid existing rights under federal oil and gas leases...which predate..." San Juan Coal Company's "...coal leases, will be honored."

Q. Do the oil and gas leases that Richardson holds, do they predate the coal leases?

A. This slightly corrects a statement you made in your opening statement, but every one of our leases predates the coal leases.

Q. All right, including -- I was misinformed, there's not an 80-acre tract --

A. No, not a Richardson lease.

Q. All right. Based upon your research, then, your professional opinion as a landman is that all of Richardson's oil and gas leases, whether they're state or federal, were issued and in full force and effect prior to the coal leases, whether they're state or federal?

A. Yes.

Q. In addition to the coal lease itself, has the Bureau of Land Management issued the resource management plan as amended, the document you're looking at?

A. Yes, the Bureau of Land Management approved the coal leasing area resource management plan, October of 1998.

Q. And Richardson protested the plan, has it not?

A. Yes, we did.

Q. All right. Let's turn to Exhibit A-5. What does that represent, Mrs. Colby?

A. A-5, this is another protest.

Q. Okay, let's turn past that. Identify for us A-6. What's that?

A. A-6 is a response which we received from the BLM.

Q. And what's the significance of this? They have not acknowledged the protest, is the way I read the letter, right?

A. I have a little trouble understanding what they were trying to tell us.

Q. All right, let's turn to Exhibit A-7. What does this represent?

A. A-7 -- Well, A-6 actually came out of Washington, and the one thing they did say, that our concerns were going to be passed down to the district office and -- well, the state office in Santa Fe.

A-7 is the response from the Santa Fe BLM office.

Q. All right, let me look at A-7. If you'll look at the third paragraph down, what is the Bureau of Land Management advising you, Mrs. Colby, concerning the commitment of San Juan Coal to the protocol included in the resource management plan?

A. Well, the BLM states that the San Juan Coal Company signed and agreed to "...take all reasonable steps to avoid adverse impacts on oil and gas production..."

Q. All right, let's turn to Exhibit A-8. What's the significance of this letter, again to Richardson? If you'll look at the second sentence of the first paragraph?

A. Yes, this is in response to another protest which we sent on January 10th of 2000. This is the state office addressing our concerns, stating that they will take reasonable actions "...to ensure protection of valid existing gas rights..." and toward the bottom they mention that they have new information that they are going to assess, and I believe that this is concerning the value of the coalbed methane, and that they have canceled the scheduled coal lease sale to allow them to do evaluation of the coalbed methane.

Q. Mr. Bruce in his opening statement said the San Juan Coal Company is going to present evidence to demonstrate that the coal has more value than the gas in the area of conflict. Has that issue been addressed by the BLM within the context of their proceedings, the valuation of coal and the valuation of gas?

A. Well, we know that a BLM coalbed methane expert was asked to do a reserve analysis on the gas in this particular area.

Q. Without talking about the specifics of the detail the question, though, is, the BLM is going through that process, are they not?

A. Yes, and they have been for quite a while.

Q. Let's look at Exhibit A-9. What is this?

A. This is an instructional memorandum issued by the Bureau of Land Management, stating policy on how to deal with conflicts between coalbed methane and coal development.

Q. The instruction memorandum, what items in the instruction memorandum are significant to you that you want to communicate to the Examiner?

A. In the discussion of the issue in the second paragraph it's stated that "...the Bureau's policy is to optimize the recovery of both resources and ensure that the public receives a reasonable return..." and the BLM may use its "...authority to minimize loss of publicly-owned resources."

There's quite a bit of discussion, but if you flip back to page 3, under "Use of Lease Provisions and Regulations", in an effort "To optimize resource development, BLM may: Direct rates of..." coalbed methane "...exploration and development to maximize..." coalbed methane "...gas production prior to coal development..."

The second line from the bottom states they may "Direct the coal lessee to analyze all possible mining plans to allow..." maximum "...recovery..." I think what they're stating here is, rather than go after something that might be more profitable first to the Coal Company, try to get everything recoverable maybe on the western side and give the gas operator chance to take the gas off of the western side.

And then on the next page BLM actually has the authority to "Suspend the coal lease or coal operations to allow optimum recovery of..." coalbed methane.

Q. If you'll continue with Exhibit A-10, what is Richardson doing here in this letter of May 11th, year 2000, to the State Director?

A. Okay, this is another protest written by Richardson.

Q. You're protesting the coal lease?

A. The coal -- the sale of the lease.

Q. All right, let's continue. Exhibit A-11 is a BLM letter back to Richardson. What are the items on this letter that you want to direct our attention to?

A. This letter advises us that our protest came in too late for them to really stop the sale -- They went ahead with the sale, but they did recognize we had legitimate concerns. Toward the bottom of the letter they state, "Although not specified in the Protocol, we will only approve new leases or mine plan modifications that won't impede methane production for the next ten years... ...we encourage rapid development of methane to maximize coalbed methane recovery."

On page 2 they talk about the protocol. We had stated that we felt that coal production would not allow us to maximize our economic recovery, and the BLM states that "The General Principles of the Protocol states,... 'San

Juan Company will use its best efforts to achieve maximum economic recovery of federal resources.'" Again, "'Valid existing rights under federal oil and gas leases, which predate...'" San Juan Coal Company's "'...leases, will be honored.'"

Q. After the receipt of the letter in May of 2000, what is your understanding on behalf of Richardson as what the BLM would like you to do concerning increasing the rate at which exploration and development of the coalbed methane is occurring?

A. Well, we were specifically directed to make this a priority area. We have, you know, many, many areas and states that operate in and drill in, and we were directed to make this a priority, get your wells drilled, accelerate production, and that's what we've been doing.

Q. Let's turn to Exhibit A-12. This is a copy from the *Federal Register*. What's the importance of this?

A. Well, this is the notice that the coal lease was going to be re-offered.

Q. Did the notice of re-offering the coal lease indicate to the public and others, including any proposed coal lessee, that there would be stipulations associated --

A. Yes.

Q. -- with accepting this lease?

A. On page 2 they specifically state what the special stipulations will be. Under the legal description, the next paragraph down states, "The tract is subject to several prior valid and pre-existing surface and subsurface rights." And then down to point (3), "subsurface leases for oil and gas, which include all of the coalbed methane gas within the Fruitland coal, and associated oil and gas lease surface rights for storage, gathering lines, access roads, drilling pads, etc. ..."

So the leases are made specifically subject to the oil and gas leases.

Q. If you'll look at the far left column and look at the last paragraph in that column --

A. Yes.

Q. -- is there additional disclosure to any potential coal lessee of the special stipulations?

A. Yes, "The right to mine and remove coal from the tract is a subordinate right to any and all prior valid and pre-existing rights."

Q. Let's go now to October of the year 2000 and look at the next correspondence in the exhibit package. It's Richardson Exhibit A-13. What's occurring there?

A. There was an advertisement in the *Federal Register* soliciting comments on the resource management plan revision. On October 19th, 2000, Richardson submitted comments.

By this point in time we had met many times with both the Bureau of Land Management and the Coal Company, and in our meetings we had this point identified that "The common thread on which the parties now agree is that, it is in everyone's best interest to allow the oil and gas lessee the opportunity to produce and sell natural gas found in the coal seams prior to commencement of mining operations."

We went on to submit where we stood in our drilling program. At this point we had drilled 31 wells in the area, we had many APDs pending approval, our plan was to drill an additional 25 wells in the fourth quarter of 2000 through the first quarter of 2001, and then in 2002 we would finalize the drilling program with the last 11 wells.

Q. In terms of Richardson's attempt to expedite the development of the coalbed methane, did you communicate to the Bureau of Land Management in January a more detailed plan concerning the drilling program?

A. Excuse me.

Q. I'm looking at Exhibit A-14 at this point.

A. Yes, we did.

Q. Summarize in Exhibit A-14 what you're communicating.

A. Oh, well, actually A-14 is a letter to the BLM expressing concern over the many APDs we had pending approval that had been in the BLM's office for five months or more.

Q. And how many wells are involved -- are addressed in this correspondence?

A. Thirteen.

Q. And these are at this point on file with the BLM, you're attempting to get those permits approved?

A. Yes.

Q. All right. Let's go to Exhibit A-15, which is a January 8th letter that Richardson is sending to the Bureau of Land Management. What are you communicating to the BLM at this point?

A. This letter has an exhibit. When you fold it out, you can see the key.

Q. All right, let's do that. Let me take a moment to unfold the colored map. Is this the colored map that was submitted to the Bureau of Land Management?

A. It's a draft copy.

Q. Okay. What are you communicating to the Bureau of Land Management?

A. We're showing visually where our producing wells are, where we have drilled a well and we are waiting on completion pipeline, where our pending APDs were located and where we plan to drill next.

Q. This is Richardson's coal production system, is it not?

A. Yes.
Q. In addition, it shows areas outside of the current proposed special infill area?
A. Yes.
Q. So if the Examiner looks at this one he can see how the special infill area fits in with the entire Richardson plan?
A. Yes, you can see outlined in red is the actual area of where the coal leases are located.
Q. Okay. Is the coalbed methane gas produced channeled or funneled to some type of gas facility? Do you want to take a break?
A. I just need a Kleenex.
Q. Okay. I haven't brought you to tears, have I?
A. Yes.
Q. You've got allergies, don't you?
A. I do.
Q. I share your concern. All right, are you all right?
A. Uh-huh.
Q. When you look at the gas-gathering system for the coalbed methane, where is it transported by the gathering system, where does it go?
A. If you will notice in 29 North, 15 West -- Well, this doesn't even have your townships and ranges, but where

it says Western Gas Resources -- Excuse me.

Q. There's an area hached in diagonal hach lines, a half section, it says Western Gas Resources San Juan Plant?

A. Right. That is our tie-in point to the El Paso main line.

Q. All right, so you're taking your gas production, PC and coalbed methane and taking it to the gas plant as shown?

A. Yes.

Q. All right. Does this plan at this point show the BLM where you propose to drill additional wells within the conflict area in order to expedite production of the coalbed methane as requested by the BLM?

A. Yes, it does.

Q. All right.

A. This is what we define as our West Farmington Prospect area.

Q. There will be some additional wells -- For example, if you look in the conflict area, Deep Lease Extension, Section 30, for example --

A. Uh-huh.

Q. -- that is an area that only shows the Richardson 30-1 well in the northeast quarter of 30, doesn't it?

A. (Nods)

Q. Since this time, additional wells have been applied for, have they not?

A. Yes, they have, and the reason they don't show up on this map, we obtained additional acreage under a farmout agreement subsequent to January of 2001.

Q. I just wanted to clarify for the Examiner that this is not inclusive --

A. That's correct.

Q. -- of the current situation when he compares this map to your Exhibit Number A-2?

A. Yes, this is where we were in January of 2001.

Q. All right. Let's take, now, the January map and compare it to A-2, to see the additional development you're proposing. For example, in Section 30, 30 North, 14 West, you now have additional wells in Section 30 that are not shown on the map associated with Exhibit A-15, correct?

A. That's correct.

Q. All right. Has the BLM approved additional APDs for Section 30?

A. Yes, Section 30 and also in the north half of 31.

Q. All right. So when we come to those four APDs I mentioned in my opening statement, they're associated with infill drilling in Section 30 and 31?

A. Yes.

Q. It's an area of dispute, and the BLM has issued your approvals over the objection of the coal gas -- I mean, of the San Juan Coal Company?

A. Yes.

Q. All right. Let's turn now to Exhibit A-16. What does this represent, Mrs. Colby?

A. This is a letter that BLM wrote to Dugan, Richardson and the Coal Company, reiterating that it was agreed "...that there is a definite need to expedite development of the gas reserves underlying the Deep Lease in and adjacent to the San Juan...underground area."

Q. And that's what you're intending to attempt to do?

A. Yes.

Q. Look at A-17 and tell me what this is.

A. Oh, this is BLM notifying that the coal lease had been issued.

Q. This is not the entire lease, is it?

A. No, the first page of the lease is shown, notice of offering.

Q. All right, turn to the third page of Exhibit A-17 and direct our attention to that portion of the coal Deep Lease Extension that you want to identify.

A. This actually does come from the lease. It states the special stipulations that were agreed to, and it restates -- Excuse me.

Q. Now, this lease is effective under the process --

It's effective March 1st of the year 2001, isn't it?

A. Yes.

Q. All right. So at this point in time you've got your APDs on file with the BLM, the BLM has gone ahead over your objection and issued the coal. What happens with regards to Exhibit Number 18, A-18? What do these represent?

A. Well, these are the four APDs -- We had just gotten a new farmout on this acreage and immediately went through the process of preparing the federal APD, which is very lengthy, to do the arch. study and to do the environmental assessment. We submitted them the last day of June through the first couple of days of July, 2001. And a couple months later they were approved.

Q. All right, BLM approves the APD. Is there an objection by San Juan Coal Company?

A. Yes, and that is labeled Exhibit A-19.

Q. This is their objection? It's a letter signed by Mr. Lynn Homer [*sic*] on behalf of San Juan Coal Company, is it not?

A. Yes.

Q. In that letter Mr. Homer asks that the BLM attach additional requirements for the oil and gas operator concerning how he's going to drill, case, complete and handle his coal gas well, correct?

A. Yes.

Q. All right. And he makes specific reference to that these conditions are necessary for safety standards?

A. Yes.

Q. So he's got his objection -- or San Juan Coal Company has their objection on file with the BLM, the BLM then does what? The temporarily do what?

A. The temporarily revoke the approval.

Q. Okay, and that's Exhibit A-20?

A. Yes.

Q. All right, then what happens? What's Exhibit A-21?

A. A-21 is a letter from the Bureau of Land Management to the Coal Company stating that they are going to reinstate the leases. They specifically addressed the safety issues presented by the Coal Company in detail, they state their many publications which attempt to address the safety concern raised by BHP with conflicting opinions as to the severity and magnitude.

Q. All right, let's just highlight the issues. If you go back after the introductory paragraph, the next full paragraph that begins, "The protest requests..."

A. Yes.

Q. The Coal Company has raised the issue of hydraulic fracturing of the coal seam with the BLM, have they not?

A. Yes.

Q. In addition, under the next paragraph it says "There are three...safety issues..."?

A. Yes.

Q. These are the same safety issues that they've advised you are topics for the hearing before Mr. Stogner today, correct?

A. Yes, that's correct.

Q. In the last full paragraph at the bottom of the page -- it starts "After reviewing..."

A. Uh-huh

Q. -- what is the Bureau of Land Management communicating at this point?

A. Well, after reviewing the BHP presentation, they feel that there's conflicting opinions, they don't really buy into it.

Q. They direct the Coal Company to address the safety issues in their mine safety plan; is that --

A. Yes.

Q. -- what you conclude here?

A. That's correct.

Q. Let's go to page 2, top of the page.

A. Yes.

Q. What is the BLM Farmington doing concerning the priority issue?

A. Well, the -- Let's see. They specifically say that to impose what the Coal Company is trying to impose on the gas operator "...would constitute an unfair burden on the oil and gas lessees who have priority rights in developing their associated mineral resource." And then they go on to remind BHP of the special stipulations that they agreed to.

Q. After denial of the San Juan Coal Company's protest, did Richardson drill the four wells that were approved by the BLM under this APD approval process?

A. Yes, those wells have been drilled.

Q. Okay, what's the current status of the wells, do you know?

A. I'm not sure whether they've been completed, waiting on pipeline, I don't know.

Q. But you know they've been drilled?

A. Yes.

Q. Let's cover the notification issue. It's not in your exhibit book, but let me give you what I've marked as Exhibit A-22.

The Division order that establishes the Basin-Fruitland Coal Gas Pool Rules contains a Rule 4. It has to do with establishing a special infill area, does it not?

A. Yes.

Q. Pursuant to that rule, did you notify the oil and gas operators of wells that were within what we're asking to be the special infill area?

A. Yes, we gave -- within the project area we gave notice to the Fruitland Coal operators.

Q. And who are those operators? They should be listed on Exhibit --

A. Well, Dugan and Richardson are the only Fruitland Coal operators in the area.

Q. Who are the other two entities listed on the notice of mailing?

A. Questar and Calpine are working interest owners not yet drilled.

Q. Are there any other oil and gas operators within the special infill area that you're aware of?

A. No.

Q. To the best of your knowledge, then, you've notified the operators and the working interest owners of any undrilled leases within the special infill area?

A. That's correct.

MR. KELLAHIN: Mr. Examiner, that concludes my examination of --

THE WITNESS: Oh, and we did have -- we went one mile outside the project area and identified all Fruitland Coal operators and considered them for notice.

MR. KELLAHIN: All right, that concludes my examination of Mrs. Colby.

We move the introduction of Exhibits A-1 through A-22.

EXAMINER STOGNER: Any objection?

MR. BRUCE: No, sir.

EXAMINER STOGNER: Exhibits A-1 through A-22 will be admitted into evidence at this time. Thank you, Mr. Kellahin.

MR. KELLAHIN: Do you need a short break, Cathy?

THE WITNESS: Yes, that would be nice, five minutes.

MR. KELLAHIN: May we have a short break so she can catch her breath here?

EXAMINER STOGNER: Five to ten minutes.

(Thereupon, a recess was taken at 9:30 a.m.)

(The following proceedings had at 9:40 a.m.)

EXAMINER STOGNER: Thank you.

Mr. Bruce, your witness.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Ms. Colby, why don't you take out your Exhibits A-1 and A-2 for the most part, or A-1 first. I just wanted to understand Richardson's lease holdings in this area.

Do I understand correctly, outlined in blue is --

are those Richardson leases?

A. Yes.

Q. Okay. Starting in -- Okay, Section 19, and it covers the south half of 19 and the west half of 20, what -- are Richardson's leasehold interests in this area limited in depth overall?

A. We have various rights. Under some of our farmout agreements we received surface to base of Pictured Cliffs. We have some leases that we went in and picked up at federal lease sales so we would have all depths in those.

Q. Okay. Well, let's start, then, with that first lease covering the south half of 19 and south half of 20. What are -- Are there any depth limitations in that lease?

A. Okay, the south half of 19 and west half of 20 would be surface to base of Pictured Cliffs.

Q. Okay.

A. That would be the same for the northeast quarter, southeast quarter would be all depths.

Q. Okay, what about Section 29?

A. Okay, Section 29, 30 and the north half of 31 were all obtained under farmout agreements and were limited surface-to-base-of-Pictured Cliffs formation.

Section 32, those are leases that we bought from another oil and gas operator, and I believe were limited in depth, surface-to-base-of-Pictured Cliffs, and that would be the same with Section 36, although that's a farmout agreement rather than a purchase.

Q. In Section 36?

A. Yes.

Q. And the ones in Section 32 to the east were purchased, right?

A. Yes.

Q. What is the general net revenue interest in these leases of Richardson? And I'm assuming Richardson owns 100 percent of the working interest as to those depths; is that correct?

A. Yes, we do. In some situations under farmout agreements there's an option for a back-in after payout.

As far as net revenue, it varies. We previously furnished BHP a schedule showing our leases, our working interest and our net revenue interest.

Q. Okay. What years were these leases either purchased or the farmouts obtained on these leases?

A. Well --

Q. And maybe just start with Section 19 and work your way through like you already did for me.

A. You know, I really can only give you a general idea that most of the transactions occurred in 1996 and 1997, although we did acquire additional acreage in 30 and

31 in mid-2001.

Q. If you'll go on to your Exhibit A-2, I want to understand something about the proposed wells. Let's start with Section 16 on the northeast end of this map. I want to make sure I understand. Richardson already has two Fruitland Coal wells in this section, correct?

A. Yes, and they're actually commingled with the Pictured Cliffs in the northeast quarter and the southwest quarter.

Q. Okay. As to the wells in orange in the northwest quarter and southeast quarter, are those currently Pictured Cliffs wells?

A. Yes, they are.

Q. And what you're proposing is to recomplete them or dually complete them?

A. Yes, I guess you'd call it -- I'm not sure if dually complete is the correct technical term, but to open up both formations in the same wellbore.

Q. Okay, or downhole commingle them perhaps?

A. Yes, right.

Q. And then move on to Section 19. Will that be a new well?

A. Yes, there are two -- Where it's just a plain circle, those are locations.

Q. Okay. So as to all of the plain circles, those are new -- In other words, a circle with a small circle inside of it?

A. Or a symbol with a small circle inside of it.

Q. And to the best of your knowledge, will all of the Pictured Cliffs wells that will be opened up in the Fruitland Coal also remain productive, remain as producers from the Pictured Cliffs?

A. Yes.

Q. Do you have any knowledge of what -- on the Dugan acreage and on the Calpine acreage, if they have any plans for additional wells?

A. I have no idea.

Q. Are there any additional proposed Pictured Cliffs wells which are not on this map?

A. If there's a location that's a Pictured Cliffs well that has not yet been drilled, we are proposing that it would be a downhole commingle Pictured Cliffs-Fruitland Coal well. So we don't have any that we're proposing just to the Pictured Cliffs at this time.

Q. So any well -- If one of the new wells would be drilled to the Fruitland Coal, it would also be drilled down to the Pictured Cliffs?

A. With the approval of the infill, unless it's already a pre-approved location.

Q. Now, the hached line gives the proposed infill area. Could you tell me again how you arrived at that particular area? I just want to make sure I'm clear.

A. Okay, we outlined every section where we had acreage that is within -- overlapping a coal lease, and in addition we went out one tier of sections as a protection buffer area.

Q. Okay, now -- So that would be one tier to the east and one tier to the south. Comparing that with your Exhibit A-1, you really didn't go up one tier to the north, did you?

A. We did not because we have no acreage one tier to the north. Nor did we go one tier to the west, because we didn't have acreage there either.

Q. Now, as to the new wells that are on Exhibit A-2, have those locations already been -- I mean, footages for those locations already been chosen, or are those approximate locations?

A. A combination of the two, both.

Q. For the ones that have already been chosen with respect to footages, how were the locations chosen? Was it due to topographic reasons, was it geology, was it archaeology?

A. All of the above.

Q. Which wells are approximate, which of the new wells that you have on here have approximate locations as opposed to specific footage locations?

A. Well, I'm going to guess that the south half of 19 might be approximate. I would say a general rule of thumb would be if it's located directly in the middle of the 160-acre quarter section, then it's approximate.

So I would believe that the 36-4 in the northwest quarter of 36, and 3015 is an approximate footage.

Q. The same might also be true for Section 1 to the south and --

A. Yes, and the --

Q. -- Section 6 --

A. -- Pittam Pond 2, yes.

Q. And as to the ones that have specific footages, have APDS been applied for those yet? Or have they been filed, I should say?

A. I believe that two of the locations, APDs were filed. The WF Federal 30-2, which is in the southeast quarter of 30, refiled an APD. We're hesitant to drill that strictly as a PC well. We feel that there's good potential if we're allowed to commingle the two formations.

And that also applies, I believe -- We have a federal APD that was filed on the northwest quarter of 20, the WF Federal 20-4. And with the same remark, a stand-alone PC well, we're hesitant to drill at this time, but if you add in the Coal, that's a good, viable location.

Q. Do you have any idea as to the approximate costs of these wells, drilled and completed?

A. No, I don't.

Q. Does one of your other witnesses have that knowledge?

A. Yes.

Q. As to the wells that are already drilled on here, as to their producing status, production from the wells, do you have that knowledge, or will another witness have that?

A. The producing status. You mean whether they're producing or not, or rates?

Q. I'm -- Yeah, whether or not they're producing, and as to their rates and cumulative production.

A. I have a general idea which wells are producing. But on the more current ones I might not be completely up to date.

Q. Will there be another witness who would have --

A. Yes.

Q. -- current producing data?

Just one final thing, Ms. Colby. You were testifying about valid existing rights with a number of your exhibits. Now, you're a landman, right?

A. Yes.

Q. And not an attorney?

A. That's correct.

Q. And you know what constitutes valid existing rights is generally a legal issue determined by the courts and BLM, is it not?

A. I don't know if I agree or disagree with that statement.

MR. BRUCE: That's all I have, Mr. Examiner.

EXAMINER STOGNER: Any redirect?

MR. KELLAHIN: No, sir.

EXAMINATION

BY EXAMINER STOGNER:

Q. In referring to the first two maps, that proposed Fruitland Coal infill area extends beyond a mile from the coal leasing area; is that correct?

A. Yes.

Q. What do you mean by "buffer zone"? Buffering who from what?

A. Well, if the coal mine is opening up the seams at the border of our lease just outside, we believe that gas is going to be migrating to the open seam and lost to the atmosphere or else vented through their ventilation system.

And we also have been informed that the coal mine expects to continue to move to the east beyond their current coal lease area. And so given that production of the coalbed methane, it's a very long-lived formation to produce. If it's a 20, 25, 30-year area to produce the gas, we'd like to have as much time as possible to produce it through our wellbores prior to the mining operations affecting it, and that's why we chose to go out for one mile, which might be conservative.

Q. Okay, I'm going to refer now to Exhibit Number A-11, which is the BLM letter of May 26th. I haven't had a chance to read all of these, obviously, but I want to refer down to the last paragraph on page 1, "Given your situation, we encourage rapid development of methane to maximize coalbed methane recovery."

Was this in response to one of your previous letters, Richardson's previous letters, to accelerate it, or was this out of their context to encourage you to rapidly develop the coal gas?

Again, I haven't read any of these yet.

A. Right. I don't think that they were responding specifically to our letter of May 11th, which they reference. We at this point in time had gone through many meetings with both the BHP and the Coal Company, and the first round of meetings, we basically brought to everybody's attention that there is gas in those coal seams that needs to be recognized and should be produced.

And then we evolved into quantifying that, yes, it's economic play, and as it -- during the process of -- since fall of 1997, Richardson was continuing to drill, continuing to prove that there was gas out there, and the emphasis then became on, how do we get that gas out quickly? And I think that's what they're referring to here, is, do what you can to get the gas out quickly.

Later in the discussions there was such an emphasis put on they asked us, What incentives can we give you to accelerate the removal of the gas?

Q. Okay, your A-18 exhibit, these are the APDs. Are these infill coal gas wells?

A. Infill coal gas -- They are a part of our Application today Let's see. Some of them we've already been allowed -- You know, it says standard coal location, we permit it as a coal well and as a downhole commingled Pictured Cliffs coal well. And if you notice on -- it's Box Number 10, "Field and Pool", that's what we were permitting. So the 30-4 is a Pictured Cliffs well. And then the 31-1, this is pre-application, a Coal-Pictured Cliffs commingle. And then the 31-2, Twin Mountains-Pictured Cliffs.

So all of the wells have been drilled through the Pictured Cliffs, and two of them -- Let's see. Actually, three out of these four are standard Pictured Cliffs locations that we would also -- No, actually two of them are standard Pictured Cliffs locations that we would like the ability to also open up the Coal.

Q. Now, these APDs that are reflected in A-18, are they the ones that are mentioned or discussed in the A-3 exhibit, the chronology, when it talks about -- the 6-30 to the 7-30, Richardson filed APDs? These are the four wells that are reflected?

A. Yes, they are, the same wells.

Q. Okay. Now, up in the chronology, on A-3, on January the 4th you talk about "Richardson writes BLM because 13 of its APD's have been pending approval 5+ moths due to EA issues." Were any of these infill wells, or were these all coal gas wells that were holding 320 acres?

A. Those, I believe, are a mix. If you look at Exhibit A-14, on the legal descriptions the northeast quarter would be -- you'd be allowed to have both Fruitland Coal and Pictured Cliffs. Southeast quarter would be strictly Pictured Cliffs. Southwest would be the commingled and northwest would be strictly Pictured Cliffs.

Our concern at this point was, we had many, many APDs that weren't getting processed. And most of these are just outside of the coal area, but it was our belief that the coal issue is bigger than what is currently under a coal lease. And we threw in a couple of our Navajo ones, which are a little bit removed, but just because they had been in the BLM after undergoing a year to get it through all the Navajo approvals, which we did, then they sat in the BLM for another -- more than half a year.

EXAMINER STOGNER: Are there any other questions of Mrs. Colby at this time?

MR. KELLAHIN: Yes, Mr. Examiner, I'd like to follow up on your questions to her.

EXAMINER STOGNER: Okay.

FURTHER EXAMINATION

MR. KELLAHIN:

Q. Mrs. Colby, I'm going to try and understand. In response to Mr. Stogner's question you were looking, for example, at Section 30 on your Exhibit Number A-2?

A. Uh-huh.

Q. Am I correct in understanding that if you had an approved APD for your well, that if it is an infill coal gas location, the well was drilled to the PC and in theory, these wells, while approved, have been drilled but not completed, correct?

A. I'm not sure if they've been completed yet or not.

Q. Will you comply with the Oil Conservation Division Rules that prior to completing and producing the infill coal location in that wellbore you will get the necessary infill approvals?

A. Oh, yes.

Q. All right.

A. And we've drilled many wells in this area just to the Pictured Cliffs.

Q. That's what I'm trying to make clear.

A. And then it's very easy to come uphole and also open up the second --

Q. But that has not been done in these wellbores?

A. No, it has not.

Q. And that's part of your request in this area, is to have the opportunity to do that?

A. Yes.

Q. So you do not have any wellbore that is not in compliance?

A. No, we don't.

Q. You're not producing an off-pattern coal gas well?

A. No.

Q. Okay. You may have drilled them, but they're not yet --

A. Right.

MR. KELLAHIN: -- producing?

Okay, I just wanted to make sure I understood. Thank you.

EXAMINER STOGNER: Any other questions?

MR. BRUCE: Just one question.

EXAMINER STOGNER: Mr. Bruce.

FURTHER EXAMINATION

BY MR. BRUCE:

Q. Now, looking at your chronology, Ms. Colby, you've known of -- "you" meaning Richardson, has known of San Juan's plans to seek and develop a coal lease, the Deep Lease Extension, for over four years now; is that correct?

A. We were first notified -- Oh, gosh, I don't have that here. I think it was October of 1997. There was a meeting held in Farmington, and we got notice of it two days before the meeting occurred, two business days, and didn't have enough time to attend. But that's when we were first put on notice.

Q. Okay, and Richardson protested the issuance of that coal lease until it was issued, did it not?

A. Yes, and even after it was issued.

MR. BRUCE: Okay, thank you.

EXAMINER STOGNER: Any other questions of Ms. Colby?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: You may be excused.

MR. KELLAHIN: Thank you, Mr. Examiner.

Mr. Examiner, we would like to make our geologic presentation to you at this time, and we're going to call Mr. Richard Shapiro, S-h-a-p-i-r-o.

MR. BROOKS: You can come up here if you want to talk to the Examiner, Steve.

MR. HAYDEN: I just wanted to make the statement that the Twin Mounds and Harper Coal Pools are not just Pictured Cliffs, they're -- any well authorized for them is authorized for Pictured Cliffs and the Fruitland sands which bracket the coal. So just to make that clear. It's been referred to as just Pictured Cliffs, but it's not.

MR. BROOKS: Thank you.

MR. KELLAHIN: Thank you, Mr. Examiner.

RICHARD SHAPIRO,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Shapiro, would you please state your name and occupation?

A. Richard Shapiro, and I'm a petroleum geologist.

Q. Where do you reside, sir?

A. Littleton, Colorado.

Q. On prior occasions have you testified before the Division as an expert petroleum geologist?

A. Not this Division, no.

Q. Would you summarize for us your education, telling us what type of degree you have and when and where you obtained it?

A. Well, I got my BS in geology from the University of Tulsa, 1975, and prior to that I had a BS in biology from Minnesota.

Q. After graduation with your BS in geology, how did you pursue a career as a petroleum geologist?

A. Well, I worked for Dyco Petroleum for five years, both in the Tulsa and the Denver office. In the Tulsa office I was an area geologist responsible for Rocky Mountains, mid-continent, Gulf Coast and Canada. After a year there I was transferred to Denver where I was a senior geologist working the same areas.

I left Dyco Petroleum and went to work for Cavalier Exploration for a year, where I was their prospect geologist.

And from 1981 on I've been a consulting geologist. Some of the companies I've consulted for are States Exploration, Richardson Operating, General Atlantic and again Dyco Petroleum. I've appeared as an expert witness on behalf of States Exploration in the State of Oklahoma. I've appeared as an expert witness in the State of North Dakota concerning a private lawsuit. And currently I am still consulting.

Q. Let me ask you about your experience in the San Juan Basin, particularly mapping the geology of the Basin-Fruitland Coal and the Pictured Cliff formations.

A. I've been doing that for approximately three and a half years.

Q. As part of your consulting responsibilities to Mr. Richardson, were you asked to develop a series of geologic displays and maps and analyze certain geologic issues concerning the coalbed methane and the Pictured Cliffs?

A. Yes, I was.

Q. And you've accomplished that at this point, have you not?

A. Yes, I have.

Q. When we look at your displays, we're going to look at what type of geologic displays?

A. Well, I've done a series of maps which encompass the structure of the Fruitland Coal, also isopach thickness of the lower and upper coals, as well as a series of cross-sections that will show the relationship of the various coals and coal lenses to each other.

Q. I'm going to give you a locator map, Mr. Shapiro -- it's the map we introduced as Exhibit A-2 -- so that you have visual representation of the special infill area. Were you asked by Mr. Richardson to develop a geologic analysis and prepare geologic displays in the Pictured Cliff and in the Basin-Fruitland Coal over an area that would include what Richardson has applied for as a special infill area?

A. Yes, I was.

Q. And based upon those mappings, you now have certain geologic conclusions and opinions?

A. Yes, I do.

MR. KELLAHIN: We tender Mr. Shapiro as an expert petroleum geologist.

EXAMINER STOGNER: Any objection?

MR. BRUCE: No, sir.

EXAMINER STOGNER: I have a couple of questions along those lines. I notice in your résumé that you provided, you've done work in Colorado, North Dakota, Wyoming and Alabama. How much of that has been, especially in Colorado, of course, the San Juan coalbed or any other coalbed in the other states or provinces of Canada?

THE WITNESS: Well, I've looked at some coalbed geology in Colorado. I'm actually involved in Wyoming in a working interest and override interest in several of the coalbed methane plays, and in North Dakota we have looked at the lignites and are still continuing to do so.

EXAMINER STOGNER: What about the work in Alabama?

THE WITNESS: The work in Alabama concerned no coalbed methane. It was Gulf Coast sand.

EXAMINER STOGNER: Okay, just wanted to clarify that, Mr. Kellahin.

So qualified, by the way.

MR. KELLAHIN: Thank you, Mr. Examiner.

Q. (By Mr. Kellahin) Let me ask you some geologic conclusions, Mr. Shapiro, before we look at the details that support those conclusions. Have you prepared a map of the structure of the coalbed methane through the special infill area and enough in the associated areas to give you an accurate and reliable picture of the structure?

A. Yes, I have.

Q. When we look at the structural position of the coal gas, as you move from west and east, what are the primary geologic conclusions about structure?

A. The structure has a dip of about 100 feet per mile, moving to the east. Basically it's pretty flat out there.

Q. Within the area of request, is there sufficient structural consistency to make it logical to set aside the special area for infill drilling?

A. Yes.

Q. Conversely, is the structure so steep from east to west that you could not have the same well density plan for all of the infill area?

A. Could you say that --

Q. Yes, sir. It's a double negative. When you look from west to east --

A. Yes.

Q. -- the structure is not so steep -- I'm going to rephrase it -- the structure is not so steep that you can't have the same well density rules for the entire proposed special infill area, correct?

A. Correct.

Q. When you look at reservoir continuity -- And you've got a map that's going to show an isopach, I assume?

A. Yes, two of them.

Q. Okay. When you look at the isopach of the coal --

A. Yes.

Q. -- is the sufficient continuity of the coalbed with a certain distance, thickness, to make it geologically logical to have the same rules for the special use area?

A. Yes.

Q. When we look at the special use area --

A. Uh-huh.

A. -- are we within the same geologic trend wherever we go in that special use area?

A. Yeah.

Q. So geologic assumptions that we can make in one part of the special use area would be applicable to other areas?

A. Yes.

Q. Do you see nonconformity or geologic inconsistency that would cause you to want to exclude any of the areas that we've asked for, for the special infill area?

A. No.

Q. Let's look at your work product.

A. Okay.

Q. What's your first exhibit?

A. Well, my first Exhibit is labeled B-2.

Q. All right, we're going to a B-numbering system --

A. Yes.

Q. -- all the B exhibits are the geology exhibits, right? Give me a moment, let me unfold this.

All right, before we look at cross-section B-B', do we have a locator map that would tell me where this line of cross-section is?

A. Yes, that would be located on Exhibit B-3.

Q. B-3.

A. It would be the map in the upper left-hand corner.

Q. All right, Mr. Shapiro, when we look at Exhibit B-3, it's a four-panel montage, is it not?

A. It is.

Q. And in the upper left corner, then, we have in addition to other information the lines of cross-section?

A. That is correct.

Q. Find us the B-B' cross-section that we're looking at when we look at and review Exhibit B-2.

A. Okay, B-B' starts in Section 36, in the southwest quarter, of Township 30 North, Range 15 West. It goes down through Section 5 of 29-14, up to 32 of 30-14, and 33, southwest quarter, of 30-14, and ends in the northeast quarter of Section 34 of 30-14.

Q. Why did you choose that line of cross-section?

A. I felt that that best exemplified the geology of the southern area in question today. It shows both that there is fairly uniform coals throughout the area, as well as localized lenses that also have geologic potential.

Q. Let me make sure I understand the nomenclature.

A. Okay.

Q. When you look at the lower Fruitland Coal, there's a base to that line.

A. Yes.

Q. And then there's a top to that line.

A. Uh-huh.

Q. What are those supposed to indicate?

A. Well, I've chosen to break the Fruitland Coal into two regions, the lower region and the upper region. And if we look at the well in the southwest of Section 33, I've used this as my type log. That would be the second one from the right on the cross-section.

The parameters I used for picking the coal, if it was a bulk-grain density of 2 or less which translates into a neutron porosity of 45 percent or more, I chose to call it a coal. And the field engineers out there, as you can see by the log, are also using various parameters in coloring the coals in.

The very bottom coal I'm calling the basal Fruitland Coal, and that is present throughout the entire area. The base of this coal is a geologic standard that is used for mapping structure in the area.

As we move up, the rest of the coals that are colored in that yellowish color tend to be more lenticular and more localized, but the whole geologic potential. You can see that they do encompass a fair amount of area going from west to east.

Where we start at the pink, that is the most consistent upper coal that I've found in the area. It is not completely uniform, but you can find it in probably 90 percent of the wells, and I used this as the base of the upper coals. And I went from a basal coal of the lower one to 300 feet up through the potential coals in the Fruitland Coal.

Q. When we look at your isopach of the coal --

A. Yes.

Q. -- what portion of the coal are you isopaching that we can relate to the cross-section?

A. In the lower coals, most of them are the coals that are displayed in yellow. But anywhere that I found two feet or more of coal, I included it in a coal package. So it will include all of the lower coals, plus any coals up to the bottom of the upper coals.

And I did the same thing with the upper coals as well. I included all the coals that I ran into as one package and isopached it as a single unit.

Q. Do you happen to be familiar with the San Juan Coal Company's nomenclature where they describe a coal sequence or a coal seam as Coal Seam Number 8?

A. Yes.

Q. How does Coal Seam Number 8 relate to the coal you're mapping on Exhibit B-2?

A. As I understand it, their Coal Seam Number 8 is the basalmost coal of the lower coals and does not include the upper, more lenticular coals.

Q. When we look to the pink area, that would be an area up the wellbore if you will --

A. Yes.

Q. -- in a coal section that's not included in the San Juan Coal Company's Seam 8?

A. That is correct.

Q. Do you know -- Are you familiar with what they call, San Juan Coal Company, calls Seam 9?

A. I believe I am.

Q. All right, sir, what do you believe?

A. I believe that what they're calling Seam 9 is the basalmost of the upper coals that I'm using.

Q. Are you aware that San Juan Coal Company has represented that they can't mine Coal Seam 9?

A. No, I was not.

Q. All right. If you focus on what you have identified as Coal Seam 9, do you find on log analysis the presence of coalbed methane in Seam 9 sequences?

A. Well, I don't on the log sequence, but I did in my research run across a well that was drilled in Section 24 in 1959, the Carpenter well, that tested Seam 9 and I believe recovered 150,000 cubic feet a day on a drill stem test. So from that conclusion I would conclude that the rest of Seam 9 has potential.

Q. Okay, I'm trying to understand the methodology when we look at your isopach. If you will a section, a log section --

A. Yes.

Q. -- as a value --

A. Uh-huh.

Q. -- you'll use your various parameters and cutoffs.

A. Yes.

Q. You will then come with a total thickness for the coal --

A. Yes.

Q. -- that will represent the basal coal, Coal Seam 8, and what you think may be coal that will contribute gas out of sequences above Coal Seam 8?

A. Yeah, that is correct. And I believe there is more coal present that has the potential to contribute gas than just Coal Seam Number 8, so I have chosen to look at that as just a homogeneous body.

Q. Okay. Your conclusion about the continuity of the basal coal throughout the proposed infill area is what, sir?

A. It's present throughout the entire area. It thickens and thins, but nowhere did I find it absent.

Q. Is there a certain estimated minimum thickness that you as a geologist would recommend in terms of positioning a wellbore to access that coalbed methane?

A. Well, I would try to drill it in the thicker coals --

Q. All right.

A. -- if at all possible.

Q. Is there a certain minimum thickness that discourage you beyond the point where you would put a wellbore there?

A. In this area I didn't run into anything I would consider discouraging. I've, in other areas, seen coals produce out of very thin seams, two to three feet.

Q. So geologically, within the special infill area you're satisfied that there is sufficient continuity and thickness to make it appropriate to drill a well and test the coal for methane production?

A. Yes.

Q. Okay. Is there anything else on Exhibit Number B-2?

A. No.

Q. All right, let's go to B-3. What's B-3?

A. B-3 is just a series of maps.

Q. Don't talk from them until we get it unfolded here.

All right, for the record let's identify the four panels, starting from the upper left and going left to right, and then we'll come back and talk about each panel.

A. Okay, the upper left panel is a cross-section panel that shows the four cross-sections that I've run through the area.

The next map is a structure map on the base of the Fruitland Coal.

The lower-left map is an isopach map of the basal Fruitland Coal package.

And the right-hand map is an isopach map of the upper Fruitland Coal.

Q. All right. When we go to the first panel on the montage, the locator map that shows the line of cross-sections --

A. Yes.

Q. -- we've talked about B-B'.

A. That is correct.

Q. In your exhibit package, what other lines of cross-sections do you have?

A. Well, I have A-A', C-C' and D-D', but I think looking at D-D' and the B-B' is sufficient to show how the coal is laid down through the area. I'd be happy to go through all four.

Q. Let's do that after I ask you this.

A. Okay.

Q. The conclusions that you've reached in response to my questions about A-A', are they the same answers you would give to those questions if we addressed ourselves to the other lines of cross-section?

A. You mean B-B', the one we just looked at?

Q. Yes, sir.

A. Yes.

Q. All right, so when we look at all the lines of cross-section going north, south, east, west --

A. Yes.

Q. -- you come to the same geologic conclusions that you've just expressed?

A. Yes, they're all very similar.

Q. Okay. Do you find anything within the special infill area that would cause you as a geologist to recommend something other than what Mr. Richardson has proposed to do in terms of infill drilling the coal?

A. No.

Q. All right. Before we talk about the structure map and the isopachs, let's skip on, then, to B-5, which is your A-A' cross-section --

A. Okay.

Q. -- is that right?

A. How about B-4, D-D'?

Q. Well, let's do that one too. I don't have it, but that's all right.

All right, Mr. Shapiro, what is it about B-4 you want to show us?

A. Well, the D-D' cross-section also incorporates the well that I was using as a type log, which is the well that is in the very center of the cross-section. And again you can see how the correlations on the coal go north-south, tying it to the type log that I used. You can see that the coals are running anywhere from about, oh, 18 to 30 feet on this cross-section in the lower sand package.

The upper sands, you'll note -- or the upper coals, I'm sorry, are somewhat more discontinuous. The Coal Seam 9 you had referred to earlier is not as uniform throughout the area, but you can see that there are several basal coals that all have the same characteristics. And this is one reason I chose to break this into upper and lower coals.

But basically, the main thrust of this cross-section is just to tie the north-south wells to the east-west wells.

Q. That's conventional, traditional, geologic methodology, is it not?

A. It is.

Q. In looking at this line do you come to any different conclusion?

A. No.

Q. All right, let's look at the next one.

A. Okay.

Q. Now we're on B-5.

A. Okay, that would be the northern east-west cross-section, A-A'. And again, you can see that you have the basal coal present throughout the entire cross-section. The well in Section 27, the 27-2 in the northwest quarter of Section 27, 30-14, again is developing some of this upper lower lenticular coal that you can follow into Section 26, and it starts to die off as you go to the west.

Again, the cross-section is very similar to the first two that we've looked at.

Q. All right, sir, let's go to the next exhibit.

A. The final cross-section is the other north-south cross-section, and again no surprises. We have the Seam 8 coal present throughout the area. There are some upper lenses that come and go throughout the north-south, and again we have some upper coals developing.

And this cross-section was tied to the A-A' cross-section by the well -- the 30-1 in the northeast quarter of Section 30 of 30-14. We find the same characteristics going north and south. And again, these show pretty much what the other three have already shown.

Q. You've sliced the area twice north to south --

A. Yes.

Q. -- sliced it twice east to west --

A. Yes.

Q. -- and you come to the conclusion -- What?

A. Well, if we look at the isopach maps --

Q. Okay, let's do that. Let's go back to the montage, Exhibit B-3.

A. This pretty well lays out the conclusions that I've arrived at. In addition to looking at all the wells on the cross-section, I looked at every other available oil and gas well drilled out here, and I've concluded that there's noting geologically that precludes the development that Richardson Production has asked for.

We're seeing an average in the lower coals, I think, of about 22 feet of total coal. In the upper coals, as is shown on the right-hand map, I think we're looking at about 25 feet, on average, throughout the area. I see no minimums that I would stay away from. So I think the entire area geologically is potential.

Structurally, if we go to the upper right-hand map and look at the special project area, we see that the structural elevation runs from about 4450 to about 4750, which gives approximately 300 feet of dip across the project area, or again as I have stated, about 100 feet per mile. The area is pretty flat. Nothing that jumps out at me that would tell me to stay out of here.

Q. In summary, then, Mr. Shapiro, there are nor limiting geologic factors or features that, in your opinion as a geologist, would preclude infill drilling to a density of four wells per section?

A. No, none at all.

MR. KELLAHIN: That concludes my examination of Mr. Shapiro. We move the introduction of his Exhibits B-1 through B-6, I believe it is.

EXAMINER STOGNER: Any objections?

MR. BRUCE: No objection.

EXAMINER STOGNER: Exhibits B-1 through B-6 will be admitted into evidence at this time.

Thank you, Mr. Kellahin.

Mr. Bruce, your witness.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Let's swim out from under the maps here.

Now, was your review mainly limited to the geology, Mr. Shapiro? I mean --

A. Yes.

Q. -- you don't have data on the producing rates of the wells?

A. No, strictly geologic.

Q. Thank you. Really just a couple items, then.

With respect to your examination, did you examine any of the core data provided by San Juan Company to Richardson?

A. No.

Q. Is there a sandstone layer between what has been referred to today as Seam 8 and Seam 9?

A. In places.
Q. In places. You don't see it as continuous?
A. No.
Q. Okay.
A. Some of it looks pretty shaly between Seam 8 and Seam 9.
Q. Okay. Just looking overall at your maps, are you recommending that with respect to the production from the Fruitland Coal, the perforations of the well completions, that they should be completing in Seam 9 as well as Seam 8, in the upper Fruitland Coal as well as the lower Fruitland Coal?
A. I'm stating that it has potential. In my experience, unless a coal is perforated and tested and either produces or doesn't produce, it remains potential. Now, I'm not saying that I would recommend that at this point in time.
Q. But that one older well, you had indicated there was gas present in the upper Fruitland Coal?
A. Yeah, they did test gas out of it.
Q. Okay. Now, back to the core data, do you know how much core data is available?
A. No.
Q. Looking at your Exhibit B-4, Mr. Shapiro, starting over on the right-hand side of your Exhibit 4 --

A. Okay.

Q. -- is that a Fruitland Coal well or a Pictured Cliffs well?

A. It appears to be a Pictured Cliffs well. I've indicated the perforations of all the wells on the cross-section.

Q. So anything below the basal coal, that thick black section, would be a Pictured Cliffs well?

A. That is correct. Or some of the wells actually were produced out of the deeper Dakota. Some of them just drilled through this and I just used the data.

Q. Okay. But when you show the perforations, those perforations are supposed to be in the Pictured Cliffs when they are below the base of the --

A. Yes.

Q. Okay. And move on now to your Exhibit B-6 --

A. Okay.

Q. -- and let's take the -- That's the C-C', and take the second well from the right.

A. Right.

Q. On the left side, is that the gamma-ray?

A. Yes.

Q. On the left side of this well?

A. Yes.

Q. And then over to the right is the density log?

A. Uh-huh.

Q. And you are basing your coal thicknesses on the density log, are they not?

A. Yeah, if it was better than a -- or less than a bulk-grain density of 2.0.

Q. Okay. Doesn't the gamma-ray log show substantially less coal than what the density log shows?

A. Well, sometimes you get the volcanic ashes that affect the radioactivity and the readings on the gamma-ray logs.

Q. But doesn't it show substantially less coal if you take the gamma-ray log? Just looking at the basal Fruitland Coal, what has been referred to as Seam 8, wouldn't that show about 25, 30 percent less coal than the density log?

A. Well, as I said, that is affected by the ashes within the formation, and they affect the gamma-ray. Some of them end up running more radioactive than others.

Q. And that pretty much matches as you go uphole. If you go up to the other basal Fruitland Coal, the gamma-ray would only show about half the coal that the density log shows, does it not?

A. Well, I don't know that the gamma-ray is accurately reading the coal, that's the problem. I think you have to --

Q. Okay, if it is accurately reading the coal, it shows half the coal that the density log shows, isn't it?

A. Well, again, I don't believe that the gamma-ray is accurately showing the coal.

Q. If it is accurately reading the coal, it shows about half of what the density log shows, isn't it?

A. Well, if it's accurately reading the coal -- and I will stipulate accurately, which I don't believe it is -- yes.

Q. Which type of log generally has a higher vertical resolution

A. Pardon?

Q. Does the gamma-ray log or the density log typically have a higher vertical resolution?

A. In what way? Just...

Q. Yeah, which one reads more accurately?

A. I think that the density does.

Q. Just one final question, Mr. Shapiro, and this is on your Exhibit B-3, which is your --

A. Okay.

Q. -- map.

Q. If I'm reading this right, what it shows is that -- and we don't have the infill area outlined on here, but if you go to Section 36 of 30 North, 15 West --

A. Yes.

Q. -- which is more or less in the center of this map --

A. Okay.

Q. -- it shows -- the way you map it, it has very, very good thickness in both the upper Fruitland Coal and the lower Fruitland Coal, does it not?

A. Yes.

MR. BRUCE: Thank you.

EXAMINER STOGNER: Any redirect?

MR. KELLAHIN: No, sir.

EXAMINATION

BY EXAMINER STOGNER:

Q. I want to refer to Exhibit Number B-2 and make sure that I get this seam number accurately according to your testimony. The Seam 8 is the lowestmost yellow, is that correct, the base of the basal of the lower Fruitland Coal?

A. Yes, if you look at the -- probably easier if you start on the far left-hand side in Section 36. It would be that large black -- that very thick area down there. And if you follow that particular yellow area to the right, that is what I would include within Seam 8.

Q. And Seam Number 9 is which one?

A. It would be that first pink one that you run into.

Q. Okay, the first pink one coming down?
A. Going from down to up.
Q. Okay, on the far left?
A. Yeah, the far left would be the only one to the east.
Q. Now, these other secondary -- I'm going to call them secondary contacts, the secondary yellows and that secondary pink one that's not designated as Seam 9 and 8, are they given a number or a name?
A. No, they aren't. They're more localized coals that kind of develop within the area. You won't find them as widespread as Seam 8 or Seam 9. But they were large enough that I could use them as correlating points to show some of the aerial extent.
Q. Okay, B-3, the lower left-hand map, if I look at the far southwestern corner of this map --
A. Okay.
Q. -- does that zero line designate the outcropping, or what am I looking at?
A. Yes, the coal is gone down there, it's too shallow. Or in a couple instances it just was not logged that high as well. I'm assuming as you move to the southwest in some of the nearer wells, you lose the coal fairly quickly.
Q. Okay. Now, when I go to B-6 --

A. Okay.

Q. -- can I assume that that lowermost yellow, the base of the base Fruitland Coal --

A. Yes.

Q. -- is that the Seam 8?

A. That would be Seam 8.

Q. Okay, how about my Seam 9?

A. Seam 9 is fairly discontinuous here, but I would say if you start at the left-hand log again, it would be the only pink that's sprayed in there, and it follows to the east, and I think you lose it actually in the Turks Toast well in Section 18 and then pick it up again in Section 7.

Q. Now, your isopach maps, you're adding up all the pink areas and coming up with the sum --

A. Yes.

Q. -- and the same with all the yellow, not just with the Seam 9 --

A. Yeah, in fact, on the pink map I'm adding in -- if you, say, just go back to, say, cross-section A-A', and look at the first well on the section, you'll see a lot of, say, two- and four-foot coals up and down. I've also included those, but they were too numerous to try to spray it all. So it's basically all the coals I found from the base of the lower up, for about 200 feet.

Q. What's my coal characteristics between the two, the Seam 8 and 9? Is there any --

A. No, they're pretty similar.

Q. Pretty similar?

A. At least on the logs I've got to work with.

Q. How about the actual deposition, the deposition of the two seams at time?

A. Well, I mean it gets younger as you get shallower. Number of unconformities through there, but I would think it would be a pretty similar deposition.

Q. There's no outstanding characteristics between the two?

A. Not that I ran into, no.

Q. Now, all the perforations that you're showing, those are current perforations, or are some of these historical?

A. I tried to put all the perforations on that were available to me to date.

EXAMINER STOGNER: Okay. Any other questions of this witness?

FURTHER EXAMINATION

BY MR. BRUCE:

Q. Just one. I just want to verify. When you're talking about the Seam 9, the upper Fruitland Coal, the only production test you have is what, 1954?

A. 1959. It wasn't a production test, it was a drill stem test.

Q. Drill stem, excuse me.

A. Yeah. I mean, it was a well that went down to the Dakota, they just happened to hit the coal, they tested it on the way down and got gas to surface.

Q. And that's the only data you have from Seam 9, ever?

A. Well, in this area.

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

EXAMINER STOGNER: Mr. Kellahin?

FURTHER EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Shapiro, are you aware of how a coal geologist, as opposed to an oil and gas geologist looking for coalbed methane -- is there a different method or criteria used between the two geologists about coal thickness?

A. I would believe so. I would think that the coal geologist would be looking for something thick enough to mine. Whereas I'm looking at, I think, much thinner beds that are capable of production.

Q. Would your thinner beds of coal still be productive of coalbed methane even if it was shaly? You could increase the shale content?

A. To a degree, yeah.

Q. Okay. So when the coal geologist is looking for a certain quality of coal to mine, that is not the criteria you're using to see what the coal is in terms of retrieving the coalbed methane?

A. No.

MR. KELLAHIN: Okay, no further questions.

EXAMINER STOGNER: Any other questions of this witness?

You may be excused.

MR. KELLAHIN: May I have a couple of minutes to fold all this up, Mr. Stogner?

EXAMINER STOGNER: Let's take a five-minute break. We'll fold up and prepare for the next one.

(Thereupon, a recess was taken at 10:57 a.m.)

(The following proceedings had at 11:08 a.m.)

EXAMINER STOGNER: Hearing will come to order.

Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner. Our next witness is Mr. Dave Cox. Mr. Cox is a petroleum engineer with special expertise in coalbed methane.

I have handed out Mr. Cox's exhibits. They are three-hole punched so you can put them in the binder if you choose to do so. Mr. Cox's résumé is already in the book. It will be behind the last blue tab, you'll see his credentials.

We have marked his exhibits C-1, starting with the résumé, and they continue through C-13. So if anybody fails to get a complete set let me know and we'll take care of that.

We're ready to proceed, Mr. Stogner.

EXAMINER STOGNER: Please.

DAVE O. COX,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

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

A. My name is Dave O. Cox. I am a consulting petroleum engineer.

Q. And where do you reside, sir?

A. I reside at 3035 Deframe Road in Golden, Colorado.

Q. Summarize for us your education, Mr. Cox.

A. I have a bachelor's in petroleum engineering from the Colorado School of Mines in 1974 and a master's of petroleum engineering from the same institution in 1977.

Q. Describe for us your expertise and experience in coalbed methane engineering.

A. All right. I've been working extensively in coalbed methane since 1981. Then from 1981 through 1984 I had a client who had a large leasehold in the Raton Basin and was looking at projects for potential acquisition in Alabama, Pennsylvania and the San Juan Basin.

And from 1984 through 1989 I was working for an independent oil producer, and the only coalbed methane activity I had during that time was in late 1988 and 1989 when I evaluated properties in the San Juan Basin and the Alabama area that had total gas in place of about 4 trillion cubic feet.

In 1990 and 1991 I was an independent consultant in Denver and worked on coalbed methane projects in the San Juan Basin and Alabama.

Then in 1992 I joined Advanced Resources International, which was one of the prime contractors for the Gas Research Institute, who funded much of the coalbed methane science and engineering work that was done in the late 1980s and early 1990s. I worked for them for five years, primarily on coalbed methane projects and all over, Colorado, New Mexico, Alabama, Pennsylvania, Canada, China, Zimbabwe, New Zealand, Australia, India -- We had projects all over the world.

Then in 1997 I joined Questa Engineering Corporation, and we've been working on coalbed methane continuously. While I've been there, I have been a consultant to the Colorado Oil Conservation Commission off and on since 1993, the Southern Ute Indian Tribe since 1995 and to numerous independent and other major oil companies as well.

Q. Do you teach classes anywhere in coalbed methane engineering?

A. Yes, I have taught a number of industry short courses since 1992, I believe, which was the first one I taught. And then I'm also currently teaching a class, graduate-level class, in coalbed methane at the Colorado School of Mines.

Q. Have you been retained by Mr. David Richardson of Richardson Operating Company as a consulting petroleum engineering expert?

A. Yes, I have.

Q. And pursuant to that employment, have you made a study of the engineering factors surrounding his proposal to infill drill a certain portion of the Basin-Fruitland Coal Gas Pool?

A. Yes.

MR. KELLAHIN: We tender Mr. Cox as an expert petroleum engineer with special expertise in coalbed methane.

EXAMINER STOGNER: Any objection?

MR. BRUCE: No, sir.

Q. (By Mr. Kellahin) Let's turn past the --

EXAMINER STOGNER: By the way he's so qualified.

MR. KELLAHIN: I'm sorry.

EXAMINER STOGNER: Now you can put New Mexico on the -- after today.

THE WITNESS: I've actually testified before the Commission before.

EXAMINER STOGNER: Oh, okay, when was that?

THE WITNESS: Gosh, either last year or the year before with the Pendragon-Whiting difficulties.

EXAMINER STOGNER: Say no more, okay.

(Laughter)

EXAMINER STOGNER: So qualified, still.

MR. KELLAHIN: Despite.

Q. (By Mr. Kellahin) I'm going to go through your presentation, Mr. Cox, in several chapters or pieces. I think it would be helpful to have some basic background before we talk about how you've analyzed the Richardson coalbed methane, and I think it would be helpful if you'll describe for us, as it applies to this area, the coalbed methane producing mechanism. How do we extract the coalbed methane from the coal?

A. Okay, the Exhibit C-2 here gives a -- This is actually from the 1991 hearing on the coalbed methane committee application. It actually presents a fairly good summary of the way coalbed methane works.

In coalbed methane, the gas is not stored by compression as we have in a conventional reservoir. Rather, the gas is adsorbed in the micropores and on the cleats -- or in the matrix of that coal. We have what we call cleats, which are natural fractures that occur in the coal. And the cleat system initially is filled with water, so we have to pull that water out for the gas to come, then, and move from the matrix or from the micropores into the cleats and into the well.

So there's a dewatering stage involved in coalbed methane. And because of that, we see a different type of response than we see in a conventional well.

Q. Let's look at the second page of Exhibit C-2, and let's look at what happens to a production decline curve in a conventional gas reservoir, the top curve.

A. Okay. The top curve here, for a conventional decline curve, what we see is, the gas rate falls off as we produce the well, because we're pulling energy out of the system, we're pulling gas out, we have lower pressure, then, and less energy to drive the gas through the well, and that's what causes the decline curve on a conventional well.

Q. What happens in a coalbed methane reservoir?

A. In coalbed methane we have what's listed here as a "'Negative' Decline Period" where from -- beyond the very early beginning of the well there, the production actually increases with time. And what's happening there is, as we pull water out of the coal and get dewatering, we're increasing the effective permeability to gas in the cleat system. And that increase is more than offsetting the pressure decline in the reservoir. So the increase in permeability associated with dewatering causes the production to increase.

Than at some later point there, we no longer have an increase, or a sufficient increase in permeability to gas, to offset the decline, and the well begins to decline.

Q. If I'm a reservoir engineer in a conventional dry gas reservoir and my task is to estimate gas in place and then estimate what I think is the estimated ultimate recovery, I have been schooled to try to prepare either a P/Z plot utilizing pressure, or a production-decline plot so I have a nice decline and I can forecast an EUR.

Can you do those things in a coalbed methane reservoir?

A. We can, but they're far, far more difficult. The decline curve, in order to use that decline curve, we need to be past this initial incline and well into the decline before we can actually use a decline curve.

One of the examples I give in my classes is, I hand out wells where you have the first two years of production and ask students to draw a decline curve on that, and then show them that same well with four years of history or six years. And frankly, during this incline period you can't use standard decline-curve techniques.

Q. Is Mr. Richardson's population of coalbed methane wells in that early time portion where we don't have an established decline to use a conventional methodology to get an EUR?

A. That's exactly right. These wells have been on, in some cases, less than 30 days, up to a few years, and they're still climbing and not sufficient production behavior to use decline curve analysis.

Q. Is there an established, recognized engineering methodology to utilize in coalbed methane reservoir analysis to get you to an estimate of gas in place and then a forecast of estimated ultimate recovery?

A. Yes, there is. There's what we call the adsorption isotherm, provides a measure of the amount of gas that the coal holds at different points, or at different pressures, and as that pressure declines, then, when the coal is producing along the isotherm, we can use that information to determine the gas in place or the ultimate recovery.

Q. What type of data is utilized to prepare the adsorption isotherm?

A. The adsorption isotherm is normally determined from core material. So it's ground up and laboratory procedures have been established to determine the -- basically it's called the adsorptive capacity or the amount of gas that the coal can hold.

Q. Let's turn to the last page of Exhibit C-2 and have you give us an illustration of an adsorption isotherm.

A. Okay. This particular example shows two different cases, coal A and coal B. Let's first look at Coal A where the coal is completely saturated with gas at the particular pressure that's involved. And in this case that's a little over 1900 p.s.i., looking at the X axis. And we look over there at the Y axis, we find that's just over 600 standard cubic feet per ton.

Now, in coalbed methane we normally use standard cubic feet per ton because the coal is measured -- the coal in place is generally measured or calculated in tons.

So what this says is, coal A here is saturated and would contain at that pressure -- that's reservoir pressure -- it would hold about 600 standard cubic feet per ton.

Q. When you characterize coal A as saturated, what are you saying?

A. What it's saying is that that coal contains as much gas as it can hold.

Q. And coal B is undersaturated. What do you mean by that?

A. Coal B being undersaturated in this example refers to the case where the coal has less gas in it than it could hold. So some of the gas -- When coal is formed, it generates many times more gas than it can hold. Typically five to ten times as much methane is generated in the coalification process than the coal can hold. And so most of that gas has escaped.

In some cases we find that more has escaped than what the coal can hold, and that's when we get a case like coal B.

Now, it's very important to recognize whether the coal is saturated or undersaturated, because it has strong implications as to producing character.

Q. Can I rely upon these isotherms, independent of whether the well has been dewatered? Is water a component of the calculation that I have to take that into consideration?

A. Not really. The water is present in the coal in the cleat system. The majority of the gas is present in the matrix, it's stored in the matrix. So the two are somewhat different. Now, the water is the reason that the gas is still held in the coal.

If we had a system that's open, as, for example, most of these basins are, if we didn't have the head of water sitting on that coal, the gas would have escaped a long time ago. And this, for example, is exactly what happened in the southern part of the Uintah Basin.

Q. Show me how to read the display first with a coal A that is saturated.

A. Okay. If we start out here with this saturated coal and it's got a content of 600 standard cubic feet per ton at about 1900 p.s.i., let's consider what happens as we drop -- first, just drop from 1900 to 1890, if we take that first 10-p.s.i. pressure drop. Since we're on the isotherm it's fully saturated. And as we pull that pressure down, the coal holds less gas in place at 1890 than it would hold at 1900. Because of that, it has to evolve some gas, and that gas, then, is produced at the wells.

So one of the characteristics of a saturated coal is, you begin getting gas production very early in the life.

Then as we carry it down -- Let's say we go down to 1000 p.s.i. From 1900 down to 1000, at 1000 we're approximately 460 or 470 standard cubic feet per ton. So we go from 600 to 470. We recover just less than a quarter of the gas in place by cutting the pressure almost in half.

And this is, again, a characteristic of coalbed methane reservoirs. You have to draw them down to very low pressures to get high recoveries.

Now, if you drop it down to, say -- Let's look at down into the range of 50 p.s.i., then we're down into a gas content that on this curve would be approximately 30 cubic feet per ton, so if you drop it to 50 p.s.i., you're going to get almost all the gas that's there. You'll get well over 90 percent of the gas that's actually there.

So this is the way that a saturated coal would work.

Q. Let me ask you some questions about how to read the display. First of all, as a coalbed methane engineer, you will derive an isotherm curve from various sources, right?

A. That's correct.

Q. Do you attempt to find an isotherm curve that fits the characteristic of the area that you're trying to examine?

A. Yes.

Q. Will it vary throughout the San Juan Basin?

A. Yes, the -- There are several things that cause it to very. There are two very key ones. The first one is, the ash content of the coals vary substantially from coal to coal and location to location.

If you take an average ash content for the Basin, it would be approximately 20 percent, but the range that you see will be anywhere from -- well, where coalbed methane has been produced, anywhere from 5-percent ash clear up to over 70-percent ash that establish production. So ash content makes a huge impact.

The second thing is that some areas of the Basin, because of differences in the coal properties, actually have a different isotherm. So the fairway of the San Juan Basin that has extremely high production and very high recoveries actually has a somewhat lower isotherm than the rest of the Basin. But because the coals there are at such high pressures, even with an isotherm that's somewhat lower than that of the rest of the Basin, you still have very good gas in place and very good productive capacity.

Q. The special infill area is in the underpressured area north and west of Farmington, is it not? We're in the underpressured area?

A. It's in the underpressured area, I'm not sure where it is in relation to Farmington.

Q. Let me have you help me read the display. If I -- and this pressure, is that a bottomhole pressure, reservoir pressure?

A. Yes, this would be the average reservoir pressure in the coal.

Q. All right, let's say I have a well that I complete and the bottomhole pressure is 1900 pounds. I would read vertically on the X axis until I intersect the isotherm curve, and then I would read horizontally to the left and find the gas content of the coal?

A. That's correct.

Q. So if it's approximately 600 standard cubic feet of gas per ton of coal, what do I do with that number?

A. Well, that number -- I can then use that times the coal thickness and the area and the coal density, because those three combined give me the total tons of coal that are present, to determine the gas in place.

Q. Correspondingly, as I move down this line to 1500 pounds, it will vertically intersect the isotherm curve and then I can read across horizontally and get my gas content?

A. Right, and at 1500 it would be a lower number. at an eyeball, it looks like it would be about 550.

Q. All right. Having the illustration or the cartoon, how have you then taken this methodology and applied it to the Richardson proposed infill area?

A. Okay, my Exhibit C-3 shows the isotherms for this and other areas. What I've done here in this exhibit is, I've plotted the two measured isotherms to BHP measured on one of their coreholes from two different seams there, and those are -- they're Test 151, which is the red curve, which is the higher curve there, and Test 152, which is the green curve, which is the lowest curve there. So these are two particular isotherms that were measured on isotherms right in this area.

Q. I've referred to the opponents as the San Juan Coal Company. BHP is your shorthand for the same entity, right?

A. Oh, excuse me, yes. The San Juan Coal Company would be correct, yes.

Q. I just wanted to make clear, we're not introducing data from some other place?

A. No, that's correct.

Q. All right. Continue, please.

A. Okay. So what I have done is, this type of variation is exactly what we see -- If we ran ten isotherms, we'd still have considerable variation between each particular isotherm, because the coal properties do change from point to point and seam to seam. So because of that, to get at the productive character what I've done is drawn an average curve here, which is the blue curve, which would represent an average isotherm for this area.

And in this particular case, as you can see, if we use this blue isotherm at 300 p.s.i., we'd be looking at around 280, roughly, standard cubic feet per ton.

And if we had 150 p.s.i., for example, we'd be looking at about 160 standard cubic feet per ton.

Now, I've also compared this isotherm to an average isotherm for the San Juan Basin, to show that this coal here is similar to that coal that's productive in the rest of the Basin. And you can see, the average isotherm has a little more curvature -- that's the purple curve there -- but we're still looking if we have pressures in the 150-to-300-p.s.i. range, we're still looking at about the same range of gas content here.

Q. Has your analysis of the Richardson area been independent of any other engineer's analysis? This is your own work product, is it not?

A. Oh, absolutely, yes.

Q. What's the relationship between the San Juan Basin average and the average you have chosen? Is there a material difference between the two that we should worry about?

A. No. Frankly, within this range at these low pressures, you could use any of these four curves, and the key point is going to be that if the coal is saturated in the vicinity -- even at 100 p.s.i., we're looking at 100 to 140 standard cubic feet per ton. This is plenty sufficient to establish commercial production.

The Powder River Basin, for example, most of the coals there, you're looking at only 30 to 70 standard cubic feet per ton. Raton Basin is certainly much higher, but the shallow coals in the Raton Basin are also in this 150 to 250 cubic feet per ton.

So this is very comparable to other productive areas.

Q. Is the isotherm you've selected on C-3 applicable to all the areas of Mr. Richardson's Application for infill drilling?

A. Yes, it should be. Again, if you had a hundred isotherms you would have variation, but in terms of an average I think it's a very good number.

Q. Once you've satisfied yourself that you have a reliable isotherm, what then do you need?

A. Well, my next step then -- I actually have two points. The first one is, I need to make sure that the coal is saturated. And the second point is, I need to know at what pressure is the saturation pressure of the coal?

What we're talking about here is, if the coal, for example, were undersaturated -- maybe it contains 300 p.s.i., but it only has enough gas to be saturated at 50 p.s.i., and so we have to determine whether the coal is saturated or not.

Q. If I'm dealing with undersaturated coal, am I producing gas when I'm below the curve, or do I have to be left and above the curve in order to produce gas?

A. Well, you have to be basically on the curve to produce gas. If you're below the curve, all that gas is being held there by the pressure of the water in the cleat system, and you're not making any gas. So if you're producing gas, you have to be on the isotherm. There has to be a free gas space there in order to be producing.

Q. To get myself on the isotherm curve, then, I've got to dewater my well, or the area?

A. That's correct. You do -- In fact, you have to dewater anyway, though. I think it's important to clarify the difference here. We have to pull the water out anyway to bring the pressure down.

But if we're undersaturated -- Let's take as an example, suppose we only had 50 cubic feet per ton and our pressure was 300 pounds. If we look at this Exhibit C-3, we'd see that 50 standard cubic feet per ton would correspond to something around 30 p.s.i., and that's 30 p.s.i.a. now. So what that would say is, we'd have to drop -- if our initial pressure is 300, we'd have to drop that reservoir pressure from 300 down to 30 before we began getting production.

Q. What did you do -- You say you now need pressure data?

A. That's correct.

Q. What do we do, how do we get it?

A. Okay, there area few measured pressure points within this area. I found five points that I could tell with their background where they came from, and those are listed on Exhibit C-4.

Q. Okay. Identify and describe that for us.

A. Okay, what I've done here is, I've listed these points where I have initial pressure information in or near the Richardson Application area. So I have first the well that the pressure was measured on, and so -- there's five of these -- the well's location; the zone that the well was completed in, or at least was reported to have been completed in; the date of the test; then the reported pressure.

And what I've done on this pressure, if it looks like the pressure was p.s.i.g. or a gauge pressure, I've corrected it to atmospheric. So it's absolute pressure or total pressure.

Then the depth at which the reading was taken and the ground level for KB, Kelly bushing, elevation of the well. And the reason I wanted that is so that I can convert to an equivalent potentiometric surface elevation.

And then also I've calculated the gradient in p.s.i. per foot for that depth, and I've included a few comments here on each of the tests to tell what the test implied of what additional information that I felt was relevant.

Q. Now that I have a reliable isotherm and now that I have some accurate pressure data, what do I do?

A. Okay, let's take -- For example, if we take this W.F. State 36-2 test, which showed a pressure of 192.5 p.s.i.a., and what that is, that's actually a casing pressure of 180 p.s.i.g., so I've added 12.5 to correct for atmospheric. Now, there was a fluid level in this well, but when we have gas wells like this, the water level is often gassy, and so this is going to give me a minimum bottomhole pressure if I ignore the effects of the fluid level in the well. So I calculated the 192.5 p.s.i. at this depth of 608 feet.

Now, if we were to come into the isotherm here, if that's saturated under those conditions back on Exhibit C-3, going up the average isotherm I come in first on the X axis at 192.5, I'd read up to the average isotherm and then read across. It would be just over, or right around, 200 standard cubic feet per ton. And that, then, is the methane-holding capacity of the coal at that condition.

Q. Once I have that value, can I then calculate or estimate what would be the gas in place?

A. Yes, I can.

Q. All right. And then from that we can forecast percentages of recovery and make those associations or conclusions?

A. That's correct.

Q. Let's skip the pressure data now and see how those various data points would be plotted on your proposed isotherm.

A. Okay, that's Exhibit C-5 here, and in Exhibit C-5 I've drawn the average isotherm in blue again, and I have, in red, a range of initial pressures to consider between 164 and 294 p.s.i.

Now, this range I derived by looking at the structure map that Mr. Shapiro prepared, that indicated we have -- the structure on the base of the coal runs from about 4450 to 4750 feet, and that covers over 90 percent of the Application area, within that range. And then the structure line that runs pretty much through the middle of the Application area is about 4550.

So what I've done here is, I've said, if we start with a water level, a standing water level that's at about 5100 feet -- and that I determined from the pressure information -- then from the structure I can evaluate what the pressure is in the coal. And so that's where I've got these three different numbers, 164 up to 294, with kind of an average across the area of 251 p.s.i.

Q. If we're trying to get the gas-in-place end-result calculation with this methodology, have you chosen enough variety or samples to give us a representative conclusion that would be applicable to the special use area, or the special infill area?

A. Yes, I have. This range covers the majority -- as I say, well over 90 percent of this Application area, and indicates that within this area we'd be looking at gas contents ranging between about 178 and 281 standard cubic feet per ton.

Q. All right, sir. Are you ready to continue?

A. Yes. Down in the lower part of the curve here I have marked three different points marked for different assumed abandonment pressures. So I'm saying if we, through production, pulled the average reservoir pressure in the coal down to certain levels -- and I picked 25, 50 and 75 p.s.i. for illustration purposes here, and for computation -- then that indicates at that point in time when we reach those levels of pressure, we're still going to be leaving behind in the coal between 32 and 90 standard cubic feet per ton.

So this -- By comparing, then, the initial gas content and the final gas content at abandonment, we can determine how much gas will be produced from this area.

Q. Are we in an area where you would characterize it as saturated or undersaturated?

A. I would classify this area as saturated. There is a very key piece of evidence that leads me to that and that is, these wells produced gas from day one. They produced significant quantities of gas very early in their life. If it were an undersaturated coal you would have to pump water out for a considerable period of time.

As an example, we have a client in the Powder River Basin who has an undersaturated coal. They've been pumping water for two years with no gas production, because the coal is undersaturated. Here, when Richardson turns on their wells, they start making gas right from the beginning. And that tells me that the coal is saturated with gas at the average reservoir pressure, or very nearly so. It might be a few p.s.i. undersaturated, but it's not 50 or 100 p.s.i. undersaturated.

Q. Let me ask you one follow-up question on the gas content. Is that a value that you could measure in the wellbore like pressure?

A. No, we can't measure it directly in the wellbore. What we can do is, we can take core samples and try and measure gas content directly off of core samples.

Or people have also used cuttings. The problem with cuttings is -- the drill cuttings, they're so small that the gas leaks out very quickly. And the problem with cores is, you still have a significant lost gas component, even in a core, because it takes a period of time to pull that core up to the surface. When the coal is saturated to begin with, as you start pulling it out, it begins degassing.

Q. Is it correct to say that inherently in these isotherms, then, they are conservative because you can't measure the real gas content of the reservoir?

A. Well, actually, the gas content and the isotherms are generally considered two different measurements. The gas content measurements are almost always conservative. History and experience has shown that the adsorption isotherms have often been conservative as well, or have been a little bit too low, but the -- as an example of this, I could cite cases where -- The biggest problem, really, with the isotherm is, you can't get enough of them. They're an expensive sample to run, and there's so much variation in the coal that you can't get enough of them.

And also, the coal is altered by bringing it out. That alteration changes its adsorptive capacity somewhat. And so in many cases we find that there's more gas in place than can be accounted for solely on either gas contents or the isotherm.

Q. Once you know your coal is saturated, that you're going to be able to produce the gas, the methane, and you can use the isotherm to compute your gas in place, how do you do that?

A. Okay, I've prepared Exhibit C-6 here to show exactly how I do that.

Q. All right, let's turn to that and have you describe it for us.

A. Okay. In Exhibit C-6 what I've done is taken -- first what we want to do is, we want to get the size of the container. How much coal is there that will hold gas? And so we start off, current spacing or current rules are for 320 acres per well. So let's examine first in this calculation what 320 acres would hold.

And then I have applied an average thickness of 20 feet. And I recognize that Mr. Shapiro has many instances greater than 20 feet. I've selected that number as indicating what ought to be reasonably completable over a majority of this Application area.

Then I have the Langmuir pressure and volume, which are the average constants that determine this isotherm, so the Langmuir pressure there determines the curvature and the Langmuir volume is a measure of the maximum amount of gas that the coal can hold.

Q. Who's this guy Langmuir?

A. Well, Langmuir was a chemist who derived these isotherms as a way of expressing how much of a substance could be adsorbed on another substance.

Q. Is there someone else with a different name that has a competing set of these things?

A. Well, actually there are literally dozens of these, but in the coalbed methane industry the Langmuir isotherm has been proven time and time again to be representative, and so that's pretty well standard use in coalbed methane.

Q. All right, sir. Please continue.

A. Okay. Now, I have applied here an average coal density of 1800 tons per acre foot, which is a San Juan Basin average. I don't have specific information for this particular area, but that number will typically range from 1750 or actually 1740 to 1770 in the Powder, which is a lower-ranked coal. A number in the 1800- to 1850-range is commonly accepted in the San Juan.

And then this initial potentiometric elevation, which was the initial water level or the water level, anyway, at the time of development here, within this area. So that's going to, then, yield for me the pressures.

Q. Now you have all the input data. Now I assume you can go back and find your pressure cases and run your calculation to see what your gas in place is and then apply a recovery factor it?

A. That's exactly what I've done here. So I've taken the range of pressures from taking the structure contour line on the east, the west and in the middle of the

Application area.

Now, the coal thickness there, that basal coal, which is what has been completed so far, generally ranges anywhere from 8 to 25 or 30 feet in the total bottom package. So the 20 feet, you're going to have a -- potentially a 10- or a 15-foot adjustment there that might need to be made for coal thickness, but that's very small in the scheme of things.

So what I've done is just taken the structural elevation there, used that to compute the initial pressure in p.s.i.a., and we see a range here between 164 and 294. Then from that and the isotherm, which was Exhibit C-5, I could get the initial gas content of between 178 and 281 cubic feet per ton, which then leads me to initial gas in place in the coal here for this 20 foot of thickness of 2.06 to 3.24 BCF per 320 acres.

Q. Okay. Now let's see what happens with the recovery component.

A. Okay, I looked at three different assumed abandonment pressures here. I've taken it down to 25, 50 or 75 p.s.i.a. Let's take the 25 p.s.i.a. case first.

You can see the higher-pressure coals because there's more pressure drop between the initial pressure and the current -- or an abandonment pressure, will have a higher recovery efficiency. And these numbers calculate out in the 82- to 89-percent range for this area.

If we only draw down the pressure at abandonment to 50 p.s.i., we're going to leave behind a whole lot of gas. We'll only recover between 65- and 78-percent recovery efficiency.

So thus, if we take the average pressure case here, we'd go from 2.5 BCF recoverable per 320 at 25 pounds abandonment, we only get 2.17 BCF if that abandonment pressure is 50 pounds. So we'd lose 340 million cubic feet of recovery by not pulling that pressure down. And similarly, if you abandon it at 75 p.s.i., you'd be losing even more gas.

So the abandonment pressure, bringing the pressure in these coals down to very low levels is critical to achieving these recoveries.

Q. Let me have you apply at this point your study to the issue of well density. Currently we have spacing units of 320 acres. You make a choice and you drill one of the 160s in each 320, you'll have two wells to a section. The proposal is to infill so that there is double the density, if you will. Does it matter here? And if so, in what way?

A. Well, what infilling does is a couple of things. The first thing is, if we look at the range of performance of these wells, if I take kind of a mental performance on the existing wells, it would be somewhere in the 100- to

150-MCF-per-day range.

So at these type of levels, say -- Let's take the 50 p.s.i.a. case. We're looking at 1.3 to 2.5 BCF recoverable on a 320. At 100 MCF a day, it would take 35 to 70 years, if you produced 100 MCF per day, constant, to recover that amount of gas.

So what's happening here is, there's a whole lot of gas there and a relatively low productive capacity.

It really is much like tight gas wells and the need for infill drilling there. That's exactly what we're looking at here. So much gas is there, each well is capable of producing typically, on average, 100 or 150 MCF a day, we need more wells to efficiently drain this resource. Otherwise, we're going to leave a lot behind when folks walk away here. And you know, whether that's 35 years from now or 70 years from now, it's a long time to get that gas at the types of rates that we're looking at.

Q. If the Division allows Richardson to have the optional infill well, would waste occur of hydrocarbons?

A. No, it's the other way around. Additional reserves would be recovered with the infill wells because the abandonment pressure, then, would be much lower.

And in addition, because the wells on 160 acres would dewater much more efficiently, the dewatering cones, if you will, that extend from the wells would interfere with each other so the wells could then dewater more quickly and more efficiently, you'd actually get a greater recovery from the infill well, having the infill well there.

So there is no waste, it's actually an improvement in recovery.

Q. In the underpressured area of the Basin-Fruitland Coal, then, you want to have interference in order to more effectively dewater and increase your recoveries?

A. That's correct. This area, although it's underpressured, it still has a whole lot of gas to be recovered. And in order to get that, you need tighter spacing.

Q. Let's turn and have you go through the analysis of the opportunity in the Pictured Cliff. They're often closely associated with each other, and is there a value to Mr. Richardson's wellbores in terms of increasing the density? You currently get 160 acres per PC well anyway, but is there reserve potential in the PC?

A. Well, there is, but the Pictured Cliffs, to begin with, contains just far, far less gas than the coal. This is a low-pressured reservoirs. At these kind of pressures a foot of coal can hold, oh, five to ten times as much gas as a foot of sandstone. And so the gas in place in the Pictured Cliffs is much, much less.

What I've done here is looked at -- Let's take a typical kind of case where we're looking at 160 acres, which is the current density for the Pictured Cliffs.

Q. You're on C-7?

A. This is Exhibit C-7, yes, sir.

Q. Okay.

A. Initial pressure, I'll use a typical number of 300 p.s.i. Reservoir temperature, about 85 degrees. And there's range here, but it's small. And Z factor is close to .95.

Now, I've picked a porosity and gas saturation here that should be typical, they're not any particular well, but the PC here, the shallow Pictured Cliffs, tends to have reasonably good porosity, in around the 20-percent range.

And the gas saturation, what I've done is, let's look at a 50-percent gas saturation case. I've seen calculations where people have come up with in the 40 range, but what I want to demonstrate here is the potential for the Pictured Cliffs in terms of the gas in place and to show that it's much smaller than the coal.

So then I considered three different thickness cases between about 5 feet and about 20 feet, because it's the upper part of the Pictured Cliffs here that is productive. The Pictured Cliffs itself extends a much greater interval than that, but it's only the upper part that's productive.

So we calculate the gas in place here from standard volumetric formulas, and we find that at 5 feet it would only be 71 million cubic feet in place. Even if we have 20 feet of Pictured Cliffs, we're only looking at 286 million cubic feet.

So these numbers are -- frankly, they're minuscule in comparison to the Fruitland gas in place. The Fruitland here will contain -- we take kind of this average pressure case for the Fruitland, 2.88 BCF versus, say, a 10-foot average for the Pictured Cliffs, 140 million cubic feet, we see that the coal has 20 times as much gas, typically, as the Pictured Cliffs.

Now, the other thing that's different between the two is, in the Pictured Cliffs as we pull the pressure down, we don't get near the benefit because we're looking at almost a straight line at these low pressures of the gas in place versus pressure, whereas the coal, we have the isotherm, which still has significant curvature.

And so if we draw down the pressure in the Pictured Cliffs to, say, 50 pounds, we'll be looking at about 84-percent recovery. So that would give us a range of 60 to 240 million cubic feet, with kind of a typical number of 120 million cubic feet.

Now, that's certainly enough to pay out a well, but the large resource here is definitely in the Fruitland.

MR. KELLAHIN: Mr. Stogner, we're at a point in transition. We're going into production curves and production data and other information with Mr. Cox. If you choose to stop now, it may be appropriate.

EXAMINER STOGNER: I think it would be.

MR. KELLAHIN: Okay.

EXAMINER STOGNER: What should we take for lunch? 1:00, 1:15, 1:30, what's your preference?

MR. KELLAHIN: One o'clock is fine with us, I think we can get here and back.

EXAMINER STOGNER: We'll be back here at one o'clock.

MR. KELLAHIN: All right, sir.

(Thereupon, a recess was taken at 11:57 a.m.)

(The following proceedings had at 1:02 p.m.)

EXAMINER STOGNER: Hearing will come to order.

Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner.

Q. (By Mr. Kellahin) Mr. Cox, I'd like to turn to another chapter in your presentation, and let's talk about the production curves and data for the Richardson-operated wells. Have you selected some production plots or production curves from representative wells in the

Richardson-operated areas?
A. I've selected some particular wells to demonstrate certain points about this area, yes.
Q. All right. Can you summarize for us the points that you intend to demonstrate by these production curves?
A. Yes. There's a couple of different things. I have an old well that although it was completed as a PC well, I've got the production curve for it that shows, based on the rate and the cumulative production that although it was completed in the Pictured Cliffs it was connected with the Fruitland.
Then I have four particular wells of Richardson's that show the impact of coalbed methane, the characteristic production character of coalbed methane and indication of the range of behavior for performance that should be expected in this Application area.
Q. All right, let's do that. If you'll turn to what is marked Exhibit C-8, let's start with the first of those wells.
A. Okay. Exhibit C-8 is the production curve for the Russell Fed Number 2, or Russell Federal Number 2. This well is located in Section 33 of 30 North and 14 West. The well was completed in 1954 as a Pictured Cliffs well. Now, this particular well, the coal and the Pictured Cliffs lie in very close proximity to each other, so that there is

little or no separation between them.

Now, if you look at the production curve for this well, you see it started out at about 300 MCF a day and declined there for a period of about 15 years and stabilized at around 100 MCF a day. Ultimately, it produced 1.6 BCF, and although there's a 20-foot Pictured Cliffs section present that's productive in this well, that is not a sufficient volume of gas in the Pictured Cliffs to account for this production.

So this well demonstrates -- Since the only other source of gas that this well could have been producing from is the Fruitland, this well then demonstrates the capability of the Fruitland to produce in excess of a BCF per well in this area.

Q. If this had been a PC sandstone gas well alone, what type of decline or performance would you see illustrated on the display?

A. What you would see in that case would be a decline that -- there pretty well would be a continuous decline and -- either exponential or a straight line on this type of a plot, or a slight curvature and slight hyperbolic behavior. And a typical PC well with 20 feet of pay like this would recover in the ballpark of 250 to 300 million cubic feet if it were draining a 160.

Q. All right, let's turn to the next display, C-9.

A. All right, C-9 shows a production curve for the Bushman 6-1, which was completed in both the Pictured Cliffs and the Fruitland Coal. This is one of the first wells that Richardson completed in this area.

You can see what I've done here, the production dots are daily production information, whereas the previous curve, what I presented were annual production information divided by 365 to give you a daily basis.

Here, with much less history, I thought it was important to present and review the daily production information, not the monthly or annual information.

Now, the line that I've drawn on here is a nonbiasing 7-point smoother that I used to indicate the trend, because sometimes if we just spot points it gets too busy and it's hard to see the trend, and by doing this it makes it easy to see the trend.

And you can see this well started out initially at about 45 MCF per day, and then it shows that characteristic coalbed methane incline climbing up to about 300 MCF a day and currently is over 400 MCF per day.

So this is the type of behavior we expect from coalbed methane wells with high gas contents like this, with low initial rate, but then as dewatering proceeds we see that gas-rate increase. This well has already produced 213 million cubic feet.

Now, if every well in the Application area were like this one, we wouldn't need to infill on 160s, because this well would be able to ultimately produce far more than a BCF. But the other wells in general are not like this one. But there are many that are still very good like this.

Q. This morning you testified that in your opinion this area of the Fruitland Coal is saturated, as opposed to undersaturated. Is there anything about this plot that illustrates information about that question?

A. Yes, the fact that this well produced gas right from the beginning -- it was making 45 MCF per day -- and then that that gas rate did increase there very quickly over a period of just a few months, reaching a level of almost 300 MCF per day after about -- well, that would be about a year there -- this type of behavior is characteristic of a saturated coal.

If this coal were substantially undersaturated then it would not make any gas, or very little gas, for a considerable period of time before it began producing gas. So the production here indicates the coal is very nearly saturated.

Q. Is it typical of this area to have a coalbed methane well start at low rates such as 45 MCF a day and over time build up to -- well, something over what, 400 MCF a day?

A. Well, this is one of the better wells out here. Other wells range -- starting out -- do start, in general, at fairly low rates. About half of these start at 50 MCF per day or less, and then they do climb. The majority of them will reach in excess of 100 MCF per day.

Q. I guess my question is, when you produce a coalbed methane well and the initial rates are in these lower ranges, it's to be expected?

A. That's correct. Initially you don't have any permeability to gas, you have to pull the water out. And that's why we dewater in order to get coalbed methane production.

Q. If I have a sandstone that's got gas and I'm trying to produce it in a conventional way, I'm not going to be particularly happy with 45 MCF a day as a starting point?

A. No, that's exactly right. 45 MCF per day out of Pictured Cliffs alone is not much of a well.

Q. All right, let's turn to the next display, C-10.

A. Okay. Well, C-10 here is a lower-productivity well. You'll note it's in Section 1 of 29-15, so it's the Pittam Pond well. It's also completed in both the Pictured Cliffs and the Coal, so this is actually in the adjoining section. These wells are in adjoining sections, and even so, you see considerably different performance.

On this particular well, it started at 1 MCF per day, it's currently up at 40 MCF per day and is still climbing.

Q. All right, sir, let's turn to Exhibit C-11.

A. Okay. Now, the first two PC-Fruitland wells that I was looking are down towards the southwest part of the Application area. I picked this well as being up towards the northeastern part of the Application area to show that the areal distribution of wells or performance is such that we see similar types of performance all across the Application area.

So this particular well on Exhibit C-11 is the State 16-1 in Section 16 of 30 North, 14 West. This well actually started out -- its first 31-day average daily rate was only 5 MCF per day, and it's now climbed to over 130 MCF per day. And this shows again, this characteristic incline curve that we see on early coalbed methane production.

So this is a characteristic type of well for coalbed methane production in this area.

Q. All right, let's turn to Exhibit C-12.

A. Okay. Exhibit C-12 is a well, the State 32-1, which happens to be completed only in the Pictured Cliffs. So this particular well, it started out at 43 MCF per day for the first 31 days. It's now declined to 34 MCF per day. This well is producing at this point just from the PC, just from the Pictured Cliffs. We're not seeing the incline from coalbed methane, all we're seeing is the decline curve showing, basically, depletion of the Pictured Cliffs in this area.

So this is the type of behavior we expect from a normal Pictured Cliffs well, and the actual production rate and the volumes depend on the permeability and gas in place for the sand at the particular well that we're looking at.

Q. All right, let's turn to your summary of the production results in the Application area. This is Exhibit C-13.

A. Yes, Exhibit C-13, what I've done is, I've summarized the results for all the Richardson wells within the Application area that had at least 30 days of production. So you see that they range from 37 days of production for the Federal 5-1, which is the first well on the list, all the way up to 839 days of production for the fourth well, which is this Bushman well. So that would be about two and a half years of production. We're still very early in the performance curves on these wells.

Now, you can see that the cumulative production, it ties largely to the very early time that we're at. So most of these wells have made less than 50 million cubic feet because they've produced for only a short period of time.

If we look at the next column over from cumulative production, we have the average rate in MCF per day for the first 31 days, and you can see those range from a low of 3 all the way up to a high of 623 for the Federal 33-3, which is a Pictured Cliffs well. So that one is an excellent Pictured Cliffs well.

I've also put a column in with the median production rate that the -- this would mean half of the days that the wells produced have been higher than this and half have been lower. And the average rate in MCF per producing day that -- from the start of production for the well until October 27th, which was the last day in the database that I received from Richardson.

So you can see that the Fruitland wells, the wells that are connected to the coal -- as, for example, let's take the second well on the list here, the Federal Well 5-2, it started out with an average rate in the first 31 days or the first month of production of about 41 MCF per day, and it's climbed to over 100 MCF per day and has actually averaged over 103 now. So this well was inclining.

And you can see the next well there, the Federal 5-3, similar type of thing, started at 111 and has averaged over 227. The majority of these wells, if you compare the rates, either the median rate or the average rate through history of these wells are much higher than the initial rates because of the coalbed methane incline curve.

Q. Having studied the reservoir as you have, Mr. Cox, can you recommend to Mr. Richardson that it's appropriate to drill these infill wells?

A. Yes, that is my recommendation, that it is appropriate.

Q. Do you have an estimate of what he can expect in terms of gas in place or estimated ultimate recovery per spacing unit?

A. Yes, if we go back to my Exhibit C-6 and C-7 --

Q. All right, let's do that.

A. -- if we look at an average -- and obviously there is a range, but let's just take the average for right now -- the average indicated Fruitland recovery per 320 acres at this point would be between 1.84 and 2.51 BCF for this average case, depending on the abandonment pressure.

Now, at the same time we'd get, on the next page there, if we used ten feet, say, for a typical Pictured Cliffs thickness in the area, we'd be looking at between 108 and 131 million cubic feet from the Pictured Cliffs. And these two are additive, they are independent, they're both -- they're two separate storage areas for gas, and so we can add these two numbers together.

So that indicates, if we're to take the 320 numbers there, if we have the Fruitland on the 320, plus the Pictured Cliffs on the 160, we would have to double that number, so we'd be looking at a typical well -- or a typical 320-acre unit would be able to recover, say, if we used the 50-pound number, 2.17 BCF from the Fruitland plus -- with one well, and .12 times two wells for the Pictured Cliffs, or .24, so we'd be looking at a total of about 2.4 BCF.

Now, that's assuming we bring that abandonment pressure down to 50 pounds. Without the infill well, an additional well there producing on the 320 for the Fruitland, we probably can't bring the pressure down that far in a reasonable period of time. The kind of typical number for Fruitland performance so far in this area is between 100 and 150 MCF per day.

So we need the infill well to be able to accelerate recovery, to bring recovery that otherwise would occur 30 to 50 or 70 years from now, forward in time, in order to maximize recovery from the Fruitland here.

Q. Let me ask you a question, and hopefully you can -- Let me express it from the perspective of an English literature major and not a scientist, but if I simplify the math for my purposes, and at 50 pounds abandonment pressure on the 320, that parent well, given enough decades, would recover about 2 BCF of gas. Is that how to read this? Is that a --

A. That's correct.

Q. -- number?

A. That's correct.

Q. All right. So if I have, on the long side, 40 to 70 years I might get it within that time period?

A. That's correct, yes.

Q. Is it economically justifiable to add the infill well to accelerate that recovery? Does it make sense?

A. Yes. Most of these wells, or most of these locations for the infill wells, have already been drilled for the Pictured Cliffs. And so those wells are already present and have already been drilled.

The incremental cost of completing the Fruitland Coal will be between -- depending on the well and the size of the frac job -- between $35,000 and $50,000.

In order -- Current gas prices and revenue interest and so on, Richardson would need to be recovering an additional 40 million cubic feet per well to pay out that cost of the recompletion.

Now, that translates to an increase in recovery efficiency of only about 1 1/2 to 2 1/2 percent by drilling the infill location. To me it's a complete no-brainer.

You look at additional gas from drilling the infill location, you will accelerate reserves and you will improve the performance of the existing wells by virtue of having the Fruitland completed in these infill locations.

So it is economically justified, and there will be additional reserves recovered.

Q. If the Application area is subject to coal mining before the oil and gas operator can recover and save the gas and sell it, what happens to the gas?

A. Well, the coal mine is not going to produce the coal and leave the gas behind. They have to pull the gas out too. And so that gas will be lost from the coal that's mined.

Q. How, if at all, does the fracture system that exists naturally in the coal affect your reservoir-engineering judgments and opinions?

A. Well, it's actually critical for production. The fact that there is an existing natural fracture network, the cleat system and the face cleats and the butt cleats, that's the whole reason why we can produce the coalbed methane in the first place. We need that natural fracture system and the cleat system there in order for production to occur.

Q. What is the practice in the San Juan Basin concerning the completion methodology for coalbed methane gas wells? Are they simply connected and produced, or do you have to stimulate them in some fashion, and if so, how?

A. There are a few wells in the San Juan Basin -- the number would be less than two dozen, it might even -- something in that ballpark -- that were actually completed just as open-hole completions where they drilled through the coal, set casing above it and just produced the coal directly.

But there are a total of more than 3000 coalbed methane wells producing in the Basin. The majority of those have been hydraulically fractured. That's necessary to achieve production rates, even in the overpressured area north of the fairway. The wells are generally fractured because you need the fractures to connect to the cleat -- the hydraulic fractures, now, to connect to the cleat system and the natural fractures that are there.

Now, in the fairway itself we find another completion technique that's been used called cavitation, and it's been extremely successful. You have wells that have produced 10 and 15 million cubic feet per day with cavitation.

There are very good fractured wells in the fairway too. There are some of those that are up in the 4- and 5-million-cubic-feet-per-day range, even some very shallow.

Here we're south of the fairway, we're underpressured, and so it's not possible to do a cavity completion here. The coals don't cavitate. And so thus hydraulic fracturing is the indicated stimulation method.

Q. In summary, Mr. Cox, do you see any reservoir engineering reason from the perspective of a coalbed methane gas expert not to increase the well density in the project area?

A. No.

MR. KELLAHIN: That concludes my examination of Mr. Cox.

We move the introduction of his Exhibits 1 through 13.

MR. BRUCE: No objection, Mr. Examiner.

EXAMINER STOGNER: Exhibits C-1 through C-13 will be admitted into evidence at this time. Thank you, Mr. Kellahin.

Mr. Bruce, your witness.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Mr. Cox, why don't we just start with your Exhibit C-2 and run through some of them?

Just on the decline curves, do you have to dewater to get the incline?

A. Not necessarily, but you do have to drop the pressure, and you do -- for the majority of the cases, you do have to produce sufficient water to get the gas saturation increasing, which leads to increasing gas permeability, and that's what causes the incline.

Q. Are there any wells in the San Juan Basin that you know of that have an incline without any water production?

A. Oh, yes, there are some wells. In general, the wells were inclined as a result of water production from offsetting wells. So the wells -- This occurs especially in the fairway.

The 1-6 well, just over the line in Colorado, is a good example of that. That well was a terrible well, it made less than 50 MCF per day, it was shut in and became a monitor well, and it was shut in for about eight months. When they happened to turn it back on, it came in at several hundred MCF a day and has grown to over a million cubic feet per day, even though it was shut in during that period, and that's because of dewatering caused by offset production.

Q. That was in the overpressured area of the Basin?

A. Yes, it was.

Q. Second page of Exhibit 2, is this sorption curve dependent on the coal rank?

A. Yes, it does vary somewhat from rank to rank.

Q. So it could be lower for a different coal ranking? In other words, the curve would be below the curve you show here?

A. If the rank is a whole lot lower the -- the thing that causes more variation in most cases is differences in ash content.

Q. Do you have any data on the ash content of the coal in this area that we're talking about?

A. I've seen some information that suggests to me that it is between about 5 and 20-some percent. Based on the density of the samples that the San Juan Coal Company did the isotherms on, that would correspond to an ash content of between about 5 and 23 percent, I think I calculated.

Q. Was that incorporated in your work here?

A. Yes, that's the reason why I took an average isotherm and didn't use either the high or the low from the two samples that were available there.

Q. On your Exhibit C-3, I just want to be clear where you're coming from. First of all, the test 151 and 152, where are they from?

A. Mr. Bertoglio's report in the back of it. There were --

Q. Okay.

A. -- I think it's page 89 and 91, if I remember.

Q. Okay. And on your Exhibit C-4 and then C-5 together, I just want to be clear. The pressure information in the middle of Exhibit C-4, did you average all of those five numbers and then place those on Exhibit C-5, or use those on Exhibit C-5? Is that what you said earlier?

A. No, what I did is, I looked at the information that I had. It indicated that the -- The information I had indicated that the two older wells there, the Russell Federal Number 2 and the 1-24 Carpenter from the 1950s, had indicated potentiometric elevations in the 5231 to 5249 range.

Out of the newer wells that I had the information on, they indicated, with one exception there, we have the 5133 and 5099 for the W.F. State 36-2 and 36-3, and then 5004 for the Ropco 4-1. That Ropco looks to me as if it's probably -- you'll note the gradient on that is much lower than the others. So my inference on that was that I could use an average value of about 5100, and I recognize that I have one outlier there.

There are many things that cause the pressure to be lower than the actual average reservoir pressure. The well may not be fully built up. There's not too many things that cause the pressure to be higher, and so that's why I picked the 5100.

So I used that potentiometric elevation and the structural elevation to get at the calculated pressure.

Q. Okay. Just a point of clarification, I'm a little confused on here. The third and fourth wells, the W.F. State 36-2 and -3, are those in Range 15 West or 14 West?

A. Excuse me, those would be in Range 15 West. Actually, let me look at a map, but I'm fairly certain of that. Yes, those are -- I'm sorry, those are in Range 15 West, you're absolutely correct.

Q. That's that southwest quarter of the proposed infill area, is it not?

A. Yes, it is.

Q. Have you looked at any of the desorption data from the mine?

A. The only desorption data from the mine information that I saw was what was in Mr. Bertoglio's report, and there was also some desorption information in one of the BLM reports, and I'm not sure whether or not they were from the same wells or not. I didn't check that.

Q. Is there a -- What percentage range of difference do you have between the desorption values and the adsorption values?

A. Well, they're two entirely different types of measurements. From what I could tell, those gas desorption samples were done on samples obtained from particular coals and particular coreholes, whereas the adsorption isotherm -- so that -- the gas desorption numbers are a measurement of an amount of gas that came off a sample, whereas the adsorption isotherm is a laboratory test that's done generally on a crushed sample, and I'm assuming that the Coal Company prepared the sample properly and did that test properly.

Q. But is there a difference between the two numbers, range of difference?

A. Well, the numbers that I saw for the gas desorption samples were exceedingly low and were not consistent with the isotherm or with the production information that I've seen.

Q. Moving on to your Exhibit C-6, you're talking somewhere 2 to 2.5 BCF recovery on 320 acres, correct?

A. That's correct, or recoverable, I think, is a better word.

Q. Recoverable, okay. Now, is that number dependent on the numbers that you get from Mr. Shapiro, as far as the thickness of the coal?

A. No, the thickness number, I selected the 20 feet. I did examine the work that Mr. Shapiro had done, but I also looked at several logs myself and recognizing that there's a whole lot of coal in this section, I just picked

20 feet as a representative number. So the actual numbers, if you add up all the coals, would be, in most cases, much greater than 20 feet.

Q. Okay. At the 20 feet, at the numbers you're using here, what would one Fruitland Coal well drain, in acres?

A. Actually, that question depends on a whole lot of other factors. It depends on how the well is completed and operations and many other things, and it depends on the particular well, because permeability changes from well to well. So it's not a number where I can give you a single number.

Q. So you can't give me a drainage figure today?

A. Well, you asked what could that well drain? Some wells can drain far more than 320 acres, some wells may drain less than 320 acres. It depends on the well and the particular characteristics that you're looking at.

Q. Have you done drainage calculations for any of the wells that you've listed on your Exhibit 13?

A. Only insofar as I've calculated the gas in place within particular areas and compared that to the performance that's been observed to date.

Q. On your Exhibit C-7, these recoveries, is that strictly recovery from the Pictured Cliffs, or does it include recovery that you would also get from frac'ing up into the Fruitland Coal?

A. No, this -- Exhibit C-7 is based solely on gas that began in the Pictured cliffs.

Q. Now, the production curves you used for the Fruitland Coal, are any of them within the mine's proposed area, proposed extension -- or I should say, not proposed, the mine -- the lease extension area?

A. I don't know. With the exception of the Russell well, they're all within the Application area. I don't know whether they're within the proposed mine area or not.

Q. And maybe you didn't make this calculation or make this assumption, Mr. Cox, but did you assume that these wells would only be producing from the basal Fruitland Coal seam?

A. At this particular stage, yes, I only assumed that production would be -- not necessarily from just the basal but from the lower coal package, because there's probably -- in most places here, the coals do move somewhat in the section, so you can have pressure communication between coals that maybe are higher in the section, but it wouldn't necessarily be the basal coal. The exact coal there kind of moves in the section as you move from location to location.

But I did not include anything from the upper coals in these calculations, so that's additional coalbed methane potential that's not been evaluated here.

Q. In looking at your Exhibit 13, now, you admitted, Mr. Cox, that you were in the Whiting-Pendragon -- testified in the Whiting-Pendragon matter, did you not?

A. Yes, I did. Although I want to be clear that there should be -- by saying I "admitted", I even volunteered it.

(Laughter)

Q. But of course one of the primary issues in that case was where the production was coming from, was it coming from the PC or was it coming from the Fruitland Coal; is that correct?

A. That's correct, yes.

Q. And evidence was presented that wells that have been allegedly completed in the Fruitland -- or the Pictured Cliffs, were frac'd and were actually frac'd up into the Fruitland Coal and were producing from the Fruitland Coal; is that correct?

A. That was information or evidence presented by Whiting and their experts.

Q. Okay, could that happen in this area?

A. Yes, I have already said that although this Russell Federal Number 2, for example, although I don't have frac information on this, it's clear from the performance of this well that it's draining both Pictured

Cliffs and Fruitland. Or it was draining both Pictured Cliffs and Fruitland; it's since been abandoned.

Q. Would any of the wells that you list on your Exhibit C-13 that you list as Pictured Cliffs wells, are they producing from the Fruitland Coal?

A. There may be some component of production. But as far as what the completion is, the wells that are listed as being Pictured Cliffs completions are completed in the Pictured Cliffs here. The frac job may have connected partly to the coal in some of these wells.

Q. Now, I'm just going down the list and, for instance, your third well, the Fed 5-3, that certainly has had an incline in production, has it not?

A. Yes, it has.

Q. And actually most of what are listed here as Pictured Cliffs wells have had an incline in production or are flat on production, are they not?

A. Yes, I think that is the case, yes.

Q. I mean, if these Pictured Cliffs wells are already in communication with the Fruitland Coal, what is the need for further Fruitland Coal infill completions?

A. Those completions, although part of that frac job may have completed -- or in some cases there may be very limited or not barrier between the Pictured Cliffs and Fruitland in some of these wells, these wells are not effectively completed in the coals. The coals tend to have a different kind of frac gradient than the Pictured Cliffs.

And so in terms of optimizing the completion, you're far better off to do separate frac jobs in each of the Pictured Cliffs and the coal if you want to be able to get gas out of the coal. Trying to get gas by completing in the sand and hoping that your frac job connects to the coal is a poor method of connecting to the coal.

As a matter of fact, that actually was tried on many wells in Alabama where they would frac the sands hoping to get to the coals, and the performance of the wells that did that were not as good as those where they actually completed in the coal.

Q. Well, just going down your list again, it appears that the better producers here are the Pictured Cliffs wells?

A. Well, some of them. The Bushman is a very good producer, and that's clearly producing both from the Pictured Cliffs and the coal.

The Federal 33-3 is a Pictured Cliffs well that has shown -- it does not show the classic character of the Fruitland, and so at this point it may again have some degree of connection, but it is not yet showing that it's a Fruitland well as well.

Q. And I haven't added up the numbers, but if you looked at it, the simple PC wells are producing at higher rates than the Fruitland Coal wells? Is that a fair observation?

A. I don't know, I'd have to sit down and look through it for that purpose. I haven't done that.

Q. Looking at this listing of the production data, can you make any -- in comparing that to, you know, a land plat, can you make any sense or pattern for the variability in production from these wells?

A. There are certainly trends or differences that can be identified as, for example, this Bushman 6-1 and the Pittam Pond, which were two of the curves that I showed. Those wells are in adjoining sections, and yet they have completely different performance.

And this actually is characteristic of coal, that coals tend to be far more heterogeneous than any other kind of reservoir that we deal with. It's not at all unusual to have permeability varied by a factor of three to five or even ten times from well to the next. And likewise, thus, your performance in terms of your producing rates varies substantially.

And so because of that, that's part of the reason why you need to complete these wells and give effective completions, because the properties do vary from point to point.

Q. At what rates do these wells produce water?
A. The typical kind of water rate is around 100 barrels a day. It varies from well to well, and some wells make more, some wells make less.
Q. You don't have a listing of that available?
A. No, I did not have daily production rates for water. I did have that for gas, and that was what I was trying to show here.
Q. Do you have any cumulative production figures for water on these wells?
A. No, I don't have those with me.
Q. Just a couple more questions, Mr. Cox. You've got the -- I think you have -- is it A-2 in front of you?
A. Yes, I do, as a matter of fact.
Q. Your last well on your Exhibit C-13 is the State 36-2 well, which is in the northeast quarter of Section 36, 30 North, 15 West. What about production from the 36-3 well? Do you have any data on that? Or is that well not producing?
A. I don't recall. As I said, if I had less than 31 days of production, I didn't put it on this table. So I'd infer from that that the information I had had less than 31 days of production or that I did not receive information on that well.
Q. But you don't know whether or not that well was

producing?

A. No, I don't remember.

Q. Now, wouldn't Section 36 be one of the earlier areas mined by San Juan Coal Company in this area?

A. You know, I don't really know, quite honestly. I know that there's been some mine claims put together, but things don't always go according to plan, so I'm not sure when San Juan Coal Company would be mining what. I can't answer that, I don't know for sure.

MR. BRUCE: I think that's all I have, Mr. Examiner.

EXAMINER STOGNER: Thank you, Mr. Bruce. Redirect?

MR. KELLAHIN: No, sir.

EXAMINATION

BY EXAMINER STOGNER:

Q. Referring to A-2, if I look down there in that southeast quarter, and that's that State 36 Number 1, now, is that currently producing? It's shown here to be a proposed Fruitland infill well, but is it currently a PC well?

A. It's shown as a PC well, by which I would say it would be -- according to this exhibit, it should be currently producing, or at least currently completed. Some of these wells, I know, have been completed and haven't yet been -- or have been drilled but haven't yet been hooked up, so I don't have that complete list in my head.

Q. You used a term whenever you were being cross-examined by Mr. Bruce, and that was coal rank. Do you want to go into a little more detail about coal rank for the record? How is coal ranked?

A. Okay, coal rank is where they take and they use the information about the type of coal. So the lowest ranked coal is generally considered lignite. As the coal is buried deeper and is altered more by temperature and pressure, then it goes through sub-bituminous and bituminous and ultimately, like some of the coals back east or some of the coals next to intrusives, it gets cooked all the way to anthracite or even meta-anthracite or pure carbon. And so that's the coal rank that's talked about.

Within the San Juan Basin here, most of the coals have a -- at least south of the fairway here, have a fairly similar rank. So we're looking at -- And that rank is determined off of heating content or heating value of the coal and can be estimated from vitrinite reflectance and other things.

But within this area here, the rank differences are not enough over several miles to account for any apparent differences in the gas content.

Q. So all of them -- are all of the coals south of there in this area ranked as lignite?

A. No, this would be -- This is probably in the sub-bituminous, and I've forgotten which particular grade it would be of that. They have A, B and C and so on, and I've forgotten which one it is.

Q. I have a note here on page 2 of this -- I'm sorry, back to C-2, Exhibit C-2, page 3, I'm sorry. When you were giving your direct examination, you mentioned something about the -- similar to the Uintah Basin? I'm not familiar with that.

A. Okay, the Uintah Basin over in Utah, there's several big fields now that are making, gosh, close to 250 million a day. Drunkard's Wash is the largest, and then there's Helper Field and a couple of others. That area has similar kind of coals to what we have here in the San Juan Basin.

And you know, again whether it's bituminous or sub-bituminous I really don't recall because from an engineering standpoint it doesn't really matter a whole lot to me. I'm more interested in the gas content and the properties of the coal.

Now, the southern -- The area there where it's called the Farren Coals in Utah there, the area where it's productive, if you follow the trend of that, you come into an area where the coals all of a sudden are nonproductive, and you go from about 400 cubic feet per ton down to, gosh, in some cases less than 20 cubic feet per ton.

And apparently what -- Even though it's the same coal rank, it's the same kind of coal that was deposited at about the same time, you know, plus or minus a few hundred thousand years as to the coal to the north there, it doesn't have anywhere near the gas content.

And what's happened is, on the northern part of the Basin there, the coal outcrop, there's actually a sandbody that intercepts the coal and keeps the coal from outcropping there, so the pressure has been kept on the coal, whereas in the southerly part what's happened is, the waters have run through the Basin and basically drained the methane out of the coal in the southerly part of that trend.

Q. On these infill wells, are we expecting to see the same kind of pressures as we did in the original well in the 320? Since this being an infill well, is there going to be some pressure decrease?

A. We may get some pressure decrease, yes, although as early as these are in the life of the production, it will depend on when the wells are drilled and whether, you know, there happens to be fractures connecting it. But in general here, we wouldn't expect much pressure decrease on the infill wells if they're drilled within the next year or two.

You know, if we waited ten years, I think you would see some pressure decrease in most of the wells.

Q. Okay, I'm a little concerned about the drainage radius here. You've got a one-mile buffer zone that you're looking at around the coal -- potential coal lease mined areas or coal mined areas here and where the 320 starts. So it really doesn't look like a buffer zone, it looks like you want to extend it out a mile to take advantage of something. That's the reason I was looking at this pressure. Could you comment on that? Is a half-mile buffer zone more applicable outside of this area? Why do we need a mile?

A. Well, to be quite honest, that mile was not chosen by me, and so -- I don't see it as a mile being a hard and fast reservoir engineering question here. What I see is, this is an area that we're looking at this special infill Application for. And certainly even with that mile outside of there, I see that there would be -- there's a need for additional wells to drain the Fruitland Coal in that mile.

Now, I think the real key thing is, though, if we look ahead, pick whatever time you think it's going to be, you know, whether it's five years or ten years or fifteen years of when an area gets mined, there's a huge difference between having an area mined versus having a well in a normal spacing unit offsetting you. If the mine goes up to the edge of a section there, that's a completely different drainage situation in terms of how much gas is being drained from that adjoining section than having an offset well.

And so I don't see a mile as being at all unreasonable there. Certainly, we're sitting there right now, today, saying within a half a mile we need additional drainage points. But to say that if a mine face comes up to that area and they're going to take and pull the methane out of that mine, that's certainly going to influence things, and I think you'd need a larger buffer, then, to account for that.

Q. What's the main reason we're looking for the infill provision today?

A. Excuse me?

Q. What is the main reason why you're looking at the infill area today? Because of the mine coming in?

A. Well, I frankly see the mine coming in as a whole separate thing. This area needs to have additional wells drilled in it for the Fruitland, or competed in it for the Fruitland, to maximize recovery.

And so I see it from a reservoir engineering standpoint as, let's minimize waste and get the additional wells here.

I think -- It's my understanding that the timing of this is driven partly by the mine applications and such and the mine leases, but I think there's solid reservoir engineering reasons to infill this area.

Q. Well, why did you stop today? Why didn't you just ask for an infill for the whole Fruitland Coal?

A. It wasn't my selection, and I wasn't involved in selecting the area.

Q. The completion technique out here, is it normal to have a pulling unit or a -- I'm sorry, a pumpjack to pull the water off, or is that not necessary? Are these wells flowing?

A. No, some of the wells will flow, but you do need to pump the water off, either being pumping units, or progressive cavity pumps have been used.

Q. Okay do any of these PC wells that are on C-13, do they have pumpjacks on them?

A. Yes, the PC wells also need to be pumped here in general, in this area.

EXAMINER STOGNER: Any other questions of this witness?

MR. KELLAHIN: No, sir.

MR. BRUCE: I don't think so.

EXAMINER STOGNER: You may be excused.

THE WITNESS: Thank you.

EXAMINER STOGNER: Is that everything you have, Mr. Kellahin?

MR. KELLAHIN: That's our direct case, Mr. Examiner.

EXAMINER STOGNER: All right, Mr. Bruce. Let's take about a five- to ten-minute recess before we get started. That way you can set up.

(Thereupon, a recess was taken at 2:01 p.m.)

(The following proceedings had at 2:15 p.m.)

EXAMINER STOGNER: This hearing will come to order.

Mr. Bruce?

MR. BRUCE: Mr. Examiner, our first witness is Lynn Woomer.

He is going to be examined by Mr. Roybal, so I will relinquish the floor to him at this time.

EXAMINER STOGNER: Let's see I don't believe I have Mr. Roybal on the record yet.

Let's identify yourself there, Mr. Roybal, for the record.

MR. ROYBAL: My name is Charles Roybal, I'm counsel for San Juan Coal Company.

EXAMINER STOGNER: Okay.

MR. ROYBAL: Thank you, Mr. Hearing Officer.

LYNN WOOMER,

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

DIRECT EXAMINATION

BY MR. ROYBAL:

Q. Could you please state your name?

A. Yes, my name is Lynn Woomer.

Q. And what is your occupation?

A. At this point in time my position with BHP Minerals is technical services coordinator with the San Juan Coal Company projects development staff.

Q. Okay, you mentioned BHP. Could you explain who that is?

A. BHP, we actually just recently merged with Billiton, we're now known as BHP Billiton. But in terms of New Mexico, we have three fairly significant coal mines in the northwestern portion of New Mexico, San Juan, La Plata, as well as the Navajo Mine.

Also, BHP is obviously a larger mining conglomerate, along with Billiton. We mine a number of various mineral resources, as well as petroleum interests.

Q. All right. And what are your responsibilities at the San Juan Mine?

A. My responsibilities as technical services coordinator are primarily to negotiate, and hopefully successfully, with the oil and gas operators as well as other owners of infrastructure in advance of the mine. We have a number of existing pipelines in the immediate mine area, as well as a couple of fairly major power lines.

Q. All right. And what is your educational background?

A. I have a bachelor of science degree in forestry from Southern Illinois University, as well as a master of science degree in forestry, with a soils science and reclamation emphasis, from Stephen F. Austin State University in east Texas.

MR. ROYBAL: Mr. Hearing Officer, Mr. Woomer is not being offered as an expert witness but is offered as a fact witness familiar with the operations of our mine.

Mr. Woomer, have you been involved with development of the underground mine project?

A. Yes, I have, I've been involved with the development of the underground mine project from the git-go, basically from the time we permitted our initial underground mining activity, which was in the pilot mine, in the south lease extension, which is the southern portion of our existing surface mine at San Juan Mine, as well as being involved from the environmental compliance and permitting aspects on the underground deep mine permit application.

Q. Have you had dealings with the oil and gas interests?

A. Yes, I have.

Q. How about with the governmental agencies, such as BLM, involved with the project?

A. Yes, I've had dealings with both the BLM as well as the Oil Conservation Division.

Q. I think we should locate or familiarize the Hearing Officer with the project. I'd refer you to SJCC Exhibit Number 1 in the hearing book, exhibit book. Could you identify that exhibit, please?

A. Yeah, this is just a general locations map for San Juan Mine. Also illustrated here is La Plata mine. What this is, basically, is a mine-to-mouth operation. We produce about 6 1/2 million tons of coal, which is mined and directly hauled to the San Juan Generating Station.

The underground mine project is located immediately to the east of the San Juan Mine, as you can see it labeled "Deep Lease" and "Deep Lease Extension".

You can also see there, labeled, an indication as to where the underground pilot mine was initially started in the south end of our existing -- the south pit at San Juan Mine.

The mine is actually physically located about 16 miles to the west of Farmington.

Q. Can you tell us a little bit about the history of the San Juan Mine?

A. Yeah, San Juan Mine has obviously historically been a surface mine. Basically, it was operated originally by Western Coal Company in the late 1970s, and as I indicated, it's been historically a surface mine. We historically have utilized two surface mine pits in which to mine coal.

And San Juan generally has mined upwards of 3 1/2 to 4 million tons of coal here recently from the surface operations, and that coal has been supplemented by coal from the La Plata Mine, for a total of about 6 1/2 to 7 million tons being transported to the power plant per year.

Q. All right. And that history was as a surface operation?

A. That's correct.

Q. Could you tell us a little bit about the transition to an underground operation and why that was necessary?

A. Yes. Originally, once we had permitted the pilot mine, the pilot mine was utilized as a demonstration of whether or not underground mining was a viable form of mining. As a result of that effort, we demonstrated that it was, we demonstrated that we have a world-class mine and a world-class coal seam.

There was a couple of other alternative long-term coal-source projects that were looked at, at length, one in the Southern Ute Indian Reservation, and another at Navajo Mine just simply accelerating their coal production to accommodate the 6 1/2 million tons required by the power plant.

After doing a fairly extensive feasibility study we made a determination that the underground mine was the most viable source of coal.

Q. Could you describe San Juan's contractual obligation to the power plant?

A. Yeah, we have a contract that basically runs through 2017, and under that contract agreement we're required to provide approximately 6 1/2 million tons of coal to the power plant, San Juan Generating Station, which is run by Public Service Company of New Mexico. We provide that much coal on an annual basis.

Q. Does San Juan expect to continue surface operations in the future?

A. No, we don't. And the reason for that is that our overburden-strip ratio is just not economically feasible at this point in time. I believe it averages somewhere between 12 to 1 and 13 to 1, overburden to coal.

Q. Could you describe the transition from a surface operation to underground?

A. Well, the transition is fairly massive. Basically, our primary underground mine entries are drive immediately into the highwall of the existing southern pit of the mine.

It's also a massive undertaking in terms of economics and the amount of money involved in making that transition. You know, obviously the surface mine has equipment, actually San Juan Mine has two, you know, rather elaborate draglines that are used for overburden stripping. so that transition from surface to underground means that we have to pretty much change the way we're going about doing things. We also -- which involves changing equipment requirements and so forth.

Q. Where did the pilot mine come in, in the history of this transition?

A. The pilot mine was permitted in the fall of 1997, and I believe we actually started mining coal around the first quarter of 1998 in the pilot mine.

Q. Okay. What was the next phase of mine development after the pilot mine?

A. The next phase of mine development was basically to gather whatever environmental baseline data and other data required to put together a permit application package which -- for the underground project, which actually went in as a permit revision package to our existing surface mine permit, to actually mine the coal within the Deep Lease and Deep Lease Extension.

Also, in conjunction with that, we had to acquire the lease, an area called the Deep Lease Extension, we had to acquire the lease through the Bureau of Land Management.

Q. All right. All right, what will be the next phase of underground operations?

A. Well, right now we're currently in the process of developing our facilities, all the support facilities that might be required to conduct a fairly major underground mining activity, and that includes purchasing and bringing on line a longwall mining machine, which is a fairly extravagant endeavor and a fairly costly piece of equipment.

Q. When do you expect the longwall to be operational?

A. The longwall at this point in time, according to the most recent mine schedule, should be operational around August of 2002.

Q. All right. Mr. Woomer, I refer you to the exhibits in the exhibit book, Numbers 4 through 7, I believe.

A. Yes.

Q. Could you describe what those exhibits are?

A. Yes, Exhibit 4 is basically our coal lease, which was issued by the BLM on March 20th, 1980, for the area that we refer to as the Deep Lease.

Q. All right. Now Number 5?

A. Number 5 once again is a coal lease, once again issued by the Bureau of Land Management. And this particular lease was issued on March 1st, 2001, for the Deep Lease Extension.

Q. And Exhibit Number 6?

A. Exhibit Number 6 is another coal lease, although this is a state coal lease for Section 32 within the deep lease extension.

Q. And Number 7?

A. Number 7, another state coal lease which was issued by the New Mexico State Land Office for Section 36, which is in the Deep Lease.

Q. Mr. Woomer, I think behind you there is an exhibit marked San Juan Number 2. Could you -- It's also in the book, Mr. Examiner.

Could you point out the Deep Lease on that exhibit, please?

A. Yes, this is the Deep Lease here --

Q. All right and the Deep Lease Ext- --

A. -- and the division between the Deep Lease and the Deep Lease Extension is this red intermittent line.

Q. And the Deep Lease Extension, could you point that out?

A. Deep Lease Extension is located right here. Our existing surface-mining permit is located here in this location.

EXAMINER STOGNER: Okay, Mr. Roybal, this is not going to come out very good on a transcript --

MR. ROYBAL: Oh.

EXAMINER STOGNER: -- whenever he's looking at something up there and saying here, here and here. Is there a copy of this map that you have provided, or perhaps have him explain it?

MR. ROYBAL: Sure, Mr. Hearing Examiner. In the hearing book Exhibit Number 2.

Q. (By Mr. Roybal) Mr. Woomer, could you perhaps describe by section numbers the --

A. Sure.

Q. -- Deep Lease and Deep Lease Extension?

A. Unfortunately on that map there isn't section numbers.

EXAMINER STOGNER: Or now that we have it in front of us, we can identify the red line approximately in the middle of the exhibit.

Q. (By Mr. Roybal) Do you have Exhibit Number 2 in the exhibit book, Mr. Woomer? Maybe you can --

A. Yes.

Q. -- pull that out.
A. Yes.
Q. Perhaps if you start at the --
A. -- west edge?
Q. -- west end and describe going from left to right the sequence?
A. Okay, in general what this map shows is our existing mine plan, and you can see that the orientation of our panels, the alignment is north to south. We have a number of mining districts, starting from the east, Mining District 1, which would include that longwall panel 101 through 103, then Mining District 2, longwall panel 201 through 204 and so forth.
From the west, what we've got here is, you'll see on the map identified, you know, the term Fruitland. This -- Basically this area on the immediate west edge of the map here is -- or left edge of the map is the Fruitland lease, which is our existing surface mine lease.
Then also the next lease to the right of the Fruitland, which would be to the east, would be the deep lease, which would include Mining Districts 1, 2 and 5 and a portion of 4 and Mining District 3 as well.
And then further to the east we have what's called -- what's referred to as the Deep Lease Extension, which includes a portion of Mining Districts 3 and 4 and

Mining Districts 6 and 7.

All in all, we've got somewhere around 9600 acres included in the underground, immediate mine area.

Q. Mr. Woomer, could you describe the process by which the Deep Lease Extension was obtained?

A. In terms of the leasing action?

Q. Yes.

A. Yes, basically what we did is, we applied for the Deep Lease Extension in, I believe it was August of 1997. As part of that effort, the BLM had to amend the existing resource management plan to allow coal mining within the area, underground coal mining within the area.

And then ultimately, to make a long story short, we were issued the lease, as I indicated, in March of 2001.

Q. So what was the total time involved?

A. The total time involved was a little under four years, probably more like three and a half years.

Q. I'll refer you to San Juan Exhibit 8, and --

A. Okay.

Q. -- can you identify that exhibit, please?

A. Yes, basically this is a letter from New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division. This is our permit issuance letter. It's a letter that indicates that our mine permit revision package has been approved for the underground mining activity.

Q. Could you describe the amount of time it took to develop a permit application package?

A. Yes, we started developing the permit application package in terms of baseline data gathering and so forth back in the fall of 1997.

Q. Okay, and the time for approval of that package?

A. I believe that the permit application package was actually submitted -- if memory serves, was submitted in January-February of 1999.

Q. What are the estimated reserves for the underground mine?

A. The estimated reserves for what we call the Deep Lease and Deep Lease Extension are approximately 110 million tons.

Q. What were the estimated costs for developing the mine?

A. The estimated overall cost for initiating the overall mining activity is $146 million.

Q. Is it estimated that more capital will be necessary over time?

A. Yes, it is.

Q. How many people will the mine employ?

A. At maximum production for the underground mine, along with support facilities and personnel, we're talking approximately 300 employees.

Q. And over the course of the contract through 2017, what's the expected production?

A. The expected production is approximately 6 1/2 million tons per years.

Q. And do you have a total estimate?

A. Well, a total estimate would be somewhere around 100 million tons, I believe, through 2017.

Q. What would be the royalty stream from this production?

A. Well, based on an 8-percent royalty, 100 million tons of coal being mined, we're talking somewhere around $250 million.

Q. And what is the State's share of that royalty?

A. I believe the State's share would be 50 percent.

Q. Do San Juan Coal Company's mining plans extend beyond the existing leases?

A. Yes, they do.

Q. I'd like you to look at San Juan Coal Exhibit Number 9. Could you identify that exhibit, please?

A. Yes, this is a coal exploration lease application that San Juan Coal Company submitted to the Bureau of Land Management State Office on August 31st, 2001. Basically, the gist of it is to drill approximately 16 coal exploration drill holes in an area which is located immediately to the east of the deep lease extension, an area that we refer to as the Twin Peaks area, Twin Peaks extension.

Q. Okay. Mr. Woomer, if you could look at Exhibit Number 3, please.

A. Sure.

Q. Is this exploration area shown on that exhibit?

A. Yes, it is.

Q. Could you describe where that exploration area is?

A. The Twin Peaks exploration area would be the area that's delineated immediately to the east of the Deep Lease Extension. It consists of approximately 5100 acres, I believe.

Q. Mr. Woomer, are you aware of gas wells in the coal seam to be mined?

A. Yes.

Q. Have you been involved with mine planning related to the coalbed methane wells?

A. Yes, I have.

Q. Have you prepared a diagram depicting those wells?

A. Yes, I have.

Q. Is that Exhibit Number 3?

A. Yes, it is.

Q. Could you describe the issues that result from the coalbed methane wells coinciding with the coal mine?

A. Yes, there's a number of issues there. Basically, last count, I believe we had somewhere around 51 or so existing as well as proposed oil and gas wells within the immediate mine area.

EXAMINER STOGNER: Repeat that number again, please?

THE WITNESS: Approximately 51 existing and proposed oil and gas wells.

EXAMINER STOGNER: Thank you.

THE WITNESS: According to MSHA requirements, before mining can proceed within a 300-foot radius of an existing wellbore, we have to re-enter that well and clean -- which means mill out -- the steel casing within the coal seam and plug and abandon the well according to MSHA standards, using expanding type of cement.

So therein lies one of the problems, just the physical steel casing, and the coal seam creates an issue with safety.

The other problem is as a result of hydraulic fracturing.

It is our opinion, San Juan Coal Company's opinion, that that could enhance the probability of spontaneous combustion, not only as a result of hydraulic fracturing but also as a result of dewatering in the coal seam, which obviously is an issue in terms of mine health and safety.

Q. (By Mr. Roybal) You mentioned the MSHA requirements for distance from wells.

Have you performed a study or an estimate of -- provided an estimate of how much coal could be bypassed by having to avoid these wellbores?

A. Yes, speaking hypothetically, and assuming that we don't have a settlement, if we had to skirt around an active wellbore, we would potentially have to leave behind approximately 330,000 tons of coal, and that's with the idea in mind that we can't encroach upon the well within 300 feet.

Q. Until this summer, did San Juan Coal Company have a plan for mitigating the conflict with the coalbed methane wells?

A. Yes, we did.

Q. What was that plan?

A. Well, at that point in time, I think most everybody understands, we, San Juan Coal Company -- our position was more or less promoting well development. You know, we felt that there might be some advantage to us in terms of draining the methane and the water in advance of the mine.

We at that point in time also felt, though, that because we were going to be mining in the earlier mine districts, in Mining District 1 and 2, relatively soon, we'd probably have to sit down and reach some sort of agreeable settlement with the oil and gas operators for their leasehold within those mining districts.

And in terms of other areas, what we had thought is that the operators could just continue, you know, developing wells and producing gas, with the ultimate idea that once we approach any individual well, that San Juan Coal Company would be willing to compensate the operator for loss of production.

Q. Has that overall plan changed?

A. Yes, it has, significantly.

Q. Can you tell us when that change occurred?

A. That change -- Pretty much we had made that determination in August, in early August of this year.

Q. And what's the reason for that change?

A. The reason for that is our concern with the spontaneous combustion issue as a result of hydraulic fracturing of the coal seam in relationship to continued well development.

Q. Have you informed the Bureau of Land Management regarding that change?

A. Yes, we have.

Q. I'll refer you to San Juan Exhibit Number 14. Could you identify that exhibit, please?

A. Yes, this is a letter that San Juan Coal Company sent to the BLM regarding applications for permit to drill within the immediate mine area. And basically, the letter was protesting the approval of those APDs, for reasons I've already mentioned.

Q. And that letter was tied to this change in strategy?

A. Yes, it was.

Q. Have you informed the oil and gas interests about this change?

A. Yes, they're aware, obviously, of this change at this point in time.

Q. All right, Mr. Woomer, I guess just in closing, could you characterize San Juan Coal Company's overall goals in resolving the coalbed methane conflict?

A. Our goal, and I think this has been our goal from the beginning, is to try to sit down and negotiate with the oil and gas operators and achieve, you know, a mutually agreeable type of settlement offer.

We have in the past, you know, done evaluation and -- you know for Mining Districts 1 and 2. That valuation was subsequently rejected by the oil and gas operators.

We've, you know, in the past also just indicated a willingness to pay for additional drilling to gather additional desorption data within the immediate mine area and enter into a third-party mine evaluation that might be acceptable to everybody involved in the conflict.

So we've -- you know, we have been willing to sit down and be cooperative, in other words, and we're still pursuing that at this point in time.

MR. ROYBAL: Thank you, Mr. Woomer.

That concludes direct examination, Mr. Hearing Officer.

I'd like to move the introduction of San Juan Exhibits 1 through 9 and 14.

EXAMINER STOGNER: Any objection?

MR. KELLAHIN: No objection, Mr. Examiner.

EXAMINER STOGNER: Exhibits 1 through 9 and Exhibit Number 14 are hereby admitted into evidence at this time.

Thank you, Mr. Roybal.

Mr. Kellahin, your witness.

MR. KELLAHIN: Thank you, Mr. Examiner.

Mr. Roybal, might the witness have a copy of Cathy Colby's exhibit book so that I can ask Mr. Woomer some questions and he can have the documents in front of him?

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Do you pronounce your last name Woomer?

A. Yes.

Q. Mr. Woomer, let me clarify. Today I've referred to your company as the San Juan Coal Company. Is that mistaken nomenclature? Would you prefer me to refer to the opponent as BHP, or does it matter?

A. It doesn't -- You know, frankly, we're San Juan Coal Company under BHP Billiton. You know, it doesn't matter either way.

Q. All right, I'm in the habit of calling it San Juan Coal Company --

A. Okay.

Q. -- so if you'll let me stay with that?

A. That's fine.

Q. Your last exhibit. Your last exhibit was your letter to the BLM. I've lost track of the exhibit number. I think it was 8.

A. 14.

Q. 14?

A. Yes.

Q. 14. Let's turn to that. Mr. Woomer, how does a forester get involved with the coal business?

A. There's a history behind that. No, I -- Like I said, in my master's thesis work I emphasized mine land reclamation and soil science and actually worked for three state regulatory authorities administering the coal industry, in the States of Missouri, Colorado and Montana.

Q. So when I look at documents that have your name on them --

A. Uh-huh.

Q. -- or testimony where you've represented a company position, are you the representative that can explain that position on behalf of your company?

A. Yes, I believe so.

Q. Okay, let's give it a try. If you'll turn to Exhibit 14, it's the August 31 letter from the Coal Company to the BLM, objecting to the BLM's approval of for of Richardson's APDs, correct?

A. That is correct, as well as Dugan's APDs

Q. Inclusive in the letter that you've authored, am I correct in understanding that you've attempted to advance or articulate all the concerns your company has had or has concerning the coal gas wells, the new ones?

A. By this letter?

Q. Yes, sir.

A. Yes.

Q. So this summarizes your position, does it not?

A. This basically summarizes our position, yes.

Q. You've asked the BLM to require additional oil and gas operational or drilling requirements in this letter, have you not?

A. Yes, we have.

Q. In response to this letter, the Bureau of Land Management, at least in the Farmington District Office, has issued a response, correct?

A. Yes, they have.

Q. And that response is contained in Mrs. Colby's exhibits, and we have it, I think, as her Exhibit Number A-21. It's the September 20th BLM letter in response to your letter on behalf of your company, correct?

A. That is correct.

Q. All right. Did BLM Farmington address each and every issue you raised in your August letter?

A. Yes, they did.

Q. And in response to all those issues and concerns, BLM Farmington has denied your objection, correct?

A. That is correct.

Q. As part of getting to this point in time, the August letter, did the San Juan Coal Company submit to the BLM Farmington a detailed description or documentation concerning mine safety?

A. No, we didn't have the chance to do that.

Q. Okay. Let's talk about mine safety. When we use

the anachronism [*sic*] -- you did a while ago -- MSHA --
A. Yes.
Q. What's that mean?
A. That's Mine Safety Health Administration.
Q. That's a federal agency, isn't it?
A. That is correct.
Q. And that federal agency has rules and regulations concerning mine safety?
A. That is correct.
Q. Okay. Am I correct in understanding that the federal mine safety regulations under MSHA take -- obligate San Juan Coal Company to comply with those requirements, those rules and regulations?
A. That is correct.
Q. In addition, the federal rules for this activity will supersede state action unless state action is more stringent; is that not true?
A. That is correct also.
Q. When we look at the concerns of MSHA, would MSHA as part of a mine-safety requirement address any or all the issues set forth in your September -- I'm sorry, in your August 31 letter to the BLM?
A. Each one of those individual issues --
Q. Yes, sir.
A. -- that we've raised? Can you rephrase your

question? I'm not really sure I follow the direction there.

Q. Is MSHA going to be the agency that will set forth the regulatory requirements and obligations for San Juan Coal Company with regards to roof support?

A. Yes.

Q. With regards to ventilation?

A. Yes.

Q. With regards to the concerns you have about the presence of methane?

A. That is correct.

Q. With regards to how the coal mine is operated in terms of venting the coal methane?

A. That is correct.

Q. Okay. They will also have requirements and procedures with regards to spontaneous combustion and combustible materials, correct?

A. That is correct also.

Q. All right. With regards to all those issues, what has MSHA told you concerning your application to MSHA on behalf of your company for this particular operation?

A. With respect to the wells, the wellbores, specifically?

Q. Well, with regards to any of the issues in your August 31 letter.

A. Yes, okay. Well, basically what we've received from MSHA is an approval for a petition for modification, to mine within 300 feet of an existing wellbore under certain constraints. And those constraints are, if you'd like me to elaborate --

Q. No, let's talk generally --

A. Okay.

Q. -- I work better in generalities.

A. Okay.

Q. When we're looking at the 300-foot rule --

A. Uh-huh.

Q. That's an MSHA rule, right?

A. That is correct.

Q. All right. And that 300-foot setback from a wellbore is a condition that MSHA believes will satisfy all the safety concerns of underground coal mining in association with a gas or an oil well, correct?

A. That is correct, yeah.

Q. So if you stay that far away, then there is no safety issue, correct?

A. You're correct, yes.

Q. And what we're dealing, then, is the value of the coal --

A. Uh-huh.

Q. -- that either must be left there, or the incremental cost associated to do something with that wellbore, cut the casing, whatever you do on perhaps a more expensive level than this longwall mining creature that runs up and down its track, correct?

A. Uh-huh.

Q. All right. So it's an expense component when we get down to the bottom line, isn't it?

A. Yes, it is.

Q. If we don't have the methane wells producing the gas, it's there naturally, isn't it?

A. Yes, I would assume so.

Q. What's the Coal Company going to do with the gas?

A. We'd have to vent the gas --

Q. Okay.

A. -- as a -- Go ahead.

Q. Is that part of your proposal to MSHA?

A. Yes, it is.

Q. Have you actually made an application that covers all the points that you've raised in the letter to the BLM of August 31st?

A. Not specifically.

Q. Generally?

A. Generally, just what I've indicated, as far as, you know, our modification for petition to mine within 300 feet of the wellbores.

Q. Is this a formal petitioning process, or is this a telephone call?
A. No, it's a formal petitioning process --
Q. Okay.
A. -- that's been approved.
Q. All right, the formal petitioning process opens the door to discuss modifications and compliance requirements of MSHA, correct?
A. That's correct, yeah.
Q. You do not have at this point in time MSHA's approval for any of these things that you want to do with regards to the issues in the August 31st letter?
A. We have approval to mine within 300 foot of a wellbore, as long as we re-enter that wellbore, mill out the casing in the target coal seam and plug that wellbore with expanding type cement.
Q. Okay.
A. Yeah, we do have that approval.
Q. Let me change to another chapter. You talked in your direct testimony about a change in understanding, and my recollection is, in August of this year, prior to that time, it was -- you were promoting gas withdrawals by oil and gas operators in the area to be mined, that was what you were trying to do. Right?
A. That is correct.

Q. That's a lease obligation too, isn't it?

A. Yes, it is.

Q. You're not just doing this out of the kindness of the Coal Company's heart?

A. I believe that is a correct statement.

Q. Okay. So before you got the lease, you knew those were special stipulations, right?

A. Yes.

Q. And you knew that the San Juan Coal Company had full responsibility for removing any pre-existing impediments to the mine plan that you wanted to execute, including dealing with the gas operators?

A. I guess I really don't feel like I'm in a position to address the stipulations that are attached to the extension lease application.

Q. I'm not asking you to address those. I'm asking you, you're aware that they are in the stipulation?

A. Yes, I am aware of that.

Q. And does that not form the basis by which the Coal Company had the plan to promote the acceleration of the gas production by the gas operator? Isn't that how we got here?

A. Yes, it is.

Q. Okay. The plan now changes, and now you don't want any more gas wells?

A. I wouldn't go so far as to say that we don't want any more gas wells. I guess what I would say, that we would like to be able to work cooperatively with the operators to make sure those wells go in appropriately. We're likely to be compromising safety and creating roof and floor hazards and so forth.

Q. That invites a number of options for solution, doesn't it?

A. Yes, it does.

Q. The relocation of wellbores, right?

A. Uh-huh.

Q. That's one option?

A. Uh-huh.

Q. One option would be simply to come up with an evaluation and purchase the gas reserves and have them out of your way, right?

A. That is an option.

Q. And you have investigated with your technical people what you think those gas reserves are worth, right?

A. That is correct.

Q. And there is a substantial difference of opinion between the gas operators and the Coal Company about those recoverable gas reserves in the coalbed methane, correct?

A. That is correct.

Q. And in fact, your number doesn't even agree with the BLM number, does it?

A. No, it doesn't, but you have to understand that the only valuation that we've done thus far is a valuation on Districts 1 and Districts 2 --

Q. Okay.

A. -- which are the -- your lead mining districts.

Q. So the ball is still in your court, then, about developing an evaluation of the coalbed methane and proposing that to the operators?

A. That is correct.

Q. Okay. That's under your control, right?

A. Uh-huh.

Q. All right. Let's look at the map that shows -- Mrs. Colby's Exhibit 1, I think it is. It's the one with the green- and the blue-colored --

A. Right.

Q. All right. Now, Mr. Stogner asked Mr. Cox a question a while ago about the reason, justification and basis for this one-mile buffer to the east of the current Deep Lease Extension, correct?

A. Uh-huh, yes.

Q. All right. Let's go from west to east. We've got the pilot mine, then we move east to the next two columns of sections --

A. Uh-huh.

Q. -- which you have referred to as the Deep Lease?
A. That is correct.
Q. Is that currently being mined?
A. We do have our mine development occurring in Section 35 of the Deep Lease, yes.
Q. Of any of the sections in the Deep Lease, 35 is the one that is currently being -- having coal extracted?
A. That is correct.
Q. And are you doing it with the longwall method?
A. No, we're doing it with continuous miners.
Q. So you're using continuous miners in a portion of Section 35?
A. That is correct.
Q. How far east are you in 35 with your continuous miner operation?
A. How far east? I believe we're about in the middle of that section there.
Q. Okay. And as we go north into Section 22, again, you're moving towards the east half of that section; you're about in the middle of that section, aren't you?
A. Right. Well, actually, if you look on this map here, we're in that Panel 101, we're developing the gate roads in Panel 101 --
Q. Okay.
A. -- which would be more to the west of Section 35.

Q. All right, let's start with 35 now.
A. Okay.
Q. I'm going to move east towards Section 36.
A. Uh-huh.
Q. What's the anticipated time frame before you're going to get into the coal in Section 36?
A. Section 36, we'll probably be actually actively mining coal and developing the gate roads sometime in 2004.
Q. 2004.
A. And that would be for Panel 201.
Q. Okay. What is the company's forecast as to approximate time you're going to exit the east boundary of the Deep Lease and begin accessing the coal on the western boundary of the Deep Lease Extension?
A. Well, we're going to be developing our mains, which would extend from the Deep Lease into the Deep Lease Extension, and that occurs sometime in 2005.
Q. What is the anticipated plan at this point when you'll reach the current eastern boundary of the Deep Lease Extension and start moving into what you characterize as the Twin Peaks extension? What's the time frame for that?
A. Well, it would be sometime after 2017.
Q. 2017. Does San Juan Coal Company have any objection to having the Division approve the infill well for the coal in this tier of sections immediately east of

the current eastern boundary of the Deep Lease Extension?

A. Well, I believe at this point in time we'd prefer to -- You know, we'd prefer to sit down and cooperate with the operators to try to come up with an agreement as to how those wells are developed. That would be our preference.

Q. Well, and as an accommodation my client would like to do that too. But let's assume that fails.

A. Uh-huh.

Q. So, if you're not going to get there until 2017 --

A. Right.

Q. -- do you currently have an objection on behalf of your company to having Mr. Stogner, using whatever criteria he wants, establish a transition area --

A. Uh-huh.

Q. -- between the area affected by coal extraction and an area that's not? Do you see my question?

A. Yeah, I do see your question. Our immediate concern at this point in time is the existing permit area, the Deep Lease and Deep Lease Extension. We are obviously concerned with the areas to the east of us but, you know, frankly we haven't initiated coal exploration activities out there. We haven't really initiated any type of mine plan. I guess what it boils down to is, we're not really sure how much control we have over what occurs out there to the east of us.

Q. Okay. Tell me how many tiers or columns of sections do I need to go eastward to get to what you -- to complete the package of what you call the Twin Peaks extension.

A. Well, you know, in the coal exploration drilling license application we include Sections 15, 16, 21, 22, 27, 28 and 33 and 34 within that application package.

Q. All right.

A. So basically two sections further to the east of the periphery of the Deep Lease Extension.

Q. Is there some scientific basis for taking these extensions two rows of sections east?

A. Well, in this case I'm not sure if most folks have heard, but PNM or the San Juan Generating Station is currently doing a feasibility on bringing on line an additional -- you know, additional capacity for -- additional unit for burning additional coal. And in relationship to that, there's a certain amount of coal that's going to be required.

And it's our thought that the Twin Peaks extension area would contain a sufficient amount of reserve to accommodate that new unit, as well as if PNM decides to upgrade their existing units.

Q. Okay. Now, this longwall mining operation --

which I learned about yesterday, so bear with me -- is one that would require you to remove existing wellbores that are in the way?

A. That's correct.

Q. Okay. That process is such that as the apparatus sweeps along the coal face, there is a methodology where it progresses and there is subsidence occurring after the machinery goes by?

A. That is correct, not instantaneously --

Q. I understand.

A. -- but a subsidence occurs four to six weeks after they mine out the coal.

Q. And that vertical distance is approximately what? Are we dealing with 10, 12, 14 feet? What are we --

A. It all depends on the depth of the coal. We're expecting more surface subsidence to occur in the shallow areas, which would be in the areas in the Deep Lease Extension, as we proceed east.

Q. Let's go back and focus on the Deep Lease Extension. Can you tell us the range of subsidence at the surface that will occur in the Deep Lease Extension once the longwall machinery goes by and there is a collapse or subsidence?

A. We have estimated probably the maximum surface deformation as a result of subsidence to be eight feet.

Q. Okay.

A. Approximately eight feet.

Q. Do you have any scientific studies or reports about the practicality of drilling gas wells after the coal is extracted? I'm talking about deeper zones, because you've vented the coal gas, it's gone. But can I come back in and drill a Dakota well after you've collapsed or subsided the surface, do you know?

A. I really don't have the technical expertise there, but I think it -- as I understand, I believe it is do-able.

Q. Okay. What is not do-able, though, is saving the methane in the coal?

A. That depends on who you talk to, because as I --

Q. I want to talk to you. You guys are going to vent it, right?

A. Well, we're venting the methane but, you know, there's a number of other coal companies out east that have also come in and produced the gas on the gob vent boreholes following mining activity.

Q. You expressed in your letter to the BLM one of the safety issues was this spontaneous combustion, and the concern was that the Coal Company believed that the presence of the gas extraction in that wellbore with methane created an environment for spontaneous combustion?

A. That is correct.

Q. All right. And that is directly related, under your position, to enhancing the natural coal fractures by an artificial stimulation of the coal gas well, right?

A. That is correct.

Q. Okay. Are you aware of any spontaneous combustion in an underground coal mine, anywhere, attributed to artificial fracturing by gas wells?

A. You know, I guess my preference would be that that question be asked of Jacques Abrahamse who has that expertise. I really can't address that question.

Q. You have to deal also with the water in the coal, right?

A. That's correct.

Q. What does the Coal Company currently do with the water?

A. We pump the water out of the entries and into a sump at the base of the pit.

Q. What kind of volumes are you talking about?

A. At this point in time we haven't encountered significant volumes, but we have encountered water.

Q. Okay. All right, let me come back to my question about the buffer. Are you opposed to it or not?

A. I guess, you know, I would just say that, you know, we would like to put a qualifier on that, that if we -- you know, as I said, if we could enter into some sort of cooperative effort where we could work with the operators to develop those wells, whereby they would not have a significant impact on the mineability or the safety of the ultimate coal mine that's going to be coming in behind you.

Q. And where that eventually gets us to is this 300-foot ring around the gas well that has to be dealt with in some fashion?

A. That's correct.

MR. KELLAHIN: All right. No further questions, Mr. Stogner. Thank you.

EXAMINER STOGNER: Mr. Roybal, redirect?

MR. ROYBAL: Just a few clarifying questions, Mr. Hearing Officer.

REDIRECT EXAMINATION

BY MR. ROYBAL:

Q. Mr. Woomer, the petition for modification establishing the 300-foot radius, is that for active wells or abandoned wells?

A. It's for both.

Q. For both?

A. Yes.

Q. So if a well is complete, cemented and not producing, it's not possible to mine through that well?

A. Not without re-entering the well and plugging it and abandoning it according to the MSHA procedures.

Q. But if it is plugged and abandoned pursuant to those procedures, then you can go and mine?

A. That's correct.

Q. All right. Now, addressing the objection to the -- San Juan's objection to the Twin Peaks area, would drilling wells pose the same types of problems with regard to spontaneous combustion and safety as those in the permit areas if they were ever mined?

A. Yes. Yes, they would.

MR. ROYBAL: Thank you, Mr. Woomer.

EXAMINATION

BY EXAMINER STOGNER:

Q. Let's go back to these mine safety and MSHA, because I want to make sure I get these items straight.

This 300-foot rule, that would require the casing be left in the hole or removed, if you plan not to mine around, I believe, a 300-foot -- I call it an island, let's say.

A. Uh-huh.

Q. Is the steel casing could be removed by the operator?

A. If we don't mine within 300 feet of the well? Is that what you're asking, I'm sorry?

Q. Yes.

A. Yes.

Q. Okay. Just for clarification on my part here, under the MSHA mining permit, this venting of the methane is authorized anyway; is that correct?

A. That is correct.

Q. Now, there's a high volume of CO_2. Is that included in there, or is that subject to change with the environmental concerns over the years, for at least CO_2?

A. You know, I think once again Jacques Abrahamse would be your best person to ask that question of.

Q. Now, this spontaneous combustible issue, as I understand, your concern comes not with mining into the wellbore but the fracture being left behind; is that correct?

A. That is correct.

Q. Okay. Now, how many coreholes did the mining operation drill out here to determine the extent of the mineable coal?

A. In the Deep Lease area we drilled, I believe, around 30 to 40 holes. And in the extension we drilled approximately 20, 22 holes.

Q. Okay. Now, how are these wells plugged?

A. These wells are plugged by utilizing neat cement, plugging them all from the bottom to the surface.

Q. With cement?

A. Yes.

Q. Is there some concern about whenever you mine into these, the combustion, that spontaneous combustion will issue there?

A. No, there isn't a concern.

Q. How come?

A. Well, for one thing we didn't frac those wells. The other thing, there's no steel casing in those wells. They were open-hole core type of drilling wells.

Q. Well, usually whenever you have a hole drilled vertically, you're going to have some sort of vertical communications. That's what we're always concerned about. I don't know why you're not concerned with it.

A. Well, I guess we're not concerned with it because we feel that we've appropriately abandoned those wells, or those drilling holes, with cement. Actually, we've gone beyond the requirements that the BLM requires for exploration drill-hole abandonment.

Q. And what do they require?

A. I believe they require that you plug the hole somewhere around 50 feet above the uppermost coal seam, which would be -- in our case, which would be the 9 Seam. And what we've done is, we've plugged all the way to the surface.

Q. With cement?

A. Yes.

Q. Was that also done prior to -- in the core holes for the open-mine portion in the overburden area?

A. Yes, we do a lot of extensive coal exploration activities prior to mining, regardless of its surface or under...

Q. Okay. Now, whenever you were qualifying yourself, you have been involved in this -- with this project since the git-go. Now, are you referring back to 1971 when the open-hole portion was --

A. No, I was referring to the underground project.

Q. Okay, and that would have been --

A. Specifically, that was from the summer of 1997.

Q. Okay. I think you may have responded to Mr. Kellahin, but I want to catch that number. To put a 300-foot buffer zone or island around these existing wellbores, how much coal reserves would be left in the ground?

A. We estimated a block of coal approximately consisting of 330,000 tons.

Q. And what percentage of that, because you mentioned 110 million tons of reserves?

A. Right.

Q. Okay. Now, that 110 million tons of reserves, was that just in the Deep Lease and the Deep Lease

Extension? That doesn't include the area further to the east?

A. That is correct.

Q. What percentage is that 33,000 [*sic*]?

A. Well, we've got -- you know, it all depends on how many active wellbores we have out there, and if we don't have a settlement, then we'll have to skirt around each individual wellbore, so I really couldn't tell you, sir, what the percentage would be. But I will say it would be significant.

Q. It would be significant?

A. Right.

Q. 33,000, as opposed to 110 eleven -- I mean, 110 million reserves, tons of reserves?

A. When you figure that there's going to be a loss of approximately $800,000 in revenue -- or in royalties, as a result of that block of coal being left behind.

Q. Have you done any royalty reserves, based on the amount of coal gas being obtained out there versus what they have lost in the tonnage for the islands?

A. No, we haven't.

Q. Would that be significant?

A. Potentially.

Q. Okay, you mentioned something about a petition for modification with the BLM. What was this again?

A. That was the petition for modification that went in to MSHA to allow us to mine within 300 feet of an existing wellbore.

Q. So the 300 foot was a modification, not a rule?

A. The 300 foot is a rule.

Q. It's a rule.

A. Without this modification, we wouldn't be able to mine within 300 foot.

Q. Okay, so what's the modification? How close wold that allow you to mine?

A. Well, basically the modification allows us to mine right through the wellbores, as long as we re-enter the wellbore and plug and abandon it according to MSHA standards.

Q. But that wouldn't change, that 300-foot rule, if it's an active well or one that was plugged by the operator, that will not allow you to drill -- I mean mine, within 150 feet of that wellbore?

A. Well, only if it's abandoned under the MSHA procedures.

Q. Under the MSHA?

A. Right.

Q. So the abandonment under MSHA would essentially require, I guess, the mine operator to go in and take a look at the well, physically re-enter it and -- to assure that it's MSHA or leased --

A. Unless we had some sort of cooperative arrangement with the operators to abandon those wells according to those standards.

Q. Now, you were asked about the range of subsidence. That's eight foot, that is going to be the thickness of coal out here or the thickness of the mine, is that --

A. Well, basically subsidence depends on the amount of coal that you're mining, but it's generally considered -- you're going to see approximately -- you know, if you're mining, for instance, 10 feet of coal, 80 percent would result in subsidence, 80 percent of that entire depth would result in subsidence on the surface, so you have eight feet of subsidence.

Q. So what are some of the thickest coal seams that are going to be mined out here?

A. Well, one of the thicker portions of the coal seams would be located in the southwest portion of the Deep Lease, and I believe it's a maximum of 18 feet thick.

Our average thickness will be somewhere between 11 and 13 feet, mining thickness.

Q. Under the MSHA rules, a coal mine, are there various degrees of methane content with an underground mine -- I'm probably saying this a little bit -- Let me go back.

When I was dealing with the potash issue, those were no methane mines, but if there was a certain amount of methane detected then they had to go to an MSHA requirement that methane was detected, so that was that portion there.

Under the coal-mining MSHA regulations, do the various safety requirements underground change within the amount of methane, or is a coal mine a coal mine?

MR. ROYBAL: Mr. Hearing Officer, I think our ventilation engineer --

EXAMINER STOGNER: Okay.

MR. ROYBAL: -- will probably address --

EXAMINER STOGNER: All right, then I'll save it.

MR. ROYBAL: Thank you.

Q. (By Examiner Stogner) Would the same MSHA requirements to avoid a wellbore if it had casing in it, whether it was fiberglass casing, steel casing or open-hole completed, it would still have to be the 300-foot requirement?

A. Well, only if the well was active and it hadn't been plugged, you know, appropriately. If it's an open-hole type of scenario or if it's fiberglass, you know, then we still have to go into that wellbore and plug it and abandon it according to the MSHA procedures. But obviously it would be a lot easier, we wouldn't have to mill out the casing in the targeted coal seam, and a lot less expensive.

Q. Or say like a horizontal drainhole type of a system that the technology allows out there, which would essentially, I guess, if that would be allowed out here in the coalbed methane for gas extraction, that would increase a lot more area in which could not be mined, or it would have to be avoided if we used a horizontal technique?

A. That is correct. Actually, we've investigated that as well.

EXAMINER STOGNER: I have no other questions of this witness.

Any more redirect?

FURTHER EXAMINATION

BY MR. ROYBAL:

Q. Mr. Woomer, just real briefly, have you looked at scenarios whereby there would be sufficient wells in a panel that then the company would basically have to abandon or bypass entire panels?

A. Yes, because of the type of equipment that we're using, fairly extensive and large piece of equipment, if we had a series of wellbores in any individual panel, I would say, you know, maybe three or four wellbores in an individual panel, we might have to abandon the entire panel, which would result in potentially upwards of 3 million tons of coal being lost and about 8 million dollars of royalties being lost as well.

Q. And again, that is dependent on the number and location of the wells within --

A. That's right, because you can't possibly physically relocate the longwall equipment and do a new setup. It's too costly and physically impossible.

MR. ROYBAL: Thank you, Mr. Woomer.

MR. BROOKS: I've got a couple of questions, if you want --

MR. KELLAHIN: Well, I was just curious --

MR. BROOKS: Go ahead, Mr. Kellahin.

RECROSS-EXAMINATION

BY MR. KELLAHIN:

Q. How long a distance are you dealing with, with the longwall machinery?

A. A thousand foot, these panels are 1000 feet wide.

Q. Okay.

A. And the panels are about -- well, the southern mining district panels and some of the other panels average around 10,000 feet long.

Q. When we get to a section that's got a gas well, and if we're looking at a density of four wells to the section, the longwall miner using 1000 feet of horizontal extension will pass through a substantial portion of the coal without coming too close to any of the four wells, right?

A. You know, I prefer that you would ask that question of Jacques, if you would. I think he's got the expertise to address that more thoroughly.

MR. KELLAHIN: I was just looking at a section being, you know, 5280 feet long and seeing how you could position the longwall miner to minimize your impact on the wellbore.

All right, nothing further, Mr. Stogner.

MR. BROOKS: If I may, Mr. Stogner?

EXAMINER STOGNER: Please.

EXAMINATION

BY MR. BROOKS:

Q. You testified a while back about the timing of your plans, and I'm not sure I'm clear on it. Where is the area that you expect to get into in 2004?

A. We expect to be in what's indicated as LW-201 on your map there.

Q. That would be --

A. That would be the first panel in mining district --

Q. -- the east half of Sections 24, 25 and 36. Are these section numbers on here?

A. Well, that would be the east -- or the west half of Section 36 and the west half of Section 25.

Q. Okay. Let me get myself located on this map

here. It would be the west half of 36 and the west half of --
A. -- 25.
Q. -- 25?
A. 25.
Q. Okay. And you're moving from west to east; is that correct?
A. That is correct.
Q. So how long would it be till you get over to Sections 4 and Section 33?
A. Section 4 and Section 33, you mean over in the Twin Peaks area, then?
Q. Yeah.
A. Further to the east?
Q. I think about LW-803, -802, -904, that area. If I'm reading the map --
A. Well, as I indicated, you know, we're probably talking somewhere around 2017 to 2019. The reason I say that, if you look at that longwall panel 704 --
Q. Yeah.
A. -- we actually move out of that panel in July of 2018.
Q. You move out in 2018?
A. Right, and then we --
Q. And when would you start that panel, when would

you get to that panel? This is -- We're in the west quarter of Sections 20 and 29, this L-104, right?

A. Right.

Q. When would you be moving into that panel?

A. You're talking about LW-704, is that what you --

Q. 704, right, I'm sorry.

A. We move into that panel as of April, 2018.

Q. 2018.

A. Right.

Q. So it would be some bit after that, that you would get over to, say, LW-904 where you're going into the extension area; is that --

A. That is correct, yes.

Q. And how long would you guess that would be?

A. Probably within -- we probably -- We'd have already developed our mains and so forth, so once we move out of Panel 704, I would think a short time after that. Probably Jacques would be the one to answer that question, as well --

Q. Okay.

A. -- but I think within a short time we'd be able to progress to the east.

Q. So you're talking about around now 2018?

A. That's correct.

Q. Okay. Now, we're talking about, in order to mine through these wellbores, you're going to have to enter those wellbores and plug those wells in accordance with MHSA [*sic*] regulations, correct?

A. That's correct.

Q. And I suppose you understand what I would assume to be the case, that you would not have a right to go in and plug wells that you don't own?

A. That is correct --

Q. You would have --

A. -- we do understand that.

Q. -- to have some kind of arrangement with the operator of those wells to allow you to take over those wells, correct?

A. That is correct, yes.

Q. Now, I believe we covered this, but your plan is to vent the methane, so there is no way that once you've finished your mining operation that the methane in the Fruitland could be produced?

A. There's still a potential of producing methane in the Fruitland Coal as a result of producing from what we call our gob vent boreholes, which once again Jacques Abrahamse could address a little more thoroughly than I could.

Q. Okay. But of course, you understand that the Supreme Court of the United States has held that the owner

of the coal does not own the methane?
A. I've heard tale of that, yes.
Q. Okay. So at some point, if you're going to proceed with this plan, you understand, or it's your intention to acquire this oil-and-gas interest in some way or other; is that your perspective on it?
A. Yes, it is my perspective, and San Juan Coal Company's perspective.
Q. So I'm getting to this -- Well, when I say "you", I'm talking about San Juan Coal Company; I don't assume you're going to purchase it personally.
A. Couldn't afford it.
Q. Well, let me ask this question: Wouldn't it be to your interest, if you're going to have to purchase these wells and the methane reserves that can be produced from them at some point, wouldn't it be to your interest to allow in the, like 15 years between now and the time you're going to be mining that area to allow those operators to produce as much of it as possible so that there would be less -- their reserve estimates would be lower and their expectations of price might not be as sanguine?
A. Uh-huh. Frankly, we're exploring that at this point in time. We feel that, as I indicated -- alluded to earlier, that there's probably not enough time within the Deep Lease to allow continued well development.

So what we're exploring at this point is possibly proposing an offer to buy the operators out within the Deep Lease and then within the Deep Lease Extension to allow continued well production, and hopefully entering into an arrangement where, as we progress towards an individual wellbore, that we'd be able to enter into an arrangement where we would compensate the operator at that point in time for loss of production. So we're trying to work out that type of proposal at this point.

Q. But of course if the testimony we've heard from the operator's witnesses this morning is to be believed, the drilling of these additional infill wells would substantially accelerate the production of the methane?

A. It appears to --

Q. I understand that's not within your area of expertise.

A. No.

Q. What has been done, or do you have knowledge of this -- There have been other areas of this country when -- there are coalbed methane deposits -- coalbeds, just coalbed methane deposits in many, many parts of the United States, correct?

A. Uh-huh, yes.

Q. And production of coalbed methane has been one of the hottest areas of oil and gas exploration in the last few years?

A. Uh-huh.

Q. There have been areas in which there have been means worked out to produce both the methane and the coal, have there not?

A. Yes, there has been.

Q. And do you have knowledge of how that -- what the general approach has been in those areas?

A. Well, I have some knowledge of that, and I know that there's been a lot of that type of activity going on in the eastern coal fields.

Q. Yeah. If I wanted to inquire about that of some of -- one of BHP's witnesses would that be you, or would it be better to ask one of the other witnesses?

A. It probably -- In terms of the technical aspects, I believe it would probably behoove you to ask Jacques Abrahamse about that.

Q. Okay.

A. Now, I'm familiar with a number of operations out east where they do have a piggy-backing effort ongoing with oil and gas producers to predrain gas ahead of the mine. Now, those are in operations where they have, you know, fairly dramatic levels of methane that they're dealing with.

Q. And --

A. And also in a different geological setting, different coal than what we're dealing with here --

Q. And what difference --

A. -- more of a bituminous/anthracite type of coal that has a greater -- less permeability and has a greater specific gravity.

Q. What difference does that make in terms of the considerations that impact that type of plan?

A. Well, I could only tell you hearsay, you know, what I've heard from Mr. Abrahamse and a few other people.

Q. Perhaps it would be better to let him speak for himself.

A. Yeah.

MR. BROOKS: Okay, that's all I have.

EXAMINER STOGNER: Anything further?

MR. ROYBAL: No.

EXAMINER STOGNER: You may be excused.

I see a hand up back there.

MR. HAYDEN: Just for clarification, I believe the MSHA regulations say a 300-foot diameter barrier around the hole, not 300-foot radius.

THE WITNESS: No, that's not correct, it's a 300-foot radius. We've looked into that pretty extensively at the mine, and it is a 300-foot radius that we're dealing with.

MR. HAYDEN: Okay. Well, the --

THE WITNESS: You talk to the MSHA people that have approved the modification, and that's their interpretation as well.

MR. HAYDEN: What MSHA has online states 300-foot diameter.

MR. BROOKS: Okay, Mr. Examiner?

EXAMINER STOGNER: Nothing further of this witness, you may be excused.

Let's take a five- to ten-minute recess at this time and prepare for the next witness.

(Thereupon, a recess was taken at 3:35 p.m.)

(The following proceedings had at 3:50 p.m.)

EXAMINER STOGNER: Hearing will come to order.

Mr. Bruce?

MR. BRUCE: Mr. Examiner, we're next going to present Paul Bertoglio, who's a petroleum engineer. And for the court reporter's record it's B-e-r-t-o-g-l-i-o.

PAUL BERTOGLIO,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Mr. Bertoglio, would you please state your name and city of residence for the record?

A. My name is Paul Bertoglio, and I reside in Casper, Wyoming.

Q. What's your occupation?

A. I am by education a petroleum engineer.

Q. What's your relationship to San Juan Coal Company in this case?

A. I was contacted in early 1996 to -- or sometime in 1996, to help with a feasibility study for an underground mine that was the Deep Lease, the Deep Lease Extension area, to help them have some understanding initially as to what they were going to be facing from the oil and gas industry, not only the drilling but the infrastructure questions.

I subsequently prepared a much more detailed feasibility study in 1997 and through 1998, that detailed everything from existing wellbores, pipelines, a cursory review of land, reviewed all the existing wells that have been plugged.

Following that, I helped with the protocol, helped answer MSHA questions as they related to oil and gas operations. And then as it became much more apparent that the feasibility study was going to be moved to the actual implementation phase, I again did a lot more in-depth evaluation, trying to advise the San Juan Coal Company on oil and gas issues from evaluations, again operations, moving pipelines, plugging wells according to MSHA regulations, those such things.

So I have had a long relationship.

Q. Okay. Now, you said by training you're an engineer. Where did you receive your education, and could you just summarize your employment background?

A. I received a bachelor of science degree in petroleum engineering from one of the other mining schools, Montana Tech, Montana School of Mineral Science and Technology, 1981.

I started work in Casper, Wyoming, for Energy Reserves Group. My primary area for five years was the San Juan Basin, where I looked after operations, 300 or 400 wells, which included -- when I say "looked after", I was responsible for the regulatory, the drilling, the production, the reservoir engineering, the geology, pretty much all aspects of it.

BHP bought Energy Reserves Group in 1985. The downturn in the oil and gas industry led to the closing of the Casper office. The production superintendent in Farmington retired, I took the position for about 15 months. I was the production superintendent over the Four Corners area for the combined -- well, BHP had bought a company within there.

Q. It was BHP Petroleum?

A. BHP Petroleum Americas, at that point.

I stayed there for about a year and a half, then went to Oklahoma City for two years doing, again, engineering, all aspects.

They closed that office, I moved to Houston. I was in Houston for five years where I held various positions from acquisitions engineer, production engineering supervisor. Most of the areas during that time period still focused on the San Juan Basin, as it was probably the most profitable area for the company.

I elected to leave the company in 1994, went to work for Snyder for a very short period in Denver where I elected at that point to go out on my own. I am a partner in an independent oil and gas producing entity called RM Energy. I also do consulting engineering. Most of RM Energy's production is in the San Juan Basin, and most of my consulting engineering that I've done has been directed towards the San Juan Basin.

Q. And when you were with Energy Reserves Group and BHP, a large portion of their production was in the Fruitland Coal and the Pictured Cliffs, was it not?

A. Initially, no. It was conventional resources or formations, Pictured Cliff, Dakota, Gallup. I became very keenly interested in the Fruitland Coal, and starting in 1983 Energy Reserves Group operated the Gallegos Canyon

Unit. We had wells that had 175-pound bottomhole pressure producing 3 and 4 BCF. Obviously there was a resource there feeding that Pictured Cliff well.

At that point I became very interested in trying to calculate whole reserves and how best to produce them.

So when I left -- When BHP came and we moved down to Houston, we initiated one of the first -- and that was in 1988 -- initiated probably one of the most extensive analyses in the underpressured area for coal seam development in the Gallegos Canyon Unit. We did extensive coring, core analysis, we did some very interesting reviews of different types of stimulation.

Q. Okay, so you have an extensive background in production from the Fruitland Coal, do you not?

A. Yes.

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

EXAMINER STOGNER: Any objections?

MR. KELLAHIN: No objection.

EXAMINER STOGNER: Mr. Bertoglio -- I'm sorry.

MR. BRUCE: Go ahead.

EXAMINER STOGNER: Mr. Bertoglio, you were referring to "the other mining school"?

THE WITNESS: I know, I should -- not to be confused with the be- -- the New Mexico one.

EXAMINER STOGNER: Oh, yeah, right. So we knew that, and I knew that too. Okay.

(Laughter)

EXAMINER STOGNER: As long as we all knew which mining school you were referring to.

Okay, with that, so accepted.

Q. (By Mr. Bruce) Mr. Bertoglio, just briefly, what are the three or four primary points you'll make with your testimony?

A. One, that any decision for infill drilling at this point is premature. From a practical matter, they are -- a large percentage of the wells are already on 160, via completions. Even though they are Pictured Cliffs, they are practically, for all practical purposes, producing predominantly the coal anyway.

Within the mine lands to date, a large percentage of the Fruitland Coal has shown to be noncommercial relative to the cost for development. And a lot of that, again, comes back to the premature point where there's not a lot of data to make a definitive argument towards economics.

And probably the one from a practical standpoint is the potential domino effect of granting infill where there's no clear geologic separation. Every offset to that will be put in a correlative-rights position, or damaged from a correlative-rights position, where if I have four producing wells in one section and I'm not allowed that in the adjacent sections, then I would suggest that my correlative rights are being violated, and I would then be coming to you and asking you for this same thing, to allow for infill wells on my adjacent leases. And I just don't know where it stops.

And I think at the appropriate time it's a Basinwide or a pool issue, rather than a special rule where it appears to be based strictly on acreage.

Q. Okay, Mr. Bertoglio, before we go into some of those things, do you have in front of you Mr. Cox's exhibits?

A. Yes.

Q. Before you go into them, a lot of the data that's in there, you don't quarrel with a lot of the specific data, do you?

A. No. In fact, I agree with the methodology. Coalbed methane reservoir engineering is completely different from conventional reservoir engineering. However, where I would tend to differ is some of the assumptions and some of the assumed values.

Q. Okay. You know, without too much interruption from me and to try to move these along, why don't you start with Exhibit C-2 and go through these exhibits, and where you have an issue with respect to this evaluation, why don't you state that for the Examiner? And be sure he knows which exhibit you're talking about.

A. Okay. Starting on C-4 -- and this may just be that I'm not quite clear as to what the basis for those pressures are, whether they are an actual bottomhole pressure. When it says static gradient, I don't know if that is an actual -- a measured bottomhole pressure.

I, in studying this, have come to some conclusions, and a lot of them are contradictory. A lot of it is based on physical things that are occurring.

For example, the mine right now as it has turned has just now started encountering water. That would indicate, starting at Section 35, and I -- agreeing with --

Q. And that's --

A. 35 --

Q. 30 North, 15 West?

A. -- West. The mine has just turned. That pilot mine is now starting to encounter water. On a hydrostatic head basis -- and I agree wholeheartedly with Mr. Shapiro that the dip of the Basin is about 100 feet per mile -- that would give you, relative to the dip, about 100 to 150 feet of water, of hydrostatic head, which translates to about 60 pounds in Section 36, where the static pressures are indicating values of 145 to 200 pounds.

I'm not suggesting that if these were statics they're wrong. I just don't -- Again, I find these contradictions. There's a lot of unknowns out there, and it's difficult to do a long-term analysis without getting a lot more definitive data.

The adsorption capacity calculation on C-5, I don't disagree, however I -- the biggest question and concern I have is using the isotherm and assuming that the coal is saturated. That makes a very large difference in evaluations. The desorption data are significantly less, somewhere on the order of 150 percent less than the adsorbed theoretical capacity of the coal.

The adsorption isotherm also, once you calculate it and look at it from a technical basis on published data throughout the literature that's public literature that's available, gives you an isotherm that is significantly higher, yields significantly higher gas contents than what the published data would indicate.

So in essence, I have all this contradictory data that, one, suggests the gas contents are, a), either totally -- the coal is saturated, the isotherm is -- and the -- the coal is saturated and the isotherm is wrong. Or the coal -- the isotherm is right, and the isotherm is drastically undersaturated. But there doesn't seem to be a happy medium unless you actually use the published isotherms. And then when you use the published isotherms, you do actually get some reasonable correlation between the desorb data and an adsorption isotherm.

Looking at Exhibit C-6, the first question as far as area I have yet to see demonstrated anywhere except for some extreme cases that coal wells will not drain 320 acres. So I don't disagree with the 320 acres. The average thickness -- I have looked, reviewed a significant amount of the coal data that's available --

Q. From the mine?

A. -- from the San Juan Coal Company. And within the mine area you will not find 20 feet of coal, in that -- in the 8 Seam. The seam they have 20 feet of gross in areas, it may be less than that, but there's significant ash beds within that, and the core data that was significant, as far as from an analysis -- it's one of the few areas where there's a lot of available data -- clearly shows significant ash beds within this that shrink even a 10-foot seam down to maybe somewhere on the order of 7 to 8 feet.

So there's -- within a -- even what appears to be a net on a log, there's even further reduction in it.

So I -- You know, 2 feet is a stretch for the mine. Now, outside the mine, yes, you're getting some thicker seams. But within the mine area, other than the very southwest quarter where it's almost at the outcrop, you're really not seeing 20-foot -- net feet.

Q. And would this reduce the average reserves in 320 acres?

A. It would cut it at least in half, just that one value would cut it in half. Again, you're using a Langmuir calculation that's assuming that it's totally saturated.

If the desorption data is much more representative -- and there's -- again, and I don't mean to hang my hat on the desorption data, I believe it's probably somewhat low as to what it reads because of the inherent problems with getting good desorption data, but not to the extent that it seems to indicate using this existing adsorption curve.

One other point I would note, that the recovery factors are being based on the difference between gas contents at 25 pounds versus, for example, at 25 pounds p.s.i.a. versus from a pressure of -- computed initial pressure of, for example, 251. There is within that an inherent inefficiency in recovery; you don't get all of the gas. There are areas that physically, the recovery efficiency within the coal itself is not going to give you 100 percent down to that level.

So again, that is a value that it is difficult to hang your hat on. And it takes a long-term production history to come up with long-term reserve -- or essentially ultimate reserves, and then do some back-calculating. But there isn't enough data to really do some significant back-calculating.

Turning to C-7, my experience in the Gallegos Canyon unit was extensive, it was probably one of the biggest producing assets for an energy reserves group. They also had quite a bit of core data on the Pictured Cliffs.

The Pictured Cliffs, to use a porosity log, a bulk density solely, will yield you extremely high porosities that are not indicative of the true effective porosity. Porosity most likely in this area is extremely low from an effective standpoint.

The logs themselves, outside of a very small area down where the Russell well was, Pictured Cliff itself, petrophysical data would indicate that the coal has a significant amount of clay in it. The clay yields a very high bound water. Those two factors -- The gas-saturation value of 50 percent, I would suggest, would probably be more on the order of 10 percent. The assumed porosity, I would suggest, is probably much more on the order of 6 to 8 percent.

Q. Again, that would reduce any Pictured Cliffs reserves?

A. Yes. And the production -- Well, I won't go there.

Q. I don't know that you need to look at the decline curves, Mr. Bertoglio, but maybe move on to Exhibit C-13 and perhaps discuss what you've seen in the Gallegos Canyon Unit, which is what, 29 North -- 12 West, 29-13

A. 29-13. 29-13, 29-12, 28-11, 28-12 --

Q. It's a rather large unit?

A. 58,000 acres.

Q. Okay. Based on all of your studies and what you've seen at the Gallegos Canyon Unit, was the Pictured Cliffs production just coming from the Pictured Cliffs formation?

A. In areas it was, and in a lot -- but the vast majority of the area, especially starting in the late 1970s, specific to the wells it became clear that the Pictured Cliff and Coal were -- whether physically or through hydraulic fracturing, were in communication with each other.

Q. Do any of the wells on Exhibit C-13, based on what you see on this exhibit and what you've reviewed on behalf of San Juan Coal, exhibit characteristics of Fruitland Coal production?

A. Yes.

Q. Could you identify a couple of those? Do you have that data --

A. Sure.

Q. -- in front of you?

A. The 5-3 well, the 16-3 well, potentially the 21-3, some of the others -- the 28-4 to some extent. My concern with blanketly saying that is, there's so little production. The wells have a characteristic incline. They also have very high water volumes, which is not usually indicative of a conventional resource. So they do model a coal well.

And when you look at the Pictured Cliffs log that's below it, there is not a strong indication of very thick, if any, commercial sands.

Q. Okay. Well, while we're on the engineering, now, one of the ideas you mentioned the issues we address is the prematurity of draining an infill drilling in this area at this time. You've gone over some of Mr. Cox's data and discussed your general knowledge of the area. What could you say about the prematurity at this time?

A. One, I have no idea what the wells are going to drain or the time it's going to take. Bushman well potentially could deplete this resource in ten years. I can calculate reserves of a BCF, I can calculate reserves of 2 BCF.

But where it's already produced relative --

approximately a quarter of a BCF right now, I can very easily extrapolate that -- the fact that it really hasn't started declining, I can extrapolate that out to where I could recover a BCF in years. I don't know. I just don't have a good grasp as to what the reserves are. There's a lot of unknowns still out there.

There are wells within the Gallegos Canyon Unit, for example, that were producing 400, 500 MCF a day, 300 MCF a day, flat, and overnight started declining at 50 percent, literally depleted the resource and declined very rapidly.

So there's no real way of ascertaining how long it is going to take to --

Q. So you can't ascertain, really, at this point, what the reserves are?

A. No.

Q. You can't ascertain how long they'll produce?

A. No.

Q. And you can't ascertain their drainage areas?

A. Correct.

Q. In your opinion, should some idea as to what the drainage area is be necessary for infill drilling purposes?

A. Yes.

Q. And apparently what's pushed this process in this Application is the timing of getting out the reserves, but

you don't even know that at this time, do you?
A. Correct.
Q. Well, let's address a specific section. Do you have the yellow land plat in front of you?
A. Yes.
Q. Over in the southwest portion of the proposed infill area is Section 36 of 30 North, 15 West. According to this land plat, that's a Richardson lease, is that not?
A. Yes.
Q. And they have what, a couple, three wells on that lease at this point?
A. According to the plat they have two coal completions in the northwest -- or excuse me, northeast, southwest, and a Pictured Cliff well in the southeast, and a proposed Pictured Cliff well -- I assume it's proposed, I'm not exactly sure. But either a proposed or an actual Pictured Cliff well in the northwest quarter.
Q. Now, in connection with your work for San Juan Coal Company, you at least have general familiarity with how the mine will progress. It's going to progress from west to east, correct?
A. Yes.
Q. And isn't Section 36 going to be -- of the acreage on this map, isn't Section 36 going to be the first Richardson section to be mined?

A. Yes.

Q. What is the status of the Richardson wells? Are they producing them? What -- Have you seen the data on them?

A. The 36-2 has produced on and off sporadically since completion. I do not have the last --

Q. When was it completed?

A. Oh, completed? I believe it as December of -- or January of 2000, or somewhere in that neighborhood. Just a second.

Okay, here it is. According to the records I have it was March of 2000. The --

Q. -- 36?

A. -- the 36-2.

Q. 36 --

A. Or --

Q. Here, I'll give you --

A. Okay.

Q. But the 36-1 well?

A. The 36-1 well?

Q. When was that completed?

A. December of 1999, it is -- Well, I have two sources. One is one I look at, *P.I. Reports*, and another one is when I have access to a public production record called *Lasser*. They give me slightly different -- but relative -- they're approximately both completed around the first of 2000.

Q. Okay. So close to two-thirds at this point?

A. Yes.

Q. And I understand that that's a Pictured Cliffs well, but has that been under production?

A. I have no data on it, so at this point I'd say it's never produced.

Q. Okay. Now, what about the 36-2 well?

A. The 36-2 well --

Q. When was that completed, and could you -- What about production from that well?

A. The 36-2 well, I have a completion date from *P.I.* of March -- sometime in March of 2000, and *Lasser* lists it as 3-24 of 2000, so both -- sometime approximately in March.

Q. So about a year and a half ago?

A. Yes.

Q. Has that well produced continuously?

A. No, it has produced -- reportedly produced sporadically. The first note of production was in May of 2000 where it produced 35 MCF and 2480 barrels of water. It's had three months where there's been production. Subsequent to that, the following month, 104 MCF and 2640 barrels of water. It was shut in in July of 2000, was back on in August. It produced 52 MCF and 5200 barrels of water. In September it produced 64 MCF and 4400 barrels of water. It produced no additional gas for the remainder of 2000, however in December it was noted it produced 3200 barrels of water.

Q. Now, looking at those two wells -- You've been here all day listening to the testimony, haven't you, Mr. Bertoglio?

A. Yes.

Q. And Richardson has said they want to accelerate development of reserves; is that correct?

A. Yes.

Q. Why wouldn't they -- And Section 36 will be the first area to mine. Why aren't they -- Maybe you don't know, but why aren't they producing the wells in Section 36 that they have?

A. I don't know, and any answer would be just speculation on my part.

Q. Fact of the matter is, the 36-2 well isn't a very good Fruitland Coal well, is it?

A. Relative to other Fruitland Coal wells he has, no, it's probably one of the poorest.

Q. Okay.

A. At this time.

Q. But if you look at one of the Richardson exhibits behind you, that Section 36 was also mapped with a pretty good coal thickness, wasn't it?

A. Yes.

Q. I mean, can you even -- You know, maybe not the value of the wells but certainly the reserves have been discussed today. At this point can you put a value on many of these wells?

A. Within the Deep Lease itself, I personally do not believe I can put any significant value on any well.

Q. Okay.

A. Within the Deep Lease Extension, the eastern bordered wells, which would be in Sections 20 and 28 and 32, most likely have some significant values. That has a lot to do with gas saturations.

The wells that are generally down the western sections of Section -- of the Deep Lease, relative, would be Sections 19, 30 and 31 of 30-14, there are several factors that come into play. One, the coal thins through there. To date, the production that has been seen from existing wells surrounding that has been extremely poor. The Dugan wells in the south half of 31, the lone reported coal -- or the completed well in the northeast of Section 30, at this point, is a fairly poor well.

So at this point I would have to say that -- you know, the data at this point suggest that a large -- or the western half of at least the Deep Lease Extension is going to be marginal.

Q. Now, comparing the land plat, A-2, you have, to the production data, Mr. Cox's Exhibit C-13, does it appear that Richardson's good wells are in the buffer zone?

A. Yes, absolutely. Relative to the total production -- and I can reference it at a point in time that is through -- based on the month of July, 2001, including -- well, I throw the Bushman well in. The -- within the Deep Lease, the average -- the Deep Lease and the Deep Lease Extension produced approximately 13.4, 13.3 million cubic feet of gas for July.

The area outside of that produced approximately 54.4 million cubic feet of gas. So relative to the number of wells, which are approximately about the same number, the volume is almost -- 20 percent of the volume --

Q. -- is in the mine area?

A. -- is in the mine area, versus outside the mine area.

Q. Eighty percent in the buffer?

A. Yes.

Q. Okay. Just a couple more things, Mr. Bertoglio. I hand you Exhibit, I think -- Richardson Exhibit B-6, which is one of the cross-sections. Now, San Juan Coal Company has taken -- has put a number of core samples out there, does it not?

A. Significant, yes.

Q. Without looking at the exhibit I just put in front of you, should those core samples be taken into account in mapping the coal thickness in this area?

A. I believe anytime anybody has any data that's available that helps you ascertain a -- or lead you to a better understanding of the geology, the engineering, you need to take it. Everything we do is indirect, and if you have something that you can actually look at on the surface, it gives you a much more accurate value versus a petrophysical log.

Q. And that data has been -- that data is available to Richardson, isn't it?

A. It is public data -- No, it is not public data. It is available to Richardson under the confidentiality agreement, and it is supplied through the BLM, and they can get it at -- through the BLM.

Q. Okay. So Mr. Shapiro's map didn't use that core data.

And then what about his interpretation regarding the gamma-ray logs and the density logs?

A. Generally, there's -- picking net pay is as much an art -- I would suggest that these maps represent a gross section versus a potential net. Within this, the -- some of the gross section, you know, I would tend to say is overstated.

There are clear indications, looking at the gamma-ray, which reads much more accurately on a vertical resolution than a density log.

You can see the partings that are noted when you look at the core data. There are -- Within the 8 bench, there's actually five and potentially a sixth bench that are clearly defined due to ash beds.

And you can -- If you look at the Turks Toast Number 1 well and look at its gamma-ray and note the inflections and peaks in the basal sand, that represents relative to what the core data shows, is these benches are somewhere around a foot to two to three feet, depending on which bench it is.

So within a gross section you have, clearly, sections that are nonproductive. High gamma-rays on some of this may be -- it could be considered potentially hot, as Mr. Shapiro said. However, you usually don't see a significant hot streak like that. It may be -- it's generally more a one- to two-foot spike rather than a nice, consistent line.

Q. So in short, using the density gives you a greater coal thickness than using the gamma-ray log?

A. Yes, and you can see partings within it also.

But depending on how quickly the tool is pulled through it, whether or not the tool is set up to actually read beyond 2 on the bulk density, you really -- all you end up getting is a block of a top and a bottom, and you don't actually see those partings.

Q. Is it your opinion that at this time Richardson's Application should be denied?

A. At this time, yes, I do.

Q. Do you believe that it would result in economic waste at this time?

A. Yes, I think probably that's one of the bigger overriding ones.

I think that the existing wells are -- well, not all of them but a large percentage of them are Pictured Cliff wells, as well as the Pictured Cliff coal wells, are already draining the coal on 160 acres.

If you allow this, and I am an offset lease holder to this and I can develop and economically produce my wells on 320-acre spacing, I will be put in a position where I will have to spend additional capital to protect my correlative rights.

MR. BRUCE: At this time, Mr. Examiner, I pass the witness.

EXAMINER STOGNER: Thank you, Mr. Bruce.

Mr. Kellahin?

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Bertoglio, define for me correlative rights, sir.

A. Correlative rights are my rights to produce gas underlying my lease and to not have those rights impinged on, to be fair, basically.

If I have a lease -- and I testified in an Oklahoma Corporation Commission hearing where we had interest in two blocks, one block was going to produce 1 BCF and a block next to it was going to produce 1 1/2 BCF, very easy to map.

The one block that was going to produce 1 1/2 BCF actually had only underneath its lease approximately 500 million. It just happened to have hit a choice spot within the reservoir. The other well did not have a choice spot within the reservoir; it was going to produce the gas away from my lease that I had an interest in.

My correlative rights were being violated, and on that basis I should have been allowed to drill subsequent well to protect my correlative rights.

Q. Correlative rights within the context of the Division's jurisdictional authority deals with the effect of oil and gas interests, does it not?

A. I believe so. I can't -- I'm not an expert.

Q. Do you see anything in the Division's procedure dealing with the correlative rights of the coal operator? That's not a correlative rights issue, is it?

A. No.

Q. What we're talking about is the opportunity for the oil and gas interest owners in a particular area to exercise that opportunity in a reasonable period of time to have the chance to recover their share of the recoverable gas, right?

A. Yes.

Q. How does Richardson protect its correlative rights in order to have the opportunity to extract the hydrocarbons from the coalbed methane if that opportunity is denied them by having your company vent the gas?

A. In this particular case, where you're dealing with a conflict between oil and gas resources that are from a large standpoint quite small compared to the value of the coal --

Q. It's an issue --

A. I don't know -- Yeah, and I don't know whether or not -- how you deal with the correlative rights. I think it's important that, you know, the wells be -- from a standpoint of being produced, need to be produced -- those that are going to be impacted first need to be produced first.

Q. Let's talk about that concept, then. It's consistent with your understanding of correlative rights to have Richardson exercise those correlative rights, accelerate the recovery of the methane as they propose to do?

A. Yes.

Q. That's consistent, right?

A. Yes, I would agree.

Q. The issue of correlative rights being impaired by that action is the effect, if any, on other interest owners that have gas rights, correct?

A. Yes.

Q. Do you see any other interest owner in this room that holds a gas right that's complaining --

A. No, I don't.

Q. -- about this?

A. No, I do not.

Q. Does San Juan Coal Company have any gas rights?

A. Not to my knowledge.

Q. When we talk about the domino effect, your concern is as we deal with the expansion of the coal extraction and move eastward, the issue is, what do we do for the gas owners, in terms of their correlative rights, to have similar rules affecting similar kind of production, correct?

A. I believe that -- let me ask -- expand on it. When I say domino effect, I believe it is not going to be based on whether or not the mine is moving to the east, it will be based on, for example, four Pictured Cliff wells in Section 16. The person who has the rights in Section 15 and whatever sections to the north and the east, most likely.

Potentially not to the west, because I honestly believe that as you get into the Basin you're going to get good wells. I have a -- There's something really strange happening within probably three-quarters of the mine area that I at this point don't have enough production data to ascertain.

But if you let four wells go in, in Section 16, and 320 acres will sufficiently drill it, and I am in the northwest quarter of 15, I will want to drill a well to protect my rights because I have two wells offsetting me in the west half -- the east half, excuse me.

Q. Let's take that position. It was part of your domino-effect argument. You're saying the gas operator in an area where you can't distinguish the special area from the area immediately east to it in the coalbed methane -- I think that's what you were going to tell me?

A. Yes, yes.

Q. -- that the rules ought to be the same, right?

A. Yes.

Q. And that if we carve out a special infill area for Richardson, we might adversely affect the correlative rights of the gas operators in the area, right? That's your point?

A. Yes.

Q. Again, there is no gas operator here opposed to the granting of the Application, is there?

A. None here that I'm -- none that I know of.

Q. Have you -- You said you've been engaged in the coalbed methane since about -- What was it, 1983?

A. Yes.

Q. 1983. Were you participating on behalf of any of the gas operators when the Division in 1988 developed the Basin-Fruitland Coal Gas Pool Rules?

A. I was not, I was in Oklahoma City.

Q. Okay. Were you involved in any way with the Burlington application earlier this year where they asked Division approval for pilot projects to test on a simulated basis the hypothesis that increased density could be achieved on a Basinwide rule change?

A. No, I was not.

Q. Are you aware of that case at all?

A. I was aware through P.I. that the case was coming forward, but beyond that no.

Q. Okay. You were going through with Mr. Bruce a number of geologic points in which you were critical of Mr. Shapiro on how he analyzed his logs and on his database.

A. I don't know if "critical" would be the -- We disagree --

Q. All right.

A. -- as to interpretation.

Q. Normally when oil and gas geologists disagree, there is an opportunity for the Examiner to see a competing interpretation in terms of a formal presentation. Does San Juan Coal Company propose at this hearing and this proceeding to submit to Mr. Stogner a difference in terms of geologic interpretation?

A. I am not a geologist. I have a reprint of a geologic net map, net pay, of the 8 Seam. However, I cannot verify the data points. It was a reprint that was taken from a document that the San Juan Coal Company submitted to the BLM in the course of their mine permit.

Q. Okay. In terms of this proceeding, though, am I correct in understanding the San Juan Coal Company has not listed a geologist to make a presentation?

A. They have not.

Q. Okay. Let me go back to your criticism about Mr. Shapiro's not using the San Juan Coal Company core data. There is how many core data points? Do you know?

A. In the Deep Lease they were approximately on 40-acre spacing.

Q. Okay.

A. In the Deep Lease Extension it was not quite that extensive, as far as core holes.

Q. You testified that that data had been released by the Coal Company to Richardson subject to a confidentiality agreement, correct?

A. Yes.

Q. And that confidentiality agreement had to do with exchange of data for purposes of providing information to the BLM about the value of their gas resource in the federal leases?

MR. BRUCE: Do you know?

THE WITNESS: Yes. Well, I don't know exactly how it was released, but I know the data is available for Richardson.

Q. (By Mr. Kellahin) All right, sir. You brought up the confidentiality.

A. Well, yeah, there is two aspects, one that was for the mine application, and then there was -- and I'm not exactly sure what all data was released that was put in the mine application. And then there was a subsequent one where new data was available that was going to be released through a confidentiality agreement between the operators and San Juan --

Q. My question, sir, is, do you have the authority or the capacity to release Richardson from the confidentiality agreement so that Mr. Shapiro can use that data in his map?

A. I have no authority myself.

Q. There was -- You noted a concern or objection about how Richardson was handling the coal gas wells in Section 36.

A. I don't know if I would call it a concern. Mr. Bruce asked me a question as to why the wells weren't producing, and I just know that relative to other wells they're not on consistently, at least up through the data I had available.

Q. But wasn't his point to draw your attention to Section 36, the emphasis being that if these were commercial coal-gas methane wells, Richardson ought to be producing them?

A. I'm not exactly sure what the basis Mr. Bruce was trying to draw me to. I think that could be one conclusion. The other one is that if the mine is truly going to take this out, this is going to be the first lease that's impacted, and they probably should be the first ones producing.

Q. All right. And you gave us some production information on those wells, did you not, on a monthly basis?

A. Yes.

Q. And have you converted that to a daily basis so that we can have an actual comparison to dates produced or days produced in terms of gas recovered and water extracted?

A. My data does not break it down to dates.

Q. All right. Would it matter to you if, on average, each of those two coal gas wells in 36 produce 400 to 500 barrels of oil a day and that that water had to be disposed of somewhere?

A. The water?

Q. Yes, sir, the water.

A. Yes, okay.

Q. Did I say something --

A. You said oil. We wouldn't be disposing --

Q. All right, I'm sorry, water.

A. But then you said water. Yes, and I understand the water situation quite well out there.

Q. Do you understand that there's been discussions between Richardson and the Coal Company about having the Coal Company assist Richardson in the disposal of that produced water so that they could accelerate the recovery of gas before it was lost?

A. Yes.

Q. When we talk about the production curves and the general level at which Richardson is achieving recovery, are we not seeing typical early-time performance on these coalbed methane wells where we have low rates? Yes, no?

A. Say it again.

Q. Yes, sir. When we're looking -- You made a point of looking at Exhibit C-13 and drawing the Examiner's attention to the low rates and the recoveries from Richardson's well. Did I misunderstand what you were doing?

A. Let me double check to see what C-13 is. Okay now, the question you asked me was -- ?

Q. Yes, sir, weren't you on direct drawing the Examiner's attention to what you characterize as generally low rates for the Richardson wells?

A. When Mr. Bruce asked me the questions, he asked me to -- whether or not -- Well, as I recall, what I pointed out on this exhibit was that the best wells were Pictured Cliff wells that exhibited coal characteristics, coal production characteristics. I was not -- I don't recall alluding to anything else.

Q. All right, perhaps I've misunderstood your testimony. Let me make sure --

A. Okay.

Q. You and Cox are not in disagreement, then, about the fact that the Richardson wells are in the early stages of the performance curve, where we still have inclining pressures?

A. Inclining production.

Q. Inclining production.

A. Yes.

Q. All right.

A. We're in agreement.

Q. That's not a problem?

A. No. And in fact, that's -- when I was looking at C-13 what I was alluding to -- the best Pictured Cliff wells, in essence, were exhibiting coal-production characteristics, and that -- So yes, we are most likely probably in complete agreement.

Q. Am I correct in understanding that the single biggest difference between you and Mr. Cox is what we consider to be the gas content of the coal on a per-ton basis?

A. Absolutely.

Q. Okay. Do you have a disagreement with Mr. Cox about the isotherm curve he's chosen in order to determine the gas content?

A. If it were the only one available, as when I did my study, yes, I would say that. My only -- That curve, if you plot it against known production, known isotherms that are widely published, it yields an isotherm that is way out -- it yields an isotherm that is significantly -- it yields significantly more gas contents than anything that is published for the San Juan Basin.

Q. Okay, let me stop there. Let's go to C-3 so everybody's looking at Mr. Cox's isotherm. Do you have C-3?

A. Getting there.

Q. All right, sir.

A. Yes.

Q. All right. Just before C-3 is C-2, let's look at that first. That's part of the presentation that was made to the Division -- You have it in your left hand.

A. Okay.

Q. -- as part of the presentation that the Division received from the coalbed methane study group when they were developing the coalbed methane spacing rules for New Mexico. Mr. Cox turned to the third page and he gave us a cartoon that illustrated the concept, correct?

A. Yes, sir.

Q. Do you have any disagreement with Mr. Cox's testimony concerning this illustration?

A. None whatsoever.

Q. None whatsoever, okay. When we take this methodology, then, and apply it to this area, you have to select an isotherm, correct?

A. That's one method.

Q. All right, let's follow this method first. His method of choice, his preferred method of choice, was to find an isotherm?

A. Yes.

Q. Or construct one based upon data available to him, and he did so in Exhibit C-3, correct?

A. Yes.

Q. All right. You disagree with this because your contention is, it will exaggerate the adsorption capacity of the coal and give you a value that's too high, right?

A. Yes.

Q. Okay, where is your isotherm that you want to use? Let's have a look at that.

A. Okay, this is my point, in that this isotherm, if you calculate this out, it yields, for example, at 100 pounds. Excuse me, at 200 pounds. It gives you a value of approximately, depending on where you're at, 200 standard cubic feet per ton.

Q. Okay, let's keep it simple, let's use it that way.

A. Okay, just for --

Q. Yeah --

A. -- illustration.

Q. -- for discussion. If we take 200 pounds, read up, we find the curve, read over, and you've got a capacity of about 200 SCF per ton?

A. Right.

Q. Okay.

A. The desorption data --

Q. Uh-huh.

A. -- the highest point that was desorbed anywhere in this, the Deep Lease or the Deep Lease Extension, was 117, and it was at much higher pressures.

The desorption date itself has its problems. But I have yet to find anyplace where it has been off 150 or 200 percent.

Q. Okay.

A. Now, I don't suggest that the desorption data itself is correct. What I have found is, in looking at the desorption data and plot it first as pressure and take the more published ICF -- the Llewellyn curves that are available, widely published and referenced -- and I don't know if they're in GRI, but they're widely referenced -- and plot that, it tends to plot more on their curves.

This isotherm plots outside of it, way to the high side of it. And this is a high-volatile seam which, if anything, should plot to the low side of it.

Q. I'm losing your point. Let me --

A. This particular --

Q. -- ask you --

A. -- curve, this particular curve, is reading almost on every single point values that every published -- the published data is much less, even for the higher ranked coals where you would expect to have higher gas content.

Q. All right, let's talk about that issue. You remember Mr. Cox's testimony that in selecting data, of all the various methodologies, it was the industry's preference and his to pick the Langmuir calculations. You don't have any trouble with using the Langmuir methodology --

A. Right.

Q. -- right? That's not the issue, is it?

A. No, and that's -- No, I don't disagree with that.

Q. All right. So do you have an isotherm we substitute or I have Mr. Cox take home with him and redo his work? And if so, let me see it.

A. I have -- The desorption data is available through the mine.

Q. Yes.

A. You can calculate the same pressures, pressures versus desorption data, and then overlay those on those widely published Langmuir curves for the base and on a Basinwide basis.

I don't -- And this is probably why I say this is somewhat premature: I don't know if I'm right, and I don't know if I'm wrong. I don't have a firm feel. I have a very strong sense that this curve itself is wrong and --

Q. Okay, let's test your conviction on that point.

A. Okay.

Q. If I'm looking for gas content in the coal, there's another way to do it, right?

A. Uh-huh.

Q. You get a canister and collect it in some kind of protocol and you do it that way, right?

A. Right.

Q. Do you have a recommendation as an engineer that's worked in this kind of stuff, to tell us what we ought to use for the adsorption value in this area for the gas content on a per-ton basis? What number should I use?

A. I personally would probably be inclined to stick towards the desorption data, and at worst use a high-volatile C which is -- and assume that it is saturated with gas contents potentially at the 175 standard cubic feet level.

Q. 175?

A. 175.

Q. Okay.

A. And again, that is based off of the Llewellyn curves for a high volatile C.

Q. Okay. When we go to Mr. Cox's C-3 isotherm --

A. Uh-huh.

Q. -- and if the gas content is 175 on the vertical scale --

A. Uh-huh.

Q. -- at what pressure are we going to be able to start producing that gas?

A. Less than 150 p.s.i.a., roughly.

Q. All right. So --

A. Well --

Q. Yeah?

A. -- and I know where these tests came from. This is the same core hole. This is the -- Well, I don't know which one is which, but one of these represents the 8-1 bench and one of these represents the 8- -- and one of them represents -- one is the A-3 and one is the A-2. But these are distinct benches within that 8 Seam. So there's radical changes, even in the Langmuir curves, even within specific benches.

Q. Okay, go slow and --

A. Okay.

Q. -- careful with me.

A. Okay.

Q. Okay, if I use this in a general way --

A. Uh-huh.

Q. -- you're telling me that on this curve, if I -- I've got to get my bottomhole pressure of my well down to 150 pounds, because I'm going to have to get it down at that rate before I am able to produce gas, based upon what you think is the gas content per coal ton, if this curve is representative --

A. If it's representative --

Q. -- make that assumption, please.

A. Yes.

Q. Okay. So if Mr. Richardson has bottomhole pressure in his wells that is greater than that, if he's above 150, then he ought not to be able to produce gas, because he's got to take that pressure down to get on the curve line to see the gas recovered?

A. Yes.

Q. All right. So if Mr. Richardson is producing gas at a drawdown pressure of more than 150 pounds, then your hypothesis about the adsorption capacity of the coal per ton is too low?

A. You lost me.

Q. Sure, let's look at the curve.

A. Okay.

Q. Let's say the capacity of the adsorption of the coal is 300. Let's just pick an easy number for a moment.

A. Okay.

Q. Three hundred. I can read horizontally across to the right, and I know that if we're going to use the blue line as the average, okay, that I am not going to produce coalbed methane gas until my bottomhole pressure is something less than about 330 pounds, right?

A. Yes.

Q. Okay. In the same way --

A. Yes.

Q. -- if the gas capacity of the coal is only 100 pounds on this curve -- See it?

A. Uh-huh.

Q. -- we're going to have to draw down that wellbore, the bottomhole pressure, until it's about, I guess, 80 pounds before we're going to see any gas recovery?

A. Yes.

Q. That's how you read this thing, right?

A. Correct.

Q. So if you're wrong about the gas content per ton of coal, you're going to have underestimated the gas in place for that coal? Assuming you do the rest of Mr. Cox's calculation?

A. Yes.

Q. All right, one final question for you on this topic. If you look at C-3, let's do 200 pounds. If you read vertically on 200 pounds, bottomhole pressure --

A. Uh-huh.

Q. -- and we find the blue line which is our average, okay --

A. Uh-huh.

Q. -- then we read horizontally over to the left, we're going to have an adsorption capacity of just over 200 pounds?

A. Yes.

Q. All right. So once we are in that position on the curve we can produce gas, okay?

A. As soon as you drop pressure below 200 pounds --

Q. Yes, sir.

A. -- right.

Q. All right. Take me back to the cartoon now --

A. Uh-huh.

Q. -- Exhibit C-2, and let's look at the saturated-undersaturated situation.

A. Uh-huh.

Q. At 1000 pounds I'm going to read vertically until I get to the curve. When I intersect the curve then I can read horizontally top the left, and I can see my gas content, right?

A. Yes.

Q. Okay. You've agreed with Mr. Cox that this is a fair illustration and his testimony was correct on saturated versus undersaturated, right?

A. Yes.

Q. I think you've also agreed with him that the gas being produced by Mr. Richardson is saturated, as opposed to undersaturated. Is there a disagreement about that?

A. That the seam is saturated or undersaturated?

Q. Yes.

A. I either believe the adsorption isotherm is wrong, or, if the adsorption isotherm is correct, then it is drastically undersaturated.

Q. All right, so that's how we link the two together --

A. Uh-huh.

Q. -- to see how you and Mr. Cox are juxtaposed --

A. Yes.

Q. -- on those issues?

A. Yes.

Q. All right. So you're right about the gas content, then Mr. Richardson's wells are undersaturated?

A. Yes.

Q. Okay, so if they're --

A. Undersaturated relative to the Langmuir curve in question.

Q. That's a given, yes, sir.

A. Right, okay, yes.

Q. Assuming for the sake of argument we accept a curve, a common curve, then on this curve, the illustration, Mr. Richardson is not going to produce any gas until he gets himself on the curve and out of the undersaturated portion of the display?

A. Yes.

Q. And on this curve, if you tell me the adsorption capacity is about 175 --

A. Which -- Excuse me. You said the cartoon.

Q. I'm looking at the cartoon, look at the cartoon.

A. I don't know if this cartoon is a representative of -- if it's a cartoon or if it's actually -- it represents the same curve.

Q. It won't matter --

A. Okay.

Q. -- for my question.

A. Okay.

Q. The illustration in the cartoon is the same concept, isn't it?

A. Yes.

Q. So when I get on the cartoon and I say I have a gas content of 175 put on the vertical scale, I know that by reading horizontally to the right, once I get to my isotherm curve, I read down the scale, and I know I'm going to be in -- I don't know, 50-pound range before I produce gas?

A. Yes.

Q. All right. And you take that same methodology, then --

A. Uh-huh.

Q. -- put it in a real-time situation with your best isotherm, and you come up with the answer. And you and Mr. Cox disagree --

A. Right.

Q. -- on the gas content?

A. Right.

Q. Do you have data to present to the Examiner this afternoon about what you believe, in your opinion, is the appropriate gas content number to use?

A. No.

MR. KELLAHIN: Okay. Thank you, Mr. Examiner, that's it.

EXAMINER STOGNER: Any redirect, Mr. Bruce?

MR. BRUCE: I don't think so. If you have some questions, Mr. Examiner, go ahead.

EXAMINER STOGNER: I do not have any questions.

Any questions of this witness?

MR. BROOKS: No.

THE WITNESS: Could I add one thing for the record, just for professional purposes? As an oil and gas operator I have no interest in any of this area, so the domino effect is not going to...

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

EXAMINER STOGNER: Okay, if there's nothing further, this witness may be excused.

Ladies and gentlemen, let's stand in recess until in the morning at 8:15.

(Evening recess taken at 5:05 p.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 12734 heard by me on 13 November 2001.

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 November 26th, 2001.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 2002

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. 12,734
APPLICATION OF RICHARDSON OPERATING COMPANY TO ESTABLISH A SPECIAL "INFILL WELL" AREA WITHIN THE BASIN-FRUITLAND COAL GAS POOL AS AN EXCEPTION FROM RULE 4 OF THE SPECIAL RULES FOR THIS POOL, SAN JUAN COUNTY, NEW MEXICO	ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: MICHAEL E. STOGNER, Hearing Examiner

Volume II: November 14th, 2001

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, MICHAEL E. STOGNER, Hearing Examiner, on Tuesday and Wednesday, November 13th-14th, 2001, 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

November 14th, 2001
Examiner Hearing
CASE NO. 12,734 (Volume II)

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E X H I B I T S

(Continued...)

E X H I B I T S (Continued)

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* * *

(Continued...)

A P P E A R A N C E S (Continued)

ALSO PRESENT:

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* * *

WHEREUPON, the following proceedings were had at 8:15 a.m.:

EXAMINER STOGNER: Hearing will come to order from yesterday. Today is Wednesday, November the 14th. We're still on Docket Number 38-01, Case Number 12,734, and I still believe we're with you, Mr. Bruce; is that correct?

MR. BRUCE: Yes, Mr. Examiner.

Before we begin with our first witness, with your permission, we've typed up testimony summaries just of our prior two witnesses, and we've marked those Exhibits 15 and 16. With your permission we move their admission.

MR. KELLAHIN: Mr. Examiner, we object to the testimony summaries. The purpose of this proceeding is to have a complete transcript of direct and cross-examination, and I think it's inappropriate to submit these as records in support of your position. I haven't read them, I don't have time to read them this morning, and we object to their use in this fashion. If they want to submit them in this matter, we object.

EXAMINER STOGNER: Do you have anything to respond, Mr. Bruce?

MR. BRUCE: Well, Mr. Examiner, there's nothing in here that hasn't been said. It's just for the convenience of the Division for a brief summary of what these witnesses have stated. We don't think there's anything objectionable in them, and we think they'll aid the Division in reviewing the record.

EXAMINER STOGNER: Thank you.

Mr. Kellahin, objection so noted.

Exhibits 15 and 16 are admitted into evidence.

Thank you.

Mr. Bruce?

MR. BRUCE: Mr. Examiner, my next witness is Jacques Abrahamse, a mining engineer, and he will be examined by Mr. Ausherman.

JACQUES F. ABRAHAMSE,

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

DIRECT EXAMINATION

BY MR AUSHERMAN:

Q. Would you state your name?

A. Yes, good morning. My name is Jacques F. Abrahamse.

Q. Please spell that.

A. J-a-c-q-u-e-s and Abrahamse is A-b-r-a-h-a-m-s-e.

Q. Mr. Abrahamse, what is your profession?

A. My profession, I am a mining engineer by qualification.

Q. And what is your current occupation?

A. My current occupation at the San Juan underground is as the ventilation engineer.

Q. What are your responsibilities there?

A. The position of ventilation engineer is to ensure the safe rendering of harmful, noxious gas, flammable, noxious gases in the underground, to comply with the MSHA requirements for minimum quantities at the working faces in and about the mine and also, more specifically, the establishment in a new operation for the establishment of a gas-analysis system for the control of our gases underground.

Q. Are you also generally familiar with the longwall mining plan and method?

A. Yes, I am.

Q. What's your formal education?

A. Formal education, I -- from my accent, I'm from Australia. I was schooled at the University of Wollongong.

Q. Could you spell that for the court reporter?

A. W-o-l-l-o-n-g-o-n-g, Wollongong.

Q. Just in case he hasn't seen the sweatshirts.

(Laughter)

A. I graduated with honors in 1987. I worked while studying, I worked as an underground mine and obtained my bachelor of engineering degree.

Q. After your education, could you very briefly describe what mining jobs you've held since graduation?

A. Okay, as indicated before, I worked up through the ranks as an underground miner on the face machines. And then in 1991 I joined the BHP organization within the Bowen Basin in Central Queensland.

I worked for one year in the open cut as a drill and blast engineer, and with an underground background and experience I requested to go to underground operations, and in February, 1992, I was the mining engineer at the Moura Number 2 underground mine in Central Queensland.

I worked there, it was a very small operation. They were basically -- I was the only mining engineer, so the duties at Moura were from gas drainage to budgeting, forecasting, scheduling projects and organization of men and crews for the gas drainage.

We had an unfortunate event at Moura where we lost twelve men due to what the warden's inquiry identified as an insipid heating, and I then was -- I worked for six months in the investigation of that inquiry, as well as being part of the witness scheme to give testimony.

From there I went to a mine called Crinum, and Crinum is located in Central Queensland as well. It's a BHP mine. And the positions that I've held there have been from a mining engineer to general duties, planning, scheduling, setting up of procedures, to working as what they call in America a shift foreman or shift boss, and in

Australia that position is a statutory position, it is under legislation under the Coal Mining Act in Australia. It is a position where you have to undertake study and an oral and a written examination.

I worked as an undermanager, as we call it in Australia, for a number of years. And then worked as a ventilation engineer at Crinum Mine.

From there I've now obtained -- come to America in June -- July, sorry, of this year, 2001, in the capacity of the ventilation engineer at the San Juan underground.

Q. In the investigation at the Moura mine were you personally found in any way at fault?

A. No, I was not, no statutory person -- no criminal allegations were made to any of the mine management at the Moura mine inquiry.

Q. Could you spell for the court reporter Moura and Crinum?

A. Moura, M-o-u-r-a. And Crinum, C-r-i-n-u-m.

MR. AUSHERMAN: Mr. Examiner, we would tender Mr. Abrahamse as an expert mining engineer with expertise in longwall mining and spontaneous combustion.

EXAMINER STOGNER: Any objection?

MR. KELLAHIN: No objection.

EXAMINER STOGNER: You mentioned the Bowen Basin mine and the Moura mine and the Crinum mine. Were all of those coal operations?

THE WITNESS: Yes, sorry, all of them were BHP coal operations. The Bowen Basin is basically a coal basin in which numerous operations existed in central Queensland.

EXAMINER STOGNER: And those were underground mines or surface?

THE WITNESS: Both.

EXAMINER STOGNER: Both.

THE WITNESS: Yes.

EXAMINER STOGNER: Okay, was the Bowen Basin primarily an underground or -- When you say both --

THE WITNESS: Sorry. Okay, the Bowen Basin extends for the full length of -- just about the full length of Queensland. Within the last five years, the underground operations have actually surpassed -- a number of underground operations have surpassed the open-cut operations, but obviously we talk about larger volumes from open cuts, so we're basically on par tonnagewise. But from a number of operations, there are an increased number of underground operations.

The outcrop towards the western end, obviously has got to a situation where underground reserves are the next phase in the Bowen Basin.

EXAMINER STOGNER: So qualified.

Q. (By Mr. Ausherman) Thank you. Mr. Abrahamse, first, I'd like to ask you some questions about longwall mining generally. What underground mining methods does San Juan Coal Company seek to use in its underground mine?

A. Currently we use the continuous miner units, and their objective is to establish -- they drive tunnels, three tunnels specifically, in what we call gate roads to establish a longwall block of coal that is of 1000 feet wide by 10,000 feet long. The primary resource is for extraction of the coal using the longwall method in the San Juan underground mine.

Q. So the continuous miner method is a way to prepare the longwall block for mining?

A. That is correct.

Q. And then most of the mining will be done by longwall method?

A. That is correct.

Q. Are you familiar with how a longwall mine mines through a coal seam?

A. Yes, I am.

Q. Have you a schematic today to help explain how that process works?

A. I have, yes.

Q. Put it on the easel, please. That is San Juan Coal Company Exhibit 12 [*sic*]. It's also in the notebook, but Mr. Abrahamse will be making reference to that and drawing a few labels for our convenience on it.

EXAMINER STOGNER: Mr. Abrahamse, I'm sure you've testified before. Just a reminder that whenever you say "here", "here" and "here", it's not going to look very good on the transcript. So try to describe items as you're -- even though it's apparent to us, for the sake of the court reporter and the transcript. Thank you.

THE WITNESS: I will do so, thank you.

Q. (By Mr. Ausherman) Mr. Abrahamse, is that from the mine plan, that schematic?

A. Yes, that is part of the approval application that was submitted for the mining lease.

MR. AUSHERMAN: What I'd like to do, Mr. Examiner, is ask Mr. Abrahamse a few introductory questions about the longwall schematic, just to identify some of the parts, what their names are and how it works, as an introduction to a short animation of a few minutes, less than five, that he will then use to explain how the longwall moves through a coal seam.

Q. (By Mr. Ausherman) Mr. Abrahamse, could you use the longwall schematic which is marked as San Juan Exhibit 12 [*sic*] and explain some of the parts of the longwall mining machine.

A. Just to start off with this, the objective for the entire unit is to establish the longwall -- coal longwall block. So in the middle of the longwall schematic the area shaded in dark color obviously is the coal, and the coal extends for 1000 feet in that direction and 10,000 feet in the longitudinal direction.

What we have on this schematic on the far right-hand side, we have -- well, basically -- sorry, there are three components.

On the far right-hand side of the schematic we have three shields, what we call longwall shields. Now, those longwall shields actually extend for the full distance of 1000 feet, but it's been cut away at this point in time just to give a representation of what is in front of the shields. These shields have hydraulic rams that basically push the shields up and down.

And there is also another ram, an inverted ram, at the base of those shields that assists in pushing what we call the AFC, the armored face conveyor, and this armored face conveyor also extends for the full length of the longwall block, for 1000 feet.

In front of the AFC, in the middle of the cutout, is what we call the shearer. And this shearer is the actual piece of equipment that physically cuts the coal, using the ranging arm and the cutting drum as shown in the block section of that longwall block.

We also, on the far left-hand side, have what we call the headgate drive. And basically the headgate drive is what powers the equipment on the face.

On the headgate drive, in the middle of the headgate drive, is what we call the transition piece. And the transition piece you aren't able to see on this diagram, but what -- the objective of the transition piece is to turn the coal at right angles, it comes along the face and turns at right angles at this point.

The coal is then conveyed on the left-hand side of the schematic over the -- what we call the BSL, and onto conveyor belts, and the conveyor belts take it all the way to the surface.

Q. Mr. Abrahamse, how big is the longwall miner machine?

A. How big is it?

A. It is an integral part of a lot of pieces put together. For example, the longwall shields themselves, they weigh 1050 ton. So in transportation from Europe you basically have one unit per semi on the road coming to the operation. Each of those units are then carried underground individually.

The AFC is basically attached to the shields, and they also are then carried down individually. And they would weigh up to -- you know, we carry two at a time, and they would be half a ton.

The shield itself, from a dimension point of view, we're looking at over 20 feet, 20 to 30 feet of dimension, in overall length.

Q. All right. Have you brought an animation to show how this machine actually mines through a coal seam?

A. Yes, I have, yes.

Q. Would you show that animation now?

A. The objective of this is to be able to -- It's very difficult to physically describe what happens underground, but hopefully this animation will give a few systematic ideas how the mass of equipment that's individually put together has to maneuver underground.

MR. AUSHERMAN: Mr. Examiner, can you see? Mr. Brooks, can you see?

EXAMINER STOGNER: Mr. Abrahamse, is this where you're going to be sitting?

THE WITNESS: I can move.

EXAMINER STOGNER: No, don't move.

THE WITNESS: All right.

EXAMINER STOGNER: Okay, the animation he's fixing to show us, is this on PowerPoint? Do you want to describe it?

MR. AUSHERMAN: It's on PowerPoint. We have a CD that we've provided the court reporter. We have additional copies of the CD here. That would be the animation that he's using.

THE WITNESS: What I will do is, once the animation starts -- the animation itself is only a minute and a half long, and I'll stop in the middle of the animation just to identify a few terminologies that will help everybody here.

CD-ROM soundtrack: "The longwall mining system -- "

THE WITNESS: Beg your pardon.

CD-ROM soundtrack: " -- differs from conventional mining in that the coal seam is removed in one operation by means of a long working face -- "

THE WITNESS: Sorry, I'll start again.

CD-ROM soundtrack: "The longwall mining system differs from conventional mining in that the coal seam is removed in one operation by means of a long working face or wall, from which the name 'longwall' is derived. The coal is mined in a continuous line, cutting across a coal face which may be several hundred feet in length."

THE WITNESS: Excuse me, I'm sorry. That's not what it looks like on my screen. I beg your pardon.

EXAMINER STOGNER: Now you know why do everything in paper.

(Laughter)

THE WITNESS: Goodness me.

EXAMINER STOGNER: Would you like to take a break and -- Let's take about a five-minute break, and that way you can make sure you got everything up and running.

(Thereupon, a recess was taken at 8:35 a.m.)

(The following proceedings had at 8:45 a.m.)

EXAMINER STOGNER: Okay, we're back in session.

MR. AUSHERMAN: Thank you.

THE WITNESS: Thank you.

CD-ROM soundtrack: "The longwall mining system differs from conventional mining in that the coal seam is removed in one operation by means of a long working face or wall, from which the name 'longwall' is derived. The coal is mined in a continuous line, cutting across a coal face which may be several hundred feet in length."

THE WITNESS: Sorry, if I can stop it here?

EXAMINER STOGNER: Please.

THE WITNESS: Okay. I've actually stopped it in the phase where the -- it's fairly similar to the longwall schematic diagram.

And if you look at -- from a terminology point of view, we have our shields that go the entire 1000 feet.

We have our headgate drive on the lower right-hand corner [*sic*]. We can see our shield in the middle of that longwall block. And the tailgate, what we call the tailgate -- headgate being at the head of the panel, tail at the back end -- the tailgate is on the far right-hand side.

And if you can see the sequence of those shield positions, that is how the shields physically move forward, one piece at a time. So we'll have over 200 shields along that entire 1000-foot face, and those shields are a catch to over 200 AFC pans. And then in front of the AFC pans is the shearer that runs up and down that AFC and cuts the coal.

Another term that I haven't introduced from the longwall schematic to this area that is most important, and that's the beloved gob.

Q. (By Mr. Ausherman) Can you spell gob?

A. G-o-b. And for any Australians and Tommies in the world it's called a goaf. But if I use the terminology goaf, I mean gob.

(Laughter)

Q. (By Mr. Ausherman) How do you spell goaf?

A. G-o-a-f. So, sorry, here we are. We've got the shields, we've got our drive. So we've got our shields across the face, the drive on the bottom right-hand side -- left-hand side, the shearer in the middle, and we have our gob on the bottom right-hand side of this view.

CD-ROM soundtrack: "There are two basic systems of longwall mining, the advancing and the retreating systems. In the longwall advancing system of mining, the coal is extracted from a face, starting from a shaft and advancing through the coal deposit toward a boundary or other limit -- "

THE WITNESS: I've stopped it at a phase -- This is a video from the United Kingdom, and it actually -- in the United Kingdom there are two types of longwall methods. And the first method they identify here is called the advancing longwall system.

The longwall equipment is exactly the same; the technique is different. The technique is that you would start at the beginning of your panel and work your way to the furtherest extent of your coal lease.

What San Juan want to use -- and San Juan is -- The second place we'll stop at this is actually a retreating -- what they call a retreating longwall system. So we would start at the furtherest end of our lease and work towards the main headings.

And the main reason for that system is to ensure that we can create a bleederless ventilation system --

Q. (By Mr. Ausherman) Is that "bleederless"?

A. A bleederless. And I'll need to talk about that in a little bit of detail later on. But a bleederless ventilation system, compared to a bleeder system where we allow air to go in and through the goaf. Our objective is not to have air go into our -- gob, sorry.

Okay, now just an important little item for your information. In the schematic of the longwall you will see those little -- the blue lines, and they form what we call a snake. And the snake is there, once the armored face conveyor is pushed forward, it allows the shearer to actually take a bite into the seam. And then the rest of the AFC is pushed forward to come back again, and they're snaked.

And that snaking action you will see in the next two depictions of -- this being the advancing, and the next scene being the retreating system.

CD-ROM soundtrack: " -- lines. In the longwall retreating system, narrow developing headings are driven through to the boundary or limit line of the coal seam, and then the coal is extracted by longwall faces retreating back in the direction of the shaft. As the mining machine makes a pass across the face, cutting a width of coal, the pan conveyor and roof supports are advanced immediat- -- "

THE WITNESS: The pans and the roof supports. And I suppose this is where we -- the crux of this system is so important in the hearing that we have here today. And I can take you back a couple of seconds in that, but I don't have people, so those -- in your shield arrangement we have this hydraulic ram, the vertical ram. And to move those shields forward, the ram lowers the canopy of the shield, and because the AFC is in front of the shield, the AFC becomes the anchor for that shield to be pulled forward.

And then conversely, when the shields are pushed roof to floor, they actually act as the next anchor point so they can physically push the AFC forward.

And that's basically the system of the -- the longwall system. You have this shield support where operators can traverse and traverse safely, compared to being under unsupported roof. And that is the difference between continuous miner units mining coal and the longwall system. There is no roof support other than the major capital cost of those shields.

Now, I don't know if you want me to go back. Would you like me to go back to --

EXAMINER STOGNER: No, continue going.

CD-ROM soundtrack: "-- -ely behind it toward the new face. As this happens, a void is left behind the supports. The roof is allowed to collapse or cave in, filling this void."

THE WITNESS: And that's the extent of the video.

EXAMINER STOGNER: Okay.

Q. (By Mr. Ausherman) Mr. Abrahamse, in the last segment of the video when the roof collapses and fills in, is that what's known as the gob or the goaf?

A. Sorry, yes, that is the gob. That depiction there indicates as the shields physically move forward, we have the roof above us fall in to roughly the height of mining, depending on the bulking factor of the immediate roof material. If you have a sandstone, massive sandstone block, then your bulking factor is reduced. But if you have a bulking factor that's significant, then that caving height, you know, will be not as great as sandstone.

But -- Yeah, sorry.

Q. Mr. Abrahamse, for the record could you show on the longwall schematic, which is Exhibit 11, where the gob, or the caved in rock, would be located, and label it?

A. Okay. From the far right-hand side of the longwall schematic where we have the three shields, you would find that the gob would be located behind the shields.

EXAMINER STOGNER: While you're up, could you turn the light on? Thank you, sir.

Q. (By Mr. Ausherman) Mr. Abrahamse, is it important that this longwall mining system keep moving in a systematic way?

A. It's essential. It's part of the whole system analysis from a geotechnical point of view and also from a ventilation point of view, yes.

Q. Why is it important from a ventilation point of view?

A. From a ventilation point of view, we will be -- as was indicated yesterday, we will be creating a gob that has coal seams behind us that will fall into the gob. It will be fractured to some degree and be part of the gob.

It is essential that the longwall keeps moving so that we do not have a potential to give us a spontaneous combustion event, because if a longwall stops for a long period of time part of the action of spontaneous combustion is for air to continually pass broken coal.

Q. Mr. Abrahamse, could you use the exhibit that Mr. Woomer used yesterday showing the depiction of the mine plan and show how the longwall mine moves through the San Juan Mine coal plan?

A. Yes, I can.

EXAMINER STOGNER: For the record, this is Exhibit what? Number 3, I believe?

MR. AUSHERMAN: That's correct.

Q. (By Mr. Ausherman) Using San Juan Exhibit Number 3, could you explain how the longwall miner moves through the mine plan? As a first step, you might label what are known as coal panels and what are known as gate roads or passageways.

A. On the -- I'll describe the areas in the current workings that we are in at the moment, which would be longwall 101, 102, 103, and that's indicated on the left-hand side of the diagram.

What we have, if you can see three lines with adjoining lines, those are called gate roads.

Q. Are those the lines with the windowpane pattern in them?

A. The windowpane pattern, that's correct, yes, that's a good way to indicate them.

Those are called the gate road headings that the continuous miner develops. And what they leave, then, is this long shaded block in the middle called the longwall block. And the longwall equipment would then be located at the furtherest end of that longwall block panel and work from the southern direction towards the northern direction, stopping before we get to what we call the main headings.

And the main headings, if you can imagine just a numerous number of tunnels, they are the headings that will be kept alive for the life of the mine for ventilation and traffic of persons.

Q. Are the coal panels the areas between the vertical windowpane lines?

A. Beg your pardon?

Q. Are the coal panels the areas between those vertical lines that you've described as passageways or gate roads that have a windowpane pattern in them?

A. Those rectangles that you can see are coal pillars, remnant coal pillars.

Q. So within the gate roads the reason we see a windowpane pattern is that the glass in the window, if you will, is a coal pillar?

A. That is correct.

Q. And what is a coal pillar?

A. A coal pillar is just the coal that is left behind that allows the people to -- You have your passageway, and your coal pillar general stability for your roof, it's a primary support for your longwall. But it is just a block of coal. At the San Juan underground it would have a dimension of 150 feet by 66 feet.

Q. That goes floor-to-ceiling for support?

A. And its primary -- Sorry, in the longwall operation it is critical for establishing our seals in those cut-throughs, what we call cut-throughs.

The headings -- the lines that run north-south are called headings. The lines that run east-west are called cut-throughs or crosscuts.

Q. Now, just to be clear, focusing again on these gate roads and the windowpane pattern in them, the clear part would be equivalent to the glass in the windowpane, and the dark lines would be equivalent to passageways or ways where the mining operation to move; is that correct?

A. That's correct, yes.

Q. Could you show on the diagram where the coal panels are located, the coal panels that you mine by the longwall miner.

A. Okay. The coal panels of the longwall block are indicated by the larger windowpane, if you can call it that, if we utilize that term, for each of these blocks.

Q. And for purposes of the record, could you refer to which blocks you're pointing to?

A. Sorry, initially this is the longwall 101 block where the mining equipment was down at the southern end of that block, and traverse or retreat towards the northern end of longwall 101 block before the mains.

Q. Mr. Abrahamse, let me ask you a few questions about what would happen when the longwall would come to a gas well, for example.

EXAMINER STOGNER: Sir, if I may, while we're still on this, there's just a couple of nomenclatures I want to clarify.

When I look at the LW, that's obviously a longwall on your notations?

THE WITNESS: Yes.

EXAMINER STOGNER: And -- But also I see some HG's represented, HG-103, HG-102. What is HG standing for?

THE WITNESS: Headgate.

EXAMINER STOGNER: Headgate. And how about the SRs, like the 103 and the 102 in the far lower left-hand corner?

THE WITNESS: Sorry, that's the setup room.

EXAMINER STOGNER: Setup room?

THE WITNESS: Setup rooms. The longwall -- before -- Because of the size of the equipment, the setup room has to be established, which basically is our headings, 19 feet wide. To get the longwall equipment in, we actually have to shave another six -- or another eight, eight feet off that heading to make it a total of 17 feet wide, to get this longwall equipment in.

So in the plan we identify them as a separate roadway called the setup room.

EXAMINER STOGNER: Okay, so when I refer to LW-103, LW-102, those are the longwalls that are currently working. So you've set up in these setup rooms and are now working back toward the main entryway, and this is the retreating or --

THE WITNESS: That is the retreating --

EXAMINER STOGNER: This is the retreating?

THE WITNESS: Yes, yes.

EXAMINER STOGNER: Okay. Thank you for allowing me to indulge in this while I had this out. So I'm going to get back to you.

MR. AUSHERMAN: Thank you, Mr. Examiner. Do not hesitate to do that as we go along. I know this is complicated and this is the first time you've seen it.

Q. (By Mr. Ausherman) Now I'd like to ask you a few questions, using that diagram, about what would happen to the longwall mining process if it encountered a well. Let's just say hypothetically, because it's easy to see on that diagram in the lower right portion of it is the number 26, indicating a section number in longwall panel 204.

As the longwall panel is advancing through longwall panel 204 and it were to come to a well in the location of the number "26", what would it do?

A. Well, at this stage, because we haven't got the -- obviously, the rights to the ownership of the well -- I mean, and hopefully this is where we will end up today, to be able to negotiate those type of dealings. But at this stage we would have to come to a stop as to the -- at your 300 feet.

We would physically have to relocate all the pieces of equipment that is on the operating longwall. We would have to stop for a period of time to establish a secondary setup room with the continuous miners, and then we would have to relocate the mine equipment from its end stop to the next position.

Q. Now, under that scenario the well that you're avoiding is a well that is a producing well or a well that is not plugged and abandoned according to MSHA standards --

A. That is correct.

Q. -- is that correct?

A. That is correct.

Q. Let's assume the same scenario, only when you come to that well it's a well that has been plugged and abandoned according to MSHA standards. What would you do with the longwall miner then?

A. We would then have the ability to mine through that area towards the completion of our final setup -- to our final takeoff point, for the final position of that longwall. So we'd be able to mine straight through it.

Q. I'd like to shift gears and ask you a few questions about spontaneous combustion. What is it?

A. Spontaneous combustion is, by definition, a process of oxidation of coal -- or wheat, for that matter -- but it's oxidation of a product whereby the heat that is generated from this endothermic -- exothermic reaction, sorry, is either sufficient enough to be removed from that product or insufficient to be removed from that product, establishing an open-fire scenario.

Q. You used the analogy of a fire triangle when we were talking about this this morning. Could you explain the three components, as the fire triangle describes them, that are necessary for spontaneous combustion?

A. Spontaneous combustion, it's not an exact -- You cannot pinpoint exact situations to a spontaneous combustion event. A spontaneous combustion event, very similar to a methane drainage scenario, has significant geological factors that need to be taken into account, significant mining operations that need to be taken into account.

So things initially like your rank, as we discussed yesterday, your rank can vary, so too can your spontaneous combustion of your coal. So the anthracite scenario -- from your brown coals, which very readily burn and your lignite that very readily burns, to your anthracite that really don't burn, the eastern Appalachians, for example, or the coal fields in New South Wales, in the southern districts, Wollongong and that. So your rank determines your propensity for spontaneous combustion.

The way that you conduct your business in the sense of how much loose coal you leave behind, obviously the definition of spontaneous combustion is, if you have a larger number of small particles within the gob or left in your mine and you allow air to flow through it like a set of bellows, then you will potentially create a scenario where that coal can create a hot spot, which then can develop into a fire.

Moisture content is another factor. The way you conduct your business from construction of seals is another factor.

Q. Let's take a few of the more important ones, one at a time. Let's look at the type of coal, rank of coal and its susceptibility to burning. How would you characterize the type of coal that San Juan Coal Company will be mining at San Juan mine with respect to its propensity to burn?

A. San Juan's coal has been identified as a sub-bituminous coal, great for the power stations. The power stations love it, you know? So in the western districts of the states, the coal is of a lesser rank, compared to the eastern side of the world. So from a spontaneous combustion point of view, the western coals are more susceptible to the event of spontaneous combustion.

Q. And San Juan Coal Company's coal is therefore more susceptible because it is in your category of western coal?

A. That is correct. We have had events in the San Juan open cut where we have had spontaneous combustion in the stockpile for the San Juan power station, the coal that sits there, four or five fires burning as we speak now.

And it's part of their practice to manage those events, and it is continuous.

We have had spontaneous combustion events in the open-cut mining pits on the San Juan lease, and we also have the events occurring in the La Plata open cut operation, just up the road from us, as the drawing number 1 in the submission.

Q. So spontaneous combustion events occur in the surface mines?

A. That's correct.

Q. That's not a problem? It's a manageable problem?

A. It's a problem, because obviously a spontaneous combustion event, if it gets out of control, it's an additional hazard that has to be managed.

So in the open cuts it's a little bit easier to be remote and use a big dragline to dig it out, whereas in the underground environment a spontaneous combustion has a totally different complexity, because for us to put men underground we do not want to put them into a scenario where we establish this fire triangle and where the fire triangle, once it's established, can potentially lead to an explosion.

Q. So the first leg of the fire triangle would be the heat that's generated by burning coal?

A. The source, yes.

Q. The source.
A. The ignition source, sorry.
Q. What are the other two layers?
A. The other is the fuel.
Q. And what would the fuel be in an underground mine?
A. In an underground mine the methane at this stage would be our fuel.
Q. And what's the other leg?
A. And the other leg is the oxygen or the air, to complete a fire triangle. It's the fire triangle that we do -- you know, that industry has been exposed to from a firefighting point of view, same principles.
Q. So we're looking at heat from burning coal --
A. Yes.
Q. -- oxygen from air that reaches the area, and we're looking at methane gas?
A. That's correct.
Q. Do you have concerns about spontaneous combustion at San Juan underground mine?
A. Yes, I do.
Q. When did you develop those concerns?
A. The concerns were identified during the feasibility stage of the project prior to me being involved with the project. It was identified as the number-one risk

to be managed at San Juan underground.

It was derived from a numerous amount of information, one being the coal that was tested at San Juan was -- what we call the crossover temperature was determined, and the crossover temperature is basically an indicative indication that at some stage of the life of the mine, if you have coal under certain conditions, under certain temperatures, will want to take off on its own accord, spontaneous combustion. That's one. And a lot of work was done with the project group to identify that and identify as our major hazard.

We also have -- that information was cross-correlated with a lot of Cypress data -- we have a gentleman that has come from the Cypress organization to the San Juan underground -- and that information clearly indicated the relativity to a spontaneous combustion event occurring in our operation because the other mines in the Utah and the Colorado district had recorded events of spontaneous combustion. So it became a very real aspect.

Q. Can you tick off for us what your concerns are about spontaneous combustion at San Juan mine?

A. Okay. The concerns are that if we have a fire develop in the gob, we have established a protocol and spent quite a bit of money, once we identified this hazard, to say, right-e-o, we have this hazard, how are we going to control it?

The controlling factors, one of the reasons is myself, myself coming over from Australia, having experience in the spontaneous combustion episodes and being part of the BHP corporate policy, we would have an inertization plant that we will have access to, we will have access to nitrogen --

Q. Could you spell inertization plant and describe what it is? I don't think --

A. All right.

Q. -- most of us know.

A. I-n-e-r-t-i- -- zed-i -- inertization; is that right? Sorry, I have to remember the zed, and so...

Operations that run with a propensity to spontaneous combustion need to develop, need to have some way of putting out the fire, if you can call it that. Many places have -- Initially, the U.S. mines ran what the call a bleeder -- I'm sorry, I'm introducing a lot of additional terminology. But an inertization system allows an operation to remove oxygen, or one side of that fire triangle, away from that scenario.

So the nitrogen plant, we will have a plant in the vicinity with fully-piped lines to the surface, to the underground workings, to our longwall operation. And with the introduction of our gas-monitoring system that I'm going to introduce into the States, it will allow us to be more proactive in identifying initial stages of spontaneous combustion and basically putting out those events before they become a problem.

Q. So these are measures that you've employed to reduce the risk of spontaneous combustion?

A. That is correct, the inertization is one aspect that we've spent time on, for elimination of the problem of spontaneous combustion in underground operations.

Q. Let's look for a minute at the downside. What would happen in an underground mine such as the San Juan mine if a spontaneous combustion event caused an explosion?

A. Yeah, besides not wanting to be around, it would cause massive fatalities and closure of the operation, i.e., the Willow Creek operation.

Q. Would an explosion event cause problems for CBM, coalbed methane, wells in the vicinity of the explosion as well?

A. Well, it would have a catastrophic effect throughout the entire district, you know, not just drilling. Socially, you know, economically, the power plant, the drilling, yes.

Q. What would be the effect on the power plant?

A. Well, at this stage the San Juan Underground, as was described earlier by Mr. Woomer, the open-cut operations in the total decline, and the underground is on the ramp-up to supply the power station with all its coal.

Q. Let me ask you some questions specifically about the effect of coalbed methane wells on this risk of spontaneous combustion. Is spontaneous combustion risk influenced by the existence of coalbed methane wells in the coal seam?

A. Yes, it is.

Q. Does well frac'ing affect that risk?

A. Yes, it does.

Q. Have you prepared a diagram today to show how frac'ing of the Number 8 coal seam could cause risk for the longwall mining operation at San Juan mine?

A. Yes.

Q. Would you put on the easel San Juan Coal Company Exhibit 10, please?

And could you use that exhibit to explain how frac'ing of the Number 8 coal seam can increase spontaneous combustion risk?

A. Firstly, just for clarification, this is just a fairly simplistic cartoon, as was indicated before, identifying more importantly the immediate roof strata of the longwall operation.

I have included the additional roof, geological roof structure, and -- to the extent of the Number 9 Seam, but keeping in mind what was indicated yesterday that this Fruitland, the orangey color in the middle at 34 feet of sandstone, is not a homogeneous sandstone -- not a homogeneous geological feature. It is present in between the 8 and the 9 Seam, but it is intermittent in channels. That's what our geological data has indicated.

So the idea of this representation is not for the entire stratigraphy of the San Juan district, but more importantly the question that has been asked of what influence a frac hole will have in and about our operation.

What I have indicated on the right-hand side, behind the longwall shield we have the gob, we have the longwall shield, shearer and the AFC within the Number 8 coal seam that is labeled. And I've diagrammatically put a black line on the left-hand side indicating a potential hydrofrac'd well.

Q. Is that a red line?

A. Sorry, is it red? Yes, more red than black, sorry.

The other markings that I have placed on the diagram in the Number 8 Seam, I just circled with a crosshach or a crossline. And again that is just a diagrammatic potential effect; it's not to indicate that that is what a frac'd well does.

Q. And you're referring to the elliptical circle in the Number 8 coal seam?

A. That is correct, yes.

So what we have is the image that when we mine this coal seam, the Number 8 coal seam, we will leave roof and coal floor in the gob. We will leave some coal and some roof in the gob.

During development, the first headings, we actually leave a larger quantity of coal in our roof, and the reason for that is that the coal, shale and the mudstone immediately above is susceptible to water. And the hydrofrac'ing process could -- and I use the word could, but identifying that it is a risk -- could lead to the fact that when we frac the Number 8 Seam we will to some extent potentially damage the zone directly above -- around the well within that elliptical shape.

Q. Could you mark with your red marker on that diagram the zone you're talking about roughly?

A. Just keep in mind that there's no dimension on this, it's just a cartoon, pictorial, so we can get an idea of what we're talking about.

Q. Thank you.

A. Now, with the process of the hydrofrac'ing, by introduction of the sand and water to physically open up the coal pore spacings for the releasing of gas, there is a potential to degrade that immediate roof area.

If we have removed the casing, or if the casing is removed and we mine towards this area, as I indicated in the short video before, one of the primary functions of the shields is to ensure we have a positive roof-to-floor pressure point.

If for some reason we lose this as the longwall shield, using that area --

Q. And when you say "this" you mean --

A. Sorry.

Q. -- the crosshached area --

A. Sorry --

Q. -- shale?

A. -- I've crosshached that area in the shale in the roof, yes.

If our longwall shield enters into that zone and if we lose the roof, then we have to physically stop the longwall operation for a period of time, and it can be up to days, to physically re-form the roof above us so that we can have a positive roof-to-floor pressure, so we can push our AFC forward, so that the shearer can rn along, and then relax enough to move forward.

So the major hazard in the longwall block of your hydrofrac'd hole is the potential instability of that roof strata.

Q. Would that cause the longwall miner to stop if it encountered an unstable roof condition and the roof failed?

A. That is correct.

Q. Why would that be a problem?

A. As I have indicated before, we will leave coal, roof and floor that will be in the gob. We have other, smaller seams above us that will be in the gob, and --

Q. So what you're saying is, the seams above, with subsidence, will collapse into the gob?

A. That's correct. We will have a potential interface between that area behind the shields to the rest of the seams.

Q. All the way through the Number 9 Coal Seam?

A. That's correct.

Q. And why is that a problem for spontaneous combustion?

A. As indicated in the definition, what we have is air, we require air from an MSHA point of view and from a normal operating point of view, to pass through the longwall shields where operators will be working.

If we stop for a prolonged period of time, we will allow air to continuously go behind the shields. Part of the normal mining operation is, air will go where the workers are to remove dust and gases that are formed from the seam, as well as some air going into this unconsolidated gob. That's part of normal mining operations.

But part of normal mining operations is also for the longwall to keep moving, so that at some stage we will eliminate that interface between air going across the face and into the wall -- sorry, through the face, into the gob.

So if we stop for a period of time, we actually induce additional air for a longer period of time to go through the goaf -- through the gob.

Q. Could stopping the longwall to move around a well create a similar type of problem?

A. It will create an additional hazard as part of the operation, yes.

Q. How long does it take to move a longwall mining machine?

A. As the schedules that have been submitted, the dates indicate, a month process from finishing one longwall to physically relocating it to the other end, to another location. There's a month period in there.

Q. Okay, Mr. Abrahamse, we've discussed with this San Juan Coal Company Exhibit 10 the difficulties with spontaneous combustion created by frac'ing in the coal panel where the longwall was mining.

A. That is correct.

Q. Could you use the flip chart to draw a rough diagram of what would happen if a well were frac'd in the gate road or the passageway, and explain whether that could cause spontaneous combustion difficulties? And if you would, begin by labeling that page SJCC 15.

EXAMINER STOGNER: I believe you already have a 15. Mr. Bruce entered that, 15 --

MR. AUSHERMAN: I'm sorry, SJCC 16.

EXAMINER STOGNER: Well, we've already got a 16 also.

MR. AUSHERMAN: 17.

EXAMINER STOGNER: 17 will work.

THE WITNESS: I'll just take a minute just to draw the layout of our longwall and blow it up so that that area -- an area of our longwall block can be depicted.

Just where we are at the moment, this is longwall 101 as an example, so we can relate to the map. On the -- Again, a cartoon of just an indication of what I'm trying to explain. You have your longwall block in the middle. On the right-hand side [*sic*] you have your headgate 101, and on the other side a tailgate 101.

Now, in mining ventilation systems we actually introduce fresh air, which I have indicated in a blue arrow. The fresh air would go along the headgate into the -- along the longwall face, and I'll indicate what we call return air, that is, air that has been contaminated from gas, dust and whatever else we -- whatever nasties we produce in the world down there. We call that return air. Back out that way to the shaft.

Now, that is called a "U" ventilation system.

The system that we incorporate will be that when the longwall is retreating -- and the retreating is from the bottom of the page up -- we will construct seals, or packwalls -- in America they call them packwalls -- on either side of the longwall blocks. So those packwalls will be wiped away around the perimeter of the longwall block.

As we advance or return, as we retreat, if we have, say, a pillar that has been fractured to some degree what that does is, by the time that longwall block gets to that position -- and this is now -- the crosshached area is now the gob -- if that pillar is fractured where we've allowed the cleats to open up to desorb our gas, have had sand in there, for example, to keep the coal cleats and joints open for desorption of the gas, if the air, intake air, goes along that longwall face, we have the potential -- excuse me, because I've moved the longwall face up, I now have two additional seals in that scenario.

Because I have a potential leakage path -- and I've indicated this with the blue line, blue dashed line, I have a potential for air to pass in that direction, through the gob and through a potentially cracked coal pillar, I'll call it a coal pillar.

Now, the primary objective in spontaneous combustion is to ensure -- and that's our behalf, on our behalf -- is to ensure -- on my behalf -- is to ensure that the seals or packwalls that are constructed are constructed of a substantial quality so that we minimize any of that leakage.

By having a frac'd hole in a pillar negates that to some degree.

Q. (By Mr. Ausherman) It negates it because it allows the passageway for air to the gob?

A. It allows a passageway, that's correct, through the gob and through the pillar.

Q. Have you considered whether dewatering of gas wells in the coal seam can affect mining risk?

A. Yes. The dewatering process, as I've indicated before, spontaneous combustion, one of the effects, other than the rank, is that if you dewater a seam significantly, you create a drier product, a drier end product.

With a drier product that is potentially more fractured -- a good analogy, I suppose, is a charcoal. You know, a charcoal, if it's fractured, it will burn a lot more readily because it's of a drier product. If you're passing air through a drier product and it is not able to release its heat quick enough, then it's physically building, then we could create ourselves a problem because of dewatering.

Q. So it would be fair to say that the drier the coal, the more susceptible it is to spontaneous combustion by oxygen passing through it?

A. As a generic term, yes. How we quantify dryness is another issue altogether, but yes, in the generic term.

Q. You testified that frac'ing and dewatering pose risks. Is there any different risk between the frac'ing and dewatering posed by a new well on the one hand, with that that would be posed by a well that is recompleted and frac'd in the Number 8 Seam on the other?

A. The hazard is the same, you know? We're talking about the same thing here.

Q. Yesterday, the Examiner asked a good question about the exploration holes that the coal company has put throughout the Deep Lease and Deep Lease Extension and whether those pose a risk for spontaneous combustion. Do they?

A. No, a part of the procedure for exploration holes is the filling of those holes. And so no, they wouldn't be in that regard, no.

Q. Does the risk to San Juan underground mine increase as more wells in the mine are frac'd into water?

A. In the generic term, yes, the more wells there are, the more potential hazards that we have to deal with.

Q. For the last subject, I'd like to shift gears and talk with you a little bit about production of gas after the mining occurs.

Are you familiar with instances in which coalbed methane gas has been developed after the mining of the coal seam in which it resides has occurred?

A. Yes, there are quite a number of operations in Colorado and Utah that use post-gob-vent boreholes to produce significant amounts of gas from the workings.

Q. How can that be if the coal is removed?

A. Well, we've heard testimony of gas potentially in the Number 9 Seam, gas in the Fruitland sandstone -- gas in the Pictured Cliffs sandstone. By removing of the coal and the formation of this gob, we have -- the roof, as has been indicated, has fallen in to create voids to allow increased permeability of the higher sandstone structures in both roof and floor.

The Pictured Cliffs -- When we actually mine that seam, because we create this 13-foot void, you'll have what we call floor heave, and that floor heave basically is the floor bumping up and breaking up.

So you have a degree -- you have a larger degree of roof cavity, but you also have a degree of floor heaving.

Q. So is the collapse of the roof and the other seam and the floor heaving analogous to a huge frac?
A. Yes, the best you could get in the thousand-foot zone.
Q. You mentioned these other mines produce from what's known as a gob vent borehole.
A. That is correct.
Q. Could you describe what that is?
A. Could I refer back to this?
Q. Yes, you may. That's Exhibit Number --
A. -- 10, Exhibit Number 10.
Part of the petition to the MSHA mining department is to -- in our initial District 1 and onwards, is to establish a borehole from the surface at designated points towards the coal seam.
The specification that we submitted to the MSHA gentlemen is based on techniques that have been used in other Utah and Colorado operations, and that's basically to have a standoff drill hole.
So we would drill 30 feet above a hole to 30 feet above the coal seam, and the last 10 feet of that casing will be perforated.
So the objective is, by establishing a hole above the seam that's not in the seam, once the longwall passes that area, then the -- and the gob is formed, then that

pipe will remain intact to allow venting of that gas, especially methane and other hydrocarbons that we develop, to a higher level.

Now, the operation per se, if we look at -- from an elevation point of view, referring to Number 3, Subject Number 3 -- in the placement of these boreholes, the beginning of the longwall panel is a higher elevation compared to the main ones.

Q. And the beginning of the panel is at the bottom of the exhibit?

A. Beg your pardon, this dark is the longwall panel, is at a higher elevation compared to the main headings.

Q. And the start, where you pointed there, is at the bottom of the --

A. At the bottom of the -- the southern end of the lease, yes.

Q. Thank you.

A. So the objective -- and this is still from an operational point of view, by having that gob form -- That is the bottom end of the start of the longwall panel, the setup room area. That is where the first gob vent boreholes will go, so that methane will traverse to the higher end of that gob -- of that void, if we can call it that.

Q. Do you believe that coalbed methane could be produced from those gob vent boreholes at San Juan mine?

A. Initially we in District 1 and District 2 -- well, District 1 at this stage of the game, the report that was given to us by Ravensreach has indicated that because it's close to the outcrop, the gas content in the longwall 1, 2 and 3 of methane is pretty limited.

But as we progress to the issue that we're here today in the Deep Lease Extension and on from that to the Twin Peaks, then that becomes more realistic and a definite process that we'll have to use to maintain our bleederless ventilation system.

Q. Do you believe that in addition to maintaining your ventilation system, coalbed methane could be economically produced from those gob vent boreholes?

A. I think we need to do a lot of work with the testimony that was delivered yesterday to get a better handle on what we call our domains of methane within -- from a reservoir point of view to establish that.

But with the numbers that were floating around yesterday that aren't going to be able to be obtained through just pure hydrofrac'ing, the availability is there for significant methane production.

MR. AUSHERMAN: That concludes my examination, and I would move the introduction of SJCC Exhibits 10 through 12 and also the flip-chart exhibit, which is 17.

EXAMINER STOGNER: Okay, let me make sure I've got -- SJCC Number 10 is the diagram, the cartoon diagram, cross-section of a mining operation.

SJCC 11 was the longwall schematic.

And the SJCC 12, that's the CD-ROM; is that correct?

MR. AUSHERMAN: That's correct.

EXAMINER STOGNER: And the SJCC 17 is the freehand drawing by Mr. Abrahamse?

MR. AUSHERMAN: Yes, it is. I'd also like to introduce, your honor, a summary of the testimony of Jacques Abrahamse, as SJCC Exhibit Number 18.

EXAMINER STOGNER: Okay, as far as 10, 11, 12 and 17, are there any objections?

MR. KELLAHIN: No objection to those exhibits, Mr. Examiner.

EXAMINER STOGNER: These four exhibits will be admitted into evidence.

And your Number 18, again, is a --

MR. AUSHERMAN: Is a summary of the testimony of Jacques Abrahamse, in a similar format to Exhibits 17 and 16 for the other two witnesses.

EXAMINER STOGNER: Any objection?

MR. KELLAHIN: Yes, sir, same objection.

EXAMINER STOGNER: So noted, 18 will be admitted into evidence.

Let's take about a five-minute recess at this time before cross-examination.

(Thereupon, a recess was taken at 9:45 a.m.)

(The following proceedings had at 9:57 a.m.)

EXAMINER STOGNER: Okay, we'll go back on the record now.

Mr. Kellahin, I believe we're ready for cross of Mr. Abrahamse.

<u>JACQUES ABRAHAMSE</u>,

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

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Let's talk about the methane gas, Mr. Abrahamse. That methane that's in the coal seam doesn't belong to the San Juan Coal Company, right?

A. As per the legal documents, yes.

Q. All right. It's a nuisance/risk factor for you that you have to account for?

A. That is correct.

Q. The ownership of that methane belongs to the gas operator or the interest owners that have leased the gas, correct?

A. That is correct.

Q. In this case, if Mr. Richardson is the gas operator, he's going to own the methane, correct?

A. (Nods)

Q. As part of the mine plan, you are proposing that you vent, and therefore waste, some of Mr. Richardson's gas, correct?

A. In initial mining, that is correct, unless we can come up with a mutual agreement, and that's where we are today.

Q. I understand. But in the absence of agreement, the mine plan is one that is going to waste some of the coalbed methane, right?

A. If it is not extracted beforehand, yes.

Q. All right. Mr. Richardson is proposing to extract his gas by additional in fill wells, correct?

A. That is correct.

Q. The problem you see is that those additional wellbores, if they're hydraulically frac'd, will require you, for safety considerations, to leave coal pillars around those wellbores?

A. That is correct.

Q. All of the safety issues that you have addressed today are resolved pursuant to MSHA regulations by leaving a coal pillar that has a radius of 300 feet around that gas well, correct?

A. A radius -- I think it is a -- yes, it's a radius, isn't it, of 300 feet?

Q. So when we talk about hydraulic fracturing of the coal by the gas operator and the potential consequences of that, as you describe it, which is increasing the potential stability of the roof, increasing the potential risk associated with spontaneous combustion and -- what else? I think that's it. Yeah, that would be it. And those are all resolved if we leave the pillar, the coal pillar, correct?

A. A combination, many factors attribute to spontaneous combustion, as I've indicated before, but that is part of the equation, yes.

Q. When we talk about the gob gas --

A. Yes.

Q. -- there is going to be gas that is vented that is not associated with the gob gas, correct?

A. Sorry, can you repeat that?

Q. All right, sir. When you talk about the remaining potential to produce the coalbed methane gas in the gob --

A. Yes, from the gob vent boreholes.

Q. -- that is a substantially less volume of gas than is originally contained in the coalbed, correct? I'm sorry, I'm confusing you.

A. No, I understand. Where I'm -- Listening to yesterday's testimony, in the deeper sections of the lease, which I have not evaluated or even looked at any of that data, it's hard to say, unless a reserve analysis has been completed and justified.

Q. Well, I guess my point is, the gob gas belongs to Mr. Richardson, not the coal mine?

A. Well, at this stage that is where we stand legally.

Q. You're proposing to offer him something that he already owns, right, by saying that he can come get the gob gas later, after you've mined the coal, right?

A. From an operational point of view --

Q. Yes, sir.

A. -- I think there's a potential significant increase in the system available to Mr. Richardson if he's willing to come to the party. It's an opportunity.

Q. You understand, the legal documents require the coal operator, San Juan Coal Company, to be solely responsible for how it deals with the presence of current and future gas wells?

A. That's right.

Q. All right.

A. And that's where we have been in negotiation.

Q. When you were employed by San Juan Coal to go to the Farmington area, I believe you said that was in July of this year?

A. July, yes.

Q. Of this year?

A. Of this year.

Q. Okay. At the time you came, I believe you indicated that the Coal Company had already conducted feasibilities about extracting the coal, feasibility studies and a plan, a mining plan?

A. Yes.

Q. Okay.

A. Yes.

Q. At the time you started in July of this year, was there available to you within the documents for the San Juan Coal Company plans and procedures to deal with the safety concerns?

A. Safety concerns for --

Q. That you have raised today --

A. That I have raised today --

Q. -- about ventilation?

A. Identification that the coal is a high-risk coal, yes, that was available to me.

Q. Let's go through the list. At the time you're employed in San Juan Coal Company, had others that preceded you collectively or individually recognized the fact that the coal was naturally fractured and contained methane?

A. Yes.

Q. Did they also recognize that there were existing gas wells that produced the coalbed methane?

A. Yes.

Q. Did they also recognize that those coalbed methane wells were often, if not almost always, hydraulically fractured?

A. I can only assume that fact, I'm not a hundred-percent sure.

Q. All right. You've raised today the potential problems associated with the gas operator hydraulically fracturing the gas well in order to produce the methane. That's your thesis, I understand?

A. That is correct.

Q. All right, and --

A. To clarify that --

Q. Yes.

A. -- there is not an impossible technical solution to any of these problems, and that is where hopefully this hearing will, you know, be able to establish some ground rules. For example --

Q. Well, it wasn't a technical question, Mr. Abrahamse.

A. Well, it is a technical problem.

Q. Well, the question was, though, at the time that you were employed in July of this year, had the Coal Company recognized the risk associated with the hydraulic fracturing of the gas wells?

A. I don't believe they did.

Q. Okay. You're telling us that in July when you arrived, you were the first expert in this ventilation area to bring to the company's attention the risk association with the hydraulic fracturing of the gas wells?

A. I was the one that raised the concern to say what we were doing with regards to solving the potential problem, identifying where the location of these holes were and what action plan we had in place to ensure that we did not create a problem for our workers underground.

Q. And one solution, then and now, is to leave the 300-foot-radius pillar around these wellbores? That is an option?

A. It's a nightmare of an operation to do that.

Q. I understand.

A. Yeah, and I'm sure that there's a far simpler solution that can be obtained.

Q. Okay. When you talk about proposed hydraulic fracturing of gas wells, let's look at the cartoon which was -- Exhibit 10? Yeah, San Juan Coal Company Exhibit 10. And you gave an illustration cartoon of this curvature above the coal seam which you were using to illustrate the potential impact of hydraulically fracturing the coal seam and compromising the roof stability above the Number 8 Coal Seam, correct?

A. That is correct.

Q. All right. Can you give me a dimension? It appears that we have other numbers to give us a scale for the display. Is that coal seam -- what, 11, 12 feet, something like that through there?

A. Generically, the coal seam, the coal-mining seam --

Q. Yes, sir.

A. -- that we'll be taking --

Q. The area shown in black?

A. The area shown in black, roughly 13 to 14 feet.

Q. Okay. In order to testify about the potential compromise of the roof stability, that little umbrella effect --

A. The umbrella? Yeah.

Q. The umbrella. You're not an expert in hydraulic fracturing of gas wells, are you, sir?

A. No, I'm not.

Q. Did you rely upon such experts associated either on a consulting basis or employment with the Coal Company to advance the argument that you've made today about compromising roof stability with hydraulic fracturing?

A. The argument is -- the highlight, as I have indicated before, was the immediate roof geological material. It's a mining correlation that does not require the consultation of reservoir experts, because a mudstone and a shale that is influenced by water and other liquid products would degradate.

Q. When you see --

A. Wait. We are currently examining our primary roof-support with our continuous miners to go from a water-operation system for removing of cuttings and dust, to a mist-drilling technique, and the principle is to minimize the degradation of that upper strata that we are finding is becoming a problem.

Q. Let me try to keep you focused on --

A. Yes.

Q. -- the gas issue. The question is that the part of your concern about the hydraulic fracturing of coal is a compromise of the roof stability?

A. That is correct.

Q. All right. In order to make or advance that contention, have you or others on behalf of the coal company examined what the gas operator does in terms of hydrologically fracturing the coal?

A. Yes, yes, I have.

Q. All right. Are you aware that it is commonly held belief among those experts that the stimulation technology of hydrologic fracturing is an enhancement of the natural fracture system within the coal?

A. That is correct, that's the liberation of the methane through the micropores, as was very well explained yesterday afternoon.

Q. And the risk associated is minimized, then, because the fracture stimulation stays within the natural coal fracture system.

A. But no one can tell me --

Q. Yes, sir.

A. -- the extent of the fracture within the coal seam. At some stage of the game when hydraulic fracturing occurs in a coal seam, it will go to a specific distance, and then, and then, it will potentially rise to the upper stratas or the lower stratas, depending on what type of rock structure we have. And that is the important issue in this -- from our point of view.

Q. That issue has already been addressed, has it not, with the fact that current wellbores have been hydraulically fractured with the MSHA solution being the 300-foot-radius pillar of protection?

A. I don't think that was able to be clarified yesterday by your --

Q. All right.
A. -- your witness. This is where this issue becomes a problem. Coal rank, ash bands, thickness of seams -- the effect of hydraulic fracturing can only and will only be determined to its absolute extent when that area is mined.
Q. Mr. Woomer yesterday on behalf of the company testified that all the mine safety issues, including this one we're now discussing, is satisfied by MSHA with the 300-foot-radius protection pillar. Are you now telling me there's data to demonstrate that the pillar ought to be bigger?
A. That is why -- MSHA requirements, I think we need to clarify this, MSHA requirements in the coal-mining industry are a minimum standard.
Q. Have you proposed any --
A. Excuse me.
Q. -- other than the minimum --
A. Excuse me, excuse me. The minimum standard that is established from the MSHA department has such a wide range, from encountering boreholes, to establishing roof-control mechanisms, to ventilation, to mechanized pieces of equipment that are underground where people have to ride in them.
The process of the MSHA department is for the

operations to identify their hazard, establish a management plan, and incorporate their petition on how they're going to roof-support.

Now, I can go through a list of criterias --

Q. I'd prefer you answer my question.

A. Yes, I am answering your question.

Q. All right, what is my question?

A. About the MSHA requirement on that 300-foot barrier.

Q. No, sir, I asked you if the company proposed to change that MSHA requirement?

A. We hope to do that --

Q. So --

A. -- that is our objective.

Q. -- Mr. Woomer's testimony yesterday is wrong?

A. No, his testimony was correct to the extent that we are hoping to -- well, we have at least -- there have been three wells within the first district that the casing has already been removed, that the holes have been filled and that the MSHA department has allowed us -- will allow us to mine straight through. So that practice is already in place and is already approved.

Q. Let's look at that issue. I was looking for -- here it is -- a copy of Richardson Exhibit A-2 to help provide what I'm proposing to look, Mr. Examiner...

Mr. Abrahamse, let me show you this.

A. Thank you.

Q. I'm referring back, Mr. Abrahamse, to San Juan Coal Company Exhibit 3 --

A. Yes.

Q. -- the illustration of the mine plan. I'm going to direct your attention to the Deep Lease Extension, and I want to look in Section 20, and I'll look in the southwest quarter of Section 20 and find what is shown on Richardson Exhibit A-2 as the Richardson WF Federal 20-1 well, which is shown as a Fruitland/Pictured Cliff well. Do you see that?

A. I do.

Q. When I look at the mine plan, which is your Exhibit 3, I find one of these -- what do we call them? We call them a gate road. Is this not a gate road that runs north and south through the section?

A. That is correct.

Q. And the existing wellbore is directly in the gate road?

A. That's right.

Q. What do you do about that?

A. We have a bit of pain.

Q. Okay, because that's an existing producing wellbore --

A. That's correct.

Q. -- it's been fractured --

A. That's right.

Q. -- it's in your gate road --

A. That's right.

Q. -- so what are your choices?

A. Okay, yeah, we have choices. But obviously we need to work together in establishing how we want to accompany that.

Q. Okay. You told me that the planning method is one where even in the absence of gas wells you leave -- pillars of support, is how I would call them. What are the -- Give me a name to put on those. You leave coal pillars at some point for stability of support?

A. In the gate roads --

Q. All right.

A. -- yes.

Q. How big are those pillars of support in the gate road?

A. As I've indicated before, they are 150-foot centers by roughly 66-foot centers.

Q. All right. Does it look like a practical solution to adjust the pillars you need to support your gate roads to becoming associated with the protection pillar required around the gas well?

A. We would have to do -- I would have to do -- Part of my action plan in identifying these holes would be establishing a technical remedy to ensure that we minimize the effect of leakage in that particular location.

Q. Okay. You have not yet completed that process, I assume?

A. Well, we have not had consultation, you know, to be able to even venture halfway down that track yet.

Q. All right. In addition to hydraulic fracturing creating a potential operational and safety hazard because of the roof-stability issue --

A. Yes.

Q. -- you have directed our attention to the potential of spontaneous combustion, right?

A. That is correct.

Q. When you talk about spontaneous combustion, are you talking about the probability of risk associated with the spontaneous combustion of the methane?

A. No, my counsel had a conceptual problem with this too, and --

Q. And perhaps I do, so tell me.

A. Yeah, and that's why the introduction of the fire triangle, I tried to -- That was the only way I could differentiate between that.

Spontaneous combustion of coal, spontaneous combustion of wheat, same thing, same consequence. The spontaneous combustion of coal is the source of ignition, source of ignition, the heat. Okay.

The source of fuel will be the methane. Now, methane actually is not as bad as people play it out to be. It is explosive within the 5- to 15-percent category. But greater than that, it actually is an inertized gas, it can be utilized as an inertized gas.

Q. I understand.

A. Okay. So yeah --

Q. So the spontaneous combustion issue --

A. -- is a --

Q. -- with the methane as the fuel --

A. As the fuel, that's correct.

Q. You know, we learned in kindergarten there was three components --

A. That's right.

Q. -- you had your ignition, fuel and oxygen?

A. And oxygen, that's right.

Q. All right, so you're looking at the fuel being the methane?

A. That is correct.

Q. All right. Do you have any reports or knowledge about spontaneous combustion being directly attributed to the hydraulic fracturing of the coal by the gas operator?

A. No. I'd like to clarify that, though.

Q. Sure.

A. No in the sense that I cannot -- and I have asked NOSHA to conduct a bit of a more intensive literature search for us. There is not one aspect that can say hydraulic fracturing attributed to a spontaneous combustion event. But I can identify at least half a dozen operations within the western coal districts of the States that have had an issue with a spontaneous combustion event that related to a fire in the gob.

Q. All right.

A. And --

Q. Well, it's the methane gas is what's going to burn, isn't it?

A. That will cause your explosion.

Q. Yes.

A. It's your coal that burns.

Q. I understand. Isn't it better to remove the methane then? You either have to vent it, or the gas operator has to produce it?

A. That is correct, to a degree, in the gob. We --

Q. And to a more degree -- a greater degree in the coal that's been mined?

A. The coal to be mined, to maintain a limit, an MSHA limit to operate within. But if we can maintain a sufficient methane in our gob, that will act as an inert system, and we're better off using it in that regard.

Q. Okay. This spontaneous combustion issue related back, in your opinion, to the hydraulic fracturing of the wells, is a current existing issue for you to address, is it not?

A. That is correct.

Q. Because we have both PC wells and Fruitland wells that are commonly fracture-stimulated?

A. That is correct. It's the coal that we are worried about. And the solution to that is relatively simple. The first hurdle is the consensus of gas-drainage operations.

But if at any stage we need to pass through that, instead of leaving a large barrier of coal in the goaf -- in the gob, sorry -- then instead of doing that we can simply, depending on the -- you know, the consultation that occurs to remove the casing from the seam, actually inject a cementaceous product into that zone.

Now, when you look at that zone on your map, injecting a cementaceous product will do two things. It will firstly secure the potential strata laminations, as exhibited in that exhibit. And secondly, when the wall comes through it will actually secure this roof-to-floor pinning, so that the shields can come underneath.

So part of what would be one of my recommendations to San Juan Underground is, when we actually -- before longwall mining in any of our districts, I would create, as a ventilation engineer, a hazard map identification. That area would be clearly delineated for the operational persons of the longwall. And when we come to that area, prior to coming to that area, we would inject that area in the longwall block to --

Q. Let me see if I understand --

A. -- so you can proceed through.

Q. -- what you're -- All right. You're talking about after the gas operator abandons his well, if it's abandoned according to MSHA or procedures acceptable to the coal mining company, then this longwall contraption can come through there and cut through casing, steel and all the rest and be done with it, right?

A. No, no, no.

Q. No, no, you don't do that, you have to remove --

A. You have to --

Q. -- the casing?

A. The removal of the casing, yes.

Q. All right.

A. That's the milling that was explained yesterday.

Q. That doesn't solve the issue about the presence of existing gas wells that continue to produce at a time where you are prepared to run this thing down the road?

A. No, it doesn't.

Q. All right. Let's look at the timing issue. This mine main, if I have some of your vocabulary -- This is a mine main, is it not?

A. The mains.

Q. Mains?

A. Mains, the mains -- the main headings, you know. Yes.

Q. The mains heading. The time sequence on one of the exhibits the other day showed that the progression of the mine is such that by the year 2008 the mine mains is supposed to be at the eastern edge of Section 20 and 29?

A. That is correct.

Q. How far have you calculated or assumed or dealt with the issue of how far you impact the coalbed methane gas by opening up the coalbed methane --

A. -- to a point?

Q. -- to being vented, yeah? How far in do you compromise the gas?

A. I cannot say for San Juan, but I can say for Australian operations that I have worked at. And we talk about the buffer zone, and the question from the Examiner being a mile long and, you know, questioning that. I worked at the Moura underground, which had a permeability of between 2 to 3 millidarcies.

Q. Okay.

A. In part of that operation, my gas drainage patterns and spacings were limited to the extent that beyond the end of the hole I could mine for at least 60 meters, which -- 60 meters is 180 feet -- and then I would hit a brick wall of methane again.

And that is a pure function of the seam's permeability. It's a pure function of the ash bands and the quality of the coal. If you go to places -- That was at Moura Number 2 in Central Queensland.

In a thermal coal orientation you have a higher permeability than the anthracite, to go to the furthest extreme, the anthracite coals, where coal spacing needs to be significantly closer for sufficient desorption. So --

Q. Coal spacing, you mean coal gas wells?

A. Sorry. To clarify, this is in-seam drainage where you actually are in the seam and you drill horizontal holes through the seam.

Q. Okay.

A. Slightly different to the -- It is not hydraulically fractured, so you aren't able to drill a direct correlation. But what you can do is -- a hole that is drilled into a seam, the analogy can go yet one step further to say, a heading of 18 by 9 without hydraulic fracturing can exhibit the same effects --

Q. Okay.

A. -- and the effects are, the permeability of your coal and the underground pressure that that coal -- the gas is exhibited to.

Q. How wide is this mine mains that I was pointing your attention to? How wide is that?

A. About 340 feet.

Q. Okay. Let's assume that there is no hydraulic fracturing of the coal, that you're simply dealing in this environment in the San Juan Coal Company's asset here, that there is no artificial stimulation by the gas operator, and that we've got the coal that's naturally fractured. Have you calculated or determined how far into the coal seam you have allowed the methane to escape?

A. No.

Q. Is that a calculation that it's possible to make?

A. The information that was exhibited yesterday, anything is possible. Permeability calculation --

Q. That's not a good question for you. Is it probable to do it within the disciplines of your expertise?

A. Yes, it is. We have not looked at that, because at this stage of the game District 1 and District 2 are our primary concerns. It is the barrier that is going to be exposed to the greater risk of spontaneous combustion in the operation. But it can be done, that's what I'm saying. There's work to be done in establishing those parameters.

And the best way is actually by getting down to that end of the world and conducting tests of seam permeability, because it will vary.

Q. Okay. Mr. Woomer yesterday -- Woomer?

A. Woomer.

Q. Woomer. -- yesterday, said that up until August of this year it was the position of the San Juan Coal Company to encourage the gas operator to increase the withdrawal of gas from the coalbed. That was the position, he said. You were here, right?

A. That's correct.

Q. And they wanted to have the operator of the coal gas increase the density and get the gas out so he could sell it.

Now, in August there was a change of position, he said, and the coal company no longer wants to have additional wells in the special area. To what is that change attributed?

A. To myself.

Q. Okay. When Mr. Woomer wrote his August 31st letter to the BLM outlining in what he told us yesterday were all the positions and concerns of the San Juan Coal Company, that letter included your concerns, did it not?

A. That is correct.
Q. And as support for his letter, did you submit any of this type of presentation to the Bureau of Land Management?
A. I certainly did.
Q. Okay. With what results, sir?
A. When I finished the two- -- I don't know, two-and-a-half-hour presentation, I got some very positive feedback from individuals. I got some negative feedback with regards to individuals' livelihoods. That's the balance of that equation.
And the end result, at the end of the meeting, was to identify some type of testing procedure that we would be able to work together to establish these controls. That fell into a heap, and nothing has occurred since.
Q. Okay. After making that presentation to the Bureau of Land Management, I assume you made it to the district officer in Farmington?
A. That is correct.
Q. And then after that on September 20th, he had issued his letter copying to the San Juan Coal Company that he was approving Richardson's four APDs, notwithstanding your objections and concern?
A. There was one step before that. I think there was an interim injunction --

Q. Yes, sir.

A. -- prior to that. That is correct.

MR. KELLAHIN: All right. No further questions, Mr. Stogner.

EXAMINER STOGNER: Any redirect?

MR. AUSHERMAN: Yes, Mr. Stogner, I have a few.

REDIRECT EXAMINATION

BY MR. AUSHERMAN:

Q. Mr. Abrahamse, Mr. Kellahin asked you about whether the venting of the coal seam gas would constitute waste of the gas, do you recall that?

A. Waste of the -- yes, I do.

Q. Do you know the statutory definition under the Oil and Gas Act for waste in New Mexico? That's not your expertise, is it?

A. No, I'm not familiar with that.

Q. So when you say waste in the answer to his question, are you using it in the sense of the statutory definition or in a more general sense?

A. A more general sense, in the sense that waste means ventilated to atmosphere, without identifying a quantity or a percentage.

Q. You testified that the MSHA 300-foot regulation was but one factor in solving spontaneous combustion risk. Could you elaborate on what the other factors might be?

A. Okay, one of the number of factors, the -- if we came to a well that was in the middle of the block that was not removed, we would go into a transition stage where the longwall would have to be recovered. In that process you physically slow down production to establish a stable roof for pulling these shields off. So there's a month period between pulling these off and reinstalling them in another location.

Within that recovery of the longwall equipment, the standard procedure that we would be utilizing would be to have a constant flow of nitrogen gas behind the longwall so that -- because we'll be passing air -- the recovery of the wall is important, because when you recover a longwall, it's like a Mechano Set -- sorry, not a Mechano set, what's --

Q. Like an Erector Set?

A. Pieces need to be put together, one piece at a time, so the process -- Mechano Set is an Australian play set, you know?

You would have to remove this equipment and disassemble the main gate drive, the BSL, the stage loader. You physically have to remove the ranging arm drums, and those drums are on both sides of that shearer. You have to remove the shearer. You then have to remove each individual AFC pan. And then the most hazardous part is --

and while you're doing that, you're venting your air across your longwall base and partially through your gob.

When we start to recover the shields, you have to recover them individually. So when you drop that shield, keeping in mind that that gob is unconsolidated roof above you, you've got to remove the shield and pull it out, pull it out and relocate it. So during that process we would have the inertization nitrogen system running through the back end of the gob so that we wouldn't have a problem, or we wouldn't develop a problem in that area until all the equipment was gone and relocated.

So that process, that process that takes time, that takes, you know, the month for dismantling and resetting up, exposes us to a potential hazard in that area for spontaneous combustion.

The other hazards -- sorry, the hazards of --

Q. In addition to MSHA compliance, what do we need to consider in order to address the risk of spontaneous combustion that you have --

A. In addition to -- in addition to what -- so -- yeah, so that is one aspect of that borehole.

The other additional requirements -- not requirements, additional stipulations that San Juan Company has put on itself, above and beyond the MSHA requirements, is what we call this gas analysis or tube bundle system, and it has the ability to remotely sample gases so that we can ensure a proactive action so that we don't get a coal burning.

And that is -- The tube bundle system is basically a whole lot of little tubes that can be scattered anywhere in the mine, in the workings, and they all come together to a point on the surface that has sets of pumps that draw gases from the mine. And those gases are then sequentially sampled through an analyzer.

So from a gas-management point of view, we can identify the effectiveness of this inertization system that we're using, the effectiveness of potential hazard in and about our seals. If I have a seal, say, for example, that is a good distance in towards the gob and it's maintaining a 90-percent oxygen criteria, then that to me is a warning to say there's been enough time for the oxygen to be diminished in there, why is it not being diminished? Something is wrong in there. I've had a breach of a seal or a cavity in the roof or -- you know? Utilizing that type of action plan to ensure that we don't have a spontaneous combustion event underground.

Q. So there are several things that you need to do, including the inertization system and the tube bundle system, in addition to the MSHA 300-foot pillar requirement, in order to ensure the safety --

A. Oh, yes, that is only a minimum.

Q. So if Mr. Woomer would have testified that the MSHA 300-foot pillar is the only factor to consider concerning safety, would you agree with that?

A. No, no.

Q. Is Mr. Woomer the one who advises the company concerning the MSHA requirements?

A. No, an experienced -- a safety coordinator is the person that would format petitions to the MSHA, and he's had extensive knowledge and extensive dealings with the MSHA department, and he's our key gentleman, you know, to direct us in which way to travel, utilizing other operations, experiences and everything else.

MR. AUSHERMAN: Thank you.

MR. KELLAHIN: Follow-up, Mr. Examiner?

EXAMINER STOGNER: Mr. Kellahin?

RECROSS-EXAMINATION

BY MR. KELLAHIN:

Q. What is the name of your MSHA compliance expert that you're referring to?

A. The safety coordinator --

Q. Yes, sir.

A. -- at San Juan Underground is David Hales.

Q. Now, when you're talking about venting the methane --

A. Yes.

Q. -- one of the safety issues is to measure the methane content?

A. That's correct.

Q. -- in the underground atmosphere that you're dealing with?

A. That is correct.

Q. As that mixed air-nitrogen-methane combination is vented from the mine, is it measured in any way?

A. It is measured.

Q. So there would be a method at which we could quantify the volume of methane that is being vented from the mine?

A. Certainly can.

MR. KELLAHIN: Okay, no further questions.

EXAMINATION

BY EXAMINER STOGNER:

Q. I've got SJCC-3 in front of me, Exhibit Number 3 in front of me, and I have a few questions here. And just for a matter of record, Sections 13 and 14 are backwards on the upper left-hand corner.

Okay, I'm going to refer down to the southern part of your current mining operations, several other portions. If I look between LW-101 and LW-404 [*sic*], these heading gates --

A. Okay.
Q. -- there's a space.
A. Yes.
Q. Is this a non-mined area?
A. That is correct.
Q. Why?
A. It has been -- the geological information, the core data that has been established, has identified that as basically a washout that has extremely high laminations of siltstone. If you look at the topography feature of that area, you have funnels of canyons that come into -- Canyons is the wrong word, sorry. Waterflows, potential ancient waterflows that have collected in that one area that runs directly through that zone.
So we have coal there that has got high ash bands, and we also have low BTU values for the power station.
Q. Now, if I continue back over to the east, between LW-201 and LW-304 --
A. Excuse me, sorry. Sorry, I've led you astray, beg your pardon. Your first --
Q. Okay, the first one I just asked about was between LW-101 and LW-204 --
A. Ah, 204.
Q. -- in sections 26 and 35 --

A. Yes.

Q. -- there is a small --

A. Yes.

Q. -- band between --

A. Okay, sorry.

Q. -- TG -- is that a tailgate?

A. Tailgate, yes.

Q. -- 101 and headgate 204.

A. Yes. The principal reason is for spontaneous combustion and water management at the San Juan underground. What we have -- The mine plan, if you look at all the blocks or districts, this here is -- sorry, Longwall 101, 102, 103, that is classified as District 1, 201 to 204 is classified as District 2, 301-304 is the District 3, and so on and so forth down the track.

The objective in the planning sequence was to go to the furtherest extent of each district on the downhill side and then mine one block, then the second and the third. And the reason was to manage water that we have -- water make we have in the mine.

It also then -- That separation block allows us to maintain water and gas within the confines of that district.

We also find from a spontaneous combustion point of view, if all these blocks were just merged one against the other with no real separation, then we could potentially get a -- what they call a crossover or leakage from one district to the next, and then it becomes an uncontrolled. We could have a fire in that end of the world, and it would spread right across the goaf.

So those -- between Longwall 204 and Longwall 101 is called a coal barrier for district separation to manage water and spont com. I apologize for...

Q. Okay, so I have one between LW-201 and LW-304, that's another one of these coal barriers?

A. That is correct, yes.

Q. Now, the one between 304 and 201 appears to be bigger than the one between 101 and 204. Does that have something to do with depth or anything?

A. That is correct, yes.

Q. Okay. Now, then, if I continue further east, and I'm over in Sections 30, 31, 32 -- and again, I'm still referring to Exhibit Number 3 -- between LW-301 and LW-704, or between your third district and seventh district, there seems to be a large area here. Was this going back to what you were talking about --

A. -- initially? That is correct, yes.

Q. -- geological constraints?

A. Geological constraints, BTU, compliance for the San Juan Power Station. And what we have is a -- When you have an area like that, it actually reduces mining stresses. So your roof stability becomes an issue. You know, additional support that needs to be taken into account.

When the lease was evaluated, I think there was consideration to recovery of those reserves, utilizing CM mining techniques, but it had come in very much later in the life of the mine.

Q. What do you mean, CM mining?

A. Sorry, beg your pardon. Continuous miner units. So we would be -- instead of developing what you see there, the gate roads have three headings, if you look at the gate roads in the longwall blocks, you see three lines. It would be -- there would e a larger number of lines and headings and crosscuts. And it --

Q. Would that be like a first mine operation, second mine operation, leaving pillars and then taking pillars out?

A. No, we would not take pillars, no. With the limited geology that's been established in there, highly stressed zones like that, you wouldn't recover pillars as such, you would just do it on first workings.

Q. Okay. From this area in Section 30, 31, 32 that we talked about, and I continue up there to Sections 18 and 19 between the 4th and 6th Districts, there again, that appears maybe connection, maybe a geological connection, a draw or a geological feature that separated that area?

A. That is correct, yes, that is correct.

Q. Now, this particular map goes out in unleased -- and when I say unleased, unleased mine acreage as I understand from yesterday's testimony, but yet there are some proposed mine plans between the 7th and 9th District and between the 8th and 10th District, there appear to be these barriers. Are these conjectured drawings, or are they based on actual geological mining samples, or do you know?

A. We're doing a bit of both. The exploration unit is actually -- we've just conducted a large number of core samples in above this, what we call the Shumway area, above that Deep Lease, and also we're going around the peripheries of -- if you look at the steps in each of those longwall blocks, the steps are there for a valid reason, and that is that the quality of the coal -- and there's a fault that actually runs at that 1001 -- on the eastern side of the 1001 area.

So yes, that is the function of the steps in the longwall blocks.

Q. I'm referring now to Exhibit Number 10. When I look down there to the actual mining operation that's depicted -- I'll let you pull that out.

A. Sorry.

Q. This is the cartoon.

A. When I look at the gob area behind your rams or --

A. Behind the shields, yes.

Q. Yes, the shields, I didn't have my diagram up here.

A. Right.

Q. The shields, behind the shields. Now, you're depicting -- This gob area forms to what degree have you noticed in your mining operations? Does it take a while for the --

A. Yes.

Q. -- roof to fall or descend, or how does it actually -- how does it actually come down in this area?

A. It actually operates in two -- what we call two zones, and I'll draw on the right-hand side on the gob a zone 1 and zone 2 area of influence.

Now, keeping in mind that this is not exactly the way that it will occur at the San Juan Underground with regards to dimensions but just pictorially again, what you have is that distance of the coal seam being 13 feet of mined coal. Now, assuming we have a one-on-one void-fill factor, this height that we have up there would be roughly 13 feet, okay, assuming that everything came down in one nice hit. And then that void will progress all the way to the surface there, you have a 13-foot drop right from the surface.

But because there's roughly an 80-percent, you find -- well, 80 to 90 percent, and it's a direct function of what type of material you have there. But just cartoonishwise, that is called the zone 1 caving. And that can occur from between zero feet to at least 500 feet, half the block -- half the longwall face. Just keep in mind that that 1000-foot face is advancing a meter at a time. So your zone 1 can be -- the zone 1 would be basically half the distance of your face but can go from zero to 500 feet.

The second phase, as the longwall progresses into the seam, as it retreats, you have this -- what we call zone 2. And zone 2 can go to number 9 and even higher.

And therefore the positioning of these gob vent bore holes is important. Once we actually subside the first longwall, we will do extensive monitoring to actually find out what zone heights we have relative to face position underground. And we will be able to determine that as time goes on.

Q. Okay, I'm now referring to your Exhibit Number 11. When you were describing having to disassemble this Erector Set -- puzzle, assembly, mechanism -- to -- for whatever reason, had to stop a mining operation, a longwall mining operation to re-establish another area, when you're taking the -- and the longwall shields are the last things to come out; is that correct?

A. That is correct, yes.

Q. How -- In what sequence are they taken out? From outwards in, or inwards out?

A. This is an underground coal mine; it's adrenalin, because we like to play in the mud and be silly. You actually find you have to -- Looking at the exhibit of the three shields on the far right-hand side of the longwall schematic, once everything is removed from the longwall recovery road, we call it -- you actually start at the furtherest end, what we call the tailgate zone.

So in Longwall 101, if you're looking at that panel, we would go right up towards the mains, and where you see that tailgate 101, that first shield on the tailgate side would be the first shield removed.

Now, the reason for that is, that is -- and I'll call it number 1, number 2 and number 3 shield, and they are removed in that sequence, 1, 2, 3, because you have unconsolidated gob on top of the shields, around the shields. You physically lower the shield. You utilize a machine they call a mule, and it's a mule with a big arm on the front that's got a clasp, and it actually drags the shield out and around and then physically drags Number 1 shield all the way down to where the headgate drive used to live. And at the headgate drive there would be another machine that picks the unit up and transports it away.

Now, because you've removed shield number 1, that gob, then, consumes that area. So in the actual removal of that shield we put temporary -- cement tin cans or barrel blocks, they call them, to support that zone where people are working, where people are actively working.

There's also another method where you utilize shields fairly similar to this but that are on tracks, and they would be placed adjacent to the shield that is being removed. So they would be up supporting the roof, you would come in with your mule, physically pull the shield out and around and advance these track shields to support the next shield that's got to come out.

And when I talk about the adrenalin rush while you're doing that, that roof is falling roughly in and around the operators. But all of these shields, the rest of the shields from there to the headgate are still pressurized and are still intact so they have a safe working area to work underneath.

If you took shields off from this end and also from that end, you'd get to a situation where you were surrounded by a gob, and we wouldn't get you out.

Q. Okay. Now, in the normal sequence, start at your starting room -- and I'm referring to LW-103 just in this instance because there's not evidently any barriers there or things to get in the way such as wellbores or geology -- you'd work your way into the main gate and then you would just pop out into one of the areas?

A. No, no.

Q. No.

A. The procedure that I described to you there for recovery, we would have to do anyway. So every longwall block you have a recovery road, and a new longwall block you'd have a setup, right, yes.

Q. Okay. The headgate and the tailgate rooms or tunnels, are they intact as -- or are they -- as the longwall mining continues back toward the main, are these gates still intact for movement, transport, whatever?

A. No, no.

Q. No.

A. If you can look at this diagram again, this would be, if we're looking at 103, you'd have another block of coal in here and then a second one, so you'd have one, two, three headings. This is the -- If you can look at the diagram, you see three long headings. This is in the first -- The conveyor belt is in the first one, you have a travel axis in the second, and the third is a stipulation from MSHA for alternate egress.

So when the longwall retreats towards the mains, this heading here collapses. And my charter is, in the cut-through that we have between the heading number 1 and heading number 2, we will place packwall seals.

Q. Now, are these packwall seals, do they remain there, or are they taken out?

A. Life of mine.

Q. Life of mine.

A. Put there and left there.

Q. And I was leading up to these pillars that you show are depicted on here. Those remain there too, you never take out a pillar?

A. You never take out a pillar.

Q. Okay, so there's a certain amount of --

A. Coal?

A. -- I call it waste, but what do you call it, pillars or coal?

A. Pillars. There's a -- In Australia, the UK and Europe, they have different requirements to MSHA. MSHA require a three-heading gate road to be established. The reason for that is, they have a conveyor belt that is what they call a return system, a totally segregated system. You need an intake that is a trafficable intake. And the third is an alternative -- what the MSHA call an alternative egress out of the mine.

In Australia the gate roads are predominantly two-heading scenarios, and in the UK they are single-heading scenarios.

Q. What are they out here?

A. Three-heading.

Q. Three-heading.

A. Three-heading. And it's an MSHA requirement, unless you get a petition for alteration to that design.

So all of the gate roads that are in place on that lease have got a three-heading -- what they call a three-heading entry -- gate road entry system.

Q. Are you using railroad tracks or rubber-wheel vehicles?

A. Rubber-wheel.

Q. Okay, in referring to -- I think we called this Exhibit Number 18. This was your diagram that you drew.

A. Yes.

Q. And you were talking about the tubing bundles.

A. Ah, tube bundles, yes.

Q. Okay, are you measuring the content -- and this was a simple diagram of the air, of course, coming in and then as it goes through your cut pass, or I'm going to call it cut pass --

A. Yes.

Q. -- and then your exit, is it measured -- how often is it measured?

A. Okay, what we actually -- The tube bundle system has not yet been installed because we are not longwall mining at this stage. But the objective of the tube bundle system is that with every -- and I'm indicating to the two seals directly behind the longwall face. Stop me if you need a clarification.

If this is the longwall face with the shields in place, the plan to MSHA is that we would have these tubes running from the surface underground, and they would be located directly behind the last two seals on the longwall.

There will also be tube bundle points located at -- near the mains, so that we can analyze what gases we have being produced by that return air flow.

We have tube bundles that actually go into behind the seals, directly behind the longwall, and also tube bundles that go into recognized, identified seals as the longwall retreats.

Now, those samples are continuously drawn through the tube bundle to the surface, continuously. Depending on the number of sample points that we are actually analyzing, if we have -- what I have worked out, if we have 30 sample points we can actually get an analysis of each gas station every 30 minutes.

Now, the reason for having the tube bundle, which is above and beyond -- The tube bundle system at San Juan will be the first tube bundle system installed in the States using Australian technology. The reason for the two seals, which are the most critical ones we're talking about with regards to spont com, is this interface of air behind our seals. The quicker that we can ensure that those two points -- the oxygen level drops between those two points, then the more comfortable we are with removing one section of that fire triangle. That is the objective.

EXAMINER STOGNER: Okay, I don't believe I have any other questions.

Any other questions?

MR. BROOKS: I'd like to ask a few questions if I may.

EXAMINATION

BY MR. BROOKS:

Q. Mr. Woomer, when he testified yesterday, referred me to you on some matters, and I will have to concede that I understand this, I think, a little bit better than I did before your testimony, so perhaps I'll be a little bit more intelligent in my questioning than I was with Mr. Woomer.

If I understand correctly, your perspective on this matter is that you would prefer that the methane not be extracted prior to your mining operations?

A. No, that's incorrect.

Q. Okay.

A. My perspective as a ventilation engineer, it is not correct.

Q. Okay. Well, when you were being examined this morning you were asked about San Juan Coal Company's position having previously been to encourage the extraction of the methane before your mining operation reached a particular part of the lease; is that correct?

A. That's correct.

Q. And that because of your recommendations San Juan Coal Company had reversed their position and no longer believed that it was appropriate to encourage the more rapid extraction of the methane. Can you explain to me why that -- what is the basis of that?

A. Okay. As I indicated before, the holes, the gas holes -- the coal-mining operation and the gas-operating operation need to work together in this. Downspacing, from a technical aspect -- the gas-reservoir gentlemen have indicated, you know, their pros and their cons -- a downspacing scenario could lead to a situation that we have now where we do not have the two groups talking to one another, yet we have a number of boreholes located directly in our gate roads.

Now, it's not a criticism on Mr. Richardson's company. I think it's a matter of two groups of people having to work together.

Now, he's located his holes nice and squarely in these quadrants, in a nice straight line. I mean, there's -- you know, topography depending, position of his identifiable lease, but that plays a huge impact. A hole in our gob, if we are able to work together, is less of a hazard, because we'll have removed the coal, than a hole that's in our gate roads.

And because there was no allowable cooperation between the groups, it became a -- Well, let's stop it so we can ensure the safety of our mine.

Q. Well, that's -- I'm still not clear. Do you -- From a coal-mining standpoint, obviously whether you cooperate or not is -- perhaps it would be better for everybody if these things could be done cooperatively, but not everybody has the same interest, and that's why we have regulatory agencies.

A. That's correct.

Q. Is your position that you would prefer the methane to be removed first or that you would prefer the methane not to be removed before you did the coal mining, the operation, or do you -- does it matter one way or another --

A. No, if --

Q. -- generically?

A. Generically, we have a coal reserve that we will be mining --

Q. Right.

A. That has a content, a methane content. If we are able to remove that, whether it's utilizing in-seam drilling, vertical drilling, there's a preference to have that gas removed.

Q. Before you do your mining?

A. Before mining occurs. But not -- You know, you don't have to remove every single ounce. But you have to remove -- if you are able to remove some of that methane, that is a benefit to the underground working operations.

Q. Okay, so your objection is not the fact that the methane is removed, that's not why you don't want more wells?

A. No, no.

Q. Okay. Now, let me go ahead. And I don't mean to interrupt your answers --

A. That's fine.

Q. -- I'm not a technical person --

A. That's fine.

Q. -- and I don't understand a lot of the things that you said, although I will congratulate you on being able to explain the technological things to a person like me better than many expert witnesses are able to do.

Anyway... Now, as I understand, there is a lot of water in this coal, naturally occurring?

A. I think generally in the area. Again, I can't speak for the entire area, just for the area that we're working at the moment, we're encountering some water from the information that I've seen from gas hydraulic-fractured wells. They seem to produce quite a bit of water. So whether it comes from the coal seam or whether it comes from -- up from the lower stratas, I can't define.

Q. Okay. Well, it's my understanding, not just from this hearing but from many hearings that have involved the Fruitland Coal in which I've participated, that typically the coal is associated with substantial amounts of water. Is that consistent with your knowledge of the matter?

A. I couldn't answer that absolutely honestly.

Q. Okay. Well, it was also my understanding, particularly from the testimony of the witnesses yesterday, but also from other testimony I've heard, that in order to remove the gas it's necessary to remove the water?

A. And I concur with the report that was given yesterday.

Q. Okay. Now, does the removal of -- Did I understand your testimony this morning that the removal of the water creates a problem for you as a coal miner? Is that correct, or is that not correct?

A. It -- We have to keep it in context. There are many factors that affect the spontaneous combustion. By dewatering an area, an identified, will make the coal drier. Okay?

Q. When it's drier it's more likely to burn?

A. And if it is drier, you increase the susceptibility for a spontaneous combustion event. You heighten it, you know, you increase its propensity. It's not to say that it will burn. That would not be an exact answer. But it's a matter of placing all the cherries together.

If I have a hydrologically frac'd hole that we have had the ability to case, but -- to remove the casing, but I haven't secured the roof, and we have a cavity fall, and that general area that we are in, I stand for five days, and it's been dewatered and it's been, you know, hydraulically fractured very well, and it's been a great producing well because, you know, heaps of methane has come out, you've opened up pore spacing, I've allowed more oxygen to get to the micropores of the coal, it's a drier coal, I've got the longwall standing for four or five days, I haven't put the inertization plan on -- Do you know what I mean? It's not a single factor. And that's what we really need to be -- you know, it's not just one single factor that affects the entire process.

Q. Well, I understand that. What I'm trying to do is to isolate those factors which San Juan Coal Company finds objectionable about having more wells drilled at this point into the coal formation. And if I understood you correctly, one of them is that this production -- gas-production process will extract water from the coal?

A. That's right, it will -- it needs to extract water to release the methane.

Q. Must do so --

A. Must do so.

Q. -- in order to --

A. Must do so.

Q. -- reduce the methane. But that's bad for you -- It may not be fatal in the sense that it, in itself, may not cause a catastrophe, but it's one factor that will cause your problems to be greater when you go to mine the coal?

A. That is correct, that is correct.

Q. Okay. Another factor is the hydrological frac'ing process that is undertaken in these wells; is that correct?

A. That is correct.

Q. And if I understood rightly, there are two problems there, and tell me if I'm wrong. For one thing, it will open up additional fractures in the coal; is that correct?

A. That is correct, yes.

Q. And the other one is that it will fracture the strata above the coal seam?

A. That's correct.

Q. Or you believe that it would?

A. I believe it will, yes --

Q. Yeah.

A. -- taking into account the nature of the strata that we have as immediate roof.

Q. Now, one of the problems that the fracturing of the coal seam -- well, I'm not sure I am clear on what events cause what problems, but I seem to understand you to be saying two things. One is that you're getting more ventilation, therefore more oxygen to the fuel on your fire triangle, therefore a greater danger of fire, correct?

A. For a longer period of time. The timing issue is the criticality. We will always be passing air at some stage behind the gob, behind the shields.

So to maintain -- Because what happens is, as the shields move all the time, if they move regularly on a daily basis, you know, we actually inertize that area by the compaction of the gob.

So you will always have -- in the diagram you saw on the video clip, it showed the porosity of the rock that falls behind. So you'll always have some air going behind there.

When you are down, when you stop producing for a prolonged period of time, that is a factor that contributes to your coal wanting to burn.

Q. Now, we talked, of course, about stopping to leave these 300-foot pillars around the wells --

A. Uh-huh.

Q. But if I understood Mr. Woomer's testimony, what you really plan to do is not to leave those 300-foot pillars around those wells, but what you really plan to do is to buy those wells and shut them in before you get to that point?

A. This is where we -- We have an ability, yeah, the pre-existing wells, if they're located in an incorrect position, they are to be shut down. If they're located in the right spots, in the middle of our longwall blocks, then they can be producing wells.

Q. In the middle of longwall blocks? Why would that be?

A. Well, as indicated in the Exhibit Number 10, if -- and it is all dependent on consultation between the two parties once again.

Q. Well, I understand that, but --

A. Once we get over that hurdle --

Q. -- why is it that they don't create a problem if they're in the middle of your longwall blocks? Because I would have assumed the reverse.

A. Because they process that I would utilize if they were in the middle of our longwall blocks, and say we were allowed to recover the steel casing from the coal seam, we would inject it so that strata would be of a competent strata for the shields to come underneath it, so we don't have a cavity forming on the roof to stop us.

But if those holes are in the middle of the longwall block, then effectively they become part of what we have as our gob vent borehole scenario. So we have a potential to remake methane from the 9 Seam, from the Pictured Cliffs, from the Fruitland Coal seam -- Fruitland sandstone --

Q. Well --

A. -- potentially.

Q. -- I don't want to get -- I think this is something of a red herring, and I don't really understand it, so I don't want to get too far down that -- I don't want to go too far down that road. Let me back up a minute.

When you're talking about stopping your operation, as I understand, the danger comes not because Of the additional fractures in the material itself, but because the fractured condition of the strata may cause you to have to stop your operation; is that --

A. That is correct.

Q. Okay.

A. That is correct. That's why I would reconsolidate -- May I refer back to --

Q. Yes.

A. If that was in our -- the middle of our longwall block --

MR. AUSHERMAN: Mr. Abrahamse, would you refer --

THE WITNESS: Sorry --

MR. AUSHERMAN: -- to the exhibit number?

THE WITNESS: -- beg your pardon. Exhibit Number 10, going to the area that I had shaded, the umbrella drawing on Exhibit Number 10, if that was the area that was exposed to hydrofrac'ing, we would look at removal of the steel casing from the seam, as per the MSHA requirement.

We would also then remove the casing to the distance specified as part of our gob vent boreholes.

Q. (By Mr. Brooks) Right.

A. I would utilize that hole prior to the wall getting to that location, to use a cementaceous product -- not cement, a cementaceous product -- to infiltrate these upper stratas and also the coal seam so that we could mine when the longwall gets to there, to mine through it safely.

Q. Well, if there is a process whereby you can do that before you get to that point, then I don't understand why you would have to stop and incur this additional risk that you were talking about. Or maybe I'm confusing you.

A. Sorry. Yeah, the risk is -- We've come to Exhibit Number 10 where there's a well --

Q. Right.

A. -- and it's intact, and we have to stop. That distance from there to there, from the casing to the longwall, is 300 feet. That's -- The risk now is that that process of removal of all that equipment from this location to another location, we have introduced another risk in that longwall block. We have to do that for each longwall block, as I indicated before, but now I've multiplied it by two. Or three, or four.

Q. Why do you have to stop at this point? I'm sorry, I just -- There's so much of this I don't understand.

A. That's all right, you know.

Q. Go ahead.

A. Why do we have to stop?

Q. Why do you have to stop?

A. Well, because taking the current legal standing in place, we have a well that is owned by --

Q. Right.

Q. -- the oil and gas, and they are not allowing us to proceed any further.

Q. Yeah. But before you get to a particular longwall -- to open a particular longwall, let's say you get to the end of -- you finish up with 303 and you're ready to go into 302, for example, and I'm just saying --

A. Yeah.

Q. Well, to be more accurate, let's say you're going from 304 and you're ready to go into 303, because I see you've got some wells marked in 303?

A. Right, oh, yeah.

Q. And you know those wells are there, so you're not going to come up to those wells and that's going to be a surprise to you. You know they're there, you have an opportunity to do something about them, whether by negotiation or by --

A. Yeah.

Q. -- reorganizing your production methods to deal with them before you get to that point.

A. Right. Your first question in regards to negotiating --

Q. Yes.

A. -- is it preferable? The second, it is extremely difficult to -- Well, you really cannot. You have a fixed longwall unit --

Q. Yes.

A. -- that is of a thousand feet.

Q. Yes.

A. You can't take a piece out and keep on going. It's an integral part. They all rely on one another.

Q. Well, I understand that.

A. And that's where the difficulty lies. In the example that you've indicated in Longwall 303, there is a block of coal.

Q. Right.

A. And we would have to evaluate the block of coal between those two points.

Q. I understand that.

A. And that would be the criteria. If we did not have the ability to mine through those wells, then my superiors would ask me to -- or someone else, whoever, in the company -- to evaluate the value of that coal from block room, from one wall to the next.

Q. Yeah.

A. Evaluate the value of that coal, evaluate the cost of the process of setting up a wall, mining a certain distance, stopping, introducing a hazard, relocating, which takes a month, and starting again, and doing that in the Longwall 303 three -- two to three times.

Q. Yeah, I think I understand at this point. And when you start a particular longwall, you've got to either go all the way through it or, if you don't have the space all cleared through it, then you're going to have to stop when you get to a well and go around it and then go on.

A. And that would be an economic evaluation on the value of that.

Q. And if you conclude that it's too big of a problem to go around the well, then that longwall -- that rules out, then, that whole longwall?

A. That's correct.

Q. Because there's no way you can fractionate it?

A. That's correct.

Q. I think I understand that point. Okay. But let me get back to where I'm trying to get to hazards here.

I first understood you to be saying that the fracturing of the formation itself would cause a greater danger of fire. And what I last understood you to be saying is, no, it's because it will cause you to have to stop your operations --

A. Are we talking about -- We're talking about three different things.

Q. Well, that --

A. Three different incidents, you know.

Q. Here's what I'm trying to do. I'm trying to isolate the various factors --

A. Yes.

Q. -- here as individual factors --

A. Yes.

Q. -- and the first one I said was the water. You're going to extract water, the water is going to make the coal drier, which is going to make it more liable to a fire hazard?

A. That's right.

Q. The second one, as I understood it, is that the fractionating of the formation by the hydraulic fracturing process will cause more air -- more pore -- more fractures and therefore more potential air space within both the formation -- the coal formation itself and the overlying strata, and that that will cause an increased fire hazard; is that correct?

A. That is correct. But understand that a hole located in the middle of the longwall block, 90 percent of the coal that has been dried out will be mined onto the conveyor belt and will be transported out of the mine.

The coal that's left in your gate roads for your seals, they stay there for life of mine.

Q. Yeah.

A. So the hazard, if we had to give it a rating, the hazard of your holes in your gate roads, because your coal is left underground for a longer period of time that can allow leakage paths to be created, is more of a hazard than in the middle of a longwall, because that coal will be removed.

Q. Okay.

A. It's going to the surface.

Q. I think I understand that.

A. It's going to be burned anyway, you know?

Q. Okay, I think I understand that now. Okay. Then the third problem -- and it's separate from the damage-to-the-formation problem -- the third problem is that you've just got these wells that interfere with your operations, and you've either got to go around them or you've got to acquire those wells and plug them?

A. Yes.

Q. Now, in terms of rating the seriousness of these problems for the mining operation, what is the most serious problem you see in the drilling of additional wells? Is it just the fact that there are more wells there that you're going to have to either buy or go around? Is that the principal problem?

A. No, it's location. And that -- as I alluded before, the last three wells that have been drilled are damn smack in the middle of the gate road. And I'll, you know, be on the conservative side and say that, you know, in looking at a pure two-dimensional diagram, that it was smack bang in the middle of a quadrant, you know.

So there's an issue from lease dimension to placement of boreholes.

Q. So the biggest problem, then, is not the number of wells that Richardson proposes to drill but where they're located?

A. From my point of view, yes. Now, whether -- the whole other ramifications of whether there is gas there or isn't or -- you know, that's another issue. But from my point of view, yeah, the positioning of the wells is critical.

Q. And the fact that they're in the gate roads makes them more of a problem for you --

A. That is correct.

Q. -- than if they were in the middle of the longwalls?

A. That is correct.

Q. And I'm still not sure I understand why that is, but I don't know -- I think --

A. The timing factor, I think, is critical, the mining of the coal in the longwall block --

Q. Yeah.

A. -- if we are mining straight through it, there isn't a timing issue because that coal is on the conveyor belt on the way to the surface, whereas the coal in that diagram I had indicated --

Q. Right.

A. -- was in the middle of the pillar, that's a life-of-mine pillar. It'll stay there forever and a day.

Q. Yes.

A. That is a problem.

Q. Okay, now let's go to the effect on the gas. Your testimony was that gas can be produced subsequent to the mining operation because of the additional fractures up and down in what you call the gob; is that right?

A. That is correct.

Q. And apparently it's your opinion that at least in theory -- and I say in theory because you said you hadn't done a reservoir study --

A. That is correct.

Q. -- at least in theory, there's going to be some gas that can be produced as a result of the mining operation that would not otherwise be produced?

A. Yes, that's my -- that is my opinion, based on what I also heard yesterday of coal reserves that are not frac'd, the Number 9 seam, and the effect of that gas, the Fruitland sandstone, which would be fractured, and the Pictured Cliffs sandstone, which would be fractured --

Q. Of course there are also coal seams above the -- If the testimony we heard yesterday is correct, there are also some coal seams above the coal seam you're going to be mining?

A. The Number 9 seam.

Q. Yeah.

A. Yes.

Q. And apparently some others that are so small that they didn't even get numbered, if those diagrams are correct. And those probably also have some gas in them also.

A. Yeah.

Q. But of course to the extent that you vent gas out of the mine -- which you plan to do if your ventilation method is approved, that's what you plan to do, you're going to be venting methane out of the mine, correct?

A. (Nods)

Q. And to the extent that you vent that gas out into the air, that gas is going to be lost and it will never be any good to anybody?

A. That's not necessarily so.

Q. No, oh, okay. Explain why not.

A. It isn't -- And the finer details have not been evaluated on that, but we have established a catching point with these gob vent boreholes, and there's a potential for that gas to be utilized. That is not an issue, that is a -- that is a consultation issue that can be fairly -- in my eyes, can be fairly easily resolved, but we're not close to that yet.

Q. Well, when you say that is not an issue, that's -- you know, you're an engineer and I'm a lawyer. For me it is definitely an issue, because this agency, New Mexico Oil Conservation Division --

A. Sorry --

Q. -- is chartered -- well, let me finish --

A. All right.

Q. -- and then I'm going to ask you a question.

The New Mexico Oil Conservation Division is charged by statute to prevent the waste of oil and gas, and what I'm trying to figure out -- because I have you telling me that maybe there's going to be some additional gas produced that couldn't otherwise be produced, but then there's going to be some gas vented out into the air -- what is likely to be the net effect on the effective utilization of oil and gas, assuming that that technology which is economic will be employed to prevent the waste of gas?

A. Sorry, I'll clarify. When I say it's not an issue, I meant in relation to parties agreeing on something. The objective is that we will have captured that gas, and we can utilized it.

Q. In other words, you are telling me that the technology exists and that it is economically feasible to avoid the venting of gas into the atmosphere such that it is not captured for production and sale?

A. From our gob vent boreholes, the other exhaust scenario that we have that -- when we talked about waste, was -- when we say waste, it's got no dimensional terms other than the fact that it's being vented to atmosphere. These are the mine fan, okay? But the capturing of the gob vent boreholes is a catchpot that can be utilized.

The problem lies in those gob vent boreholes, if I go over 50-percent methane in the gob, I actually create an inert atmosphere in my gob environment, which is great, because I've eliminated the oxygen. So I've taken out one of the triangles for potential explosion.

Now, we will -- if we have control over those individual gob vent boreholes, then we can allow methane to be vented in a controlled fashion into anything. It would assist the gas industry because there would be a higher purity in methane coming out of a hole, which will have other contaminated gases like H_2S, potentially some -- a little bit of CO_2 and some other -- likes of an ethane gas as well, and nitrogen. Okay?

But generally speaking, we need to be, at San Juan Company -- and me in particular, I'll be direct -- me in particular, I need to establish a control mechanism at the top of the borehole to say, I have a quantity of -- I have a concentration of gas at the top of my borehole that has 50-percent methane and da-da-da-da-da-da-da. Excuse me, sorry. And at the face, underground, I have a certain quantity of air that's running along the face line and diluting any noxious gas that are -- and dust and gases that are generated by longwall mining. And that balance is a fine balance that I need to establish.

If we have a second operator drawing the methane from the gob vent borehole, their primary objective would be to maximize the gas make from that borehole. Now, that does not help our scenario, because if you draw too much from -- if we put a pump or suction pump on the end of the borehole and just draw as much as we can out of there, at some stage we will actually be drawing the mine air through our gob. And as soon as we do that, well, then we won't have a mine because we'll potentially create a spont-com event.

Now, those details have not been worked out, have not even been addressed, but -- There's a lot of work to do. So there is not a reason -- and I understand where you're coming from, from your statute -- that there is not a reason to have to waste this gas.

Q. And are you -- Obviously I don't understand all the technological details, but are you telling me that in your professional opinion, if appropriate technology were applied -- by appropriate technology I mean technology that is effective and economically practical -- if appropriate technology were applied, that the waste of gas, in the sense of venting gas out into the atmosphere that could not be recovered, would not be a significant factor?

A. Sorry, I missed the question.

Q. Okay.

A. Sorry. The technology is there to do that in the States. There are a lot of applications for utilization of gases from gob vent boreholes. That's in place now. So there's nothing to say that it cannot be used.

Q. Is it economically feasible?

A. In Districts 1 and Districts 2, no, at this stage, from the data that I've -- the limited data that I've reviewed, I'd have to say no. But down the track, in the deeper ends of the operation, most definitely. But we will be able to in District 1 and 2 obtain a significant amount of data to actually clarify that.

Q. And if that technology were applied, then in your opinion your operations would not cause a significant amount of methane to be lost; is that correct?

A. No. Oh, no. That is correct. That is correct.

Q. Okay.

A. It is manageable.

MR. BROOKS: Very good, I think those are all my questions.

THE WITNESS: I'll be very honest, there are some mines -- sorry, just -- in New South Wales that actually make more money on the gas than the coal.

MR. KELLAHIN: I have one question to follow up on Mr. Bruce -- I'm sorry, Mr. Brooks' question whenever you think it's appropriate.

EXAMINER STOGNER: Do you have any other questions, follow-up?

MR. AUSHERMAN: No, I don't.

EXAMINER STOGNER: Okay, Mr. Kellahin?

FURTHER EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Abrahamse, it's not clear to me in your responses to Mr. Brooks, are you telling us that -- is the mine plan operation such that the only methane that is lost is that methane that is going to be vented through the gob vent boreholes?

A. No, I made that clear in the sense that there were, you know, two applications --

Q. Yes, sir.

A. -- to waste -- the first -- well, not a waste, but to gob vent boreholes, and what -- as we are doing now, venting very small quantities of methane to the mine atmosphere via our main fans.

Q. Is that secondary loss -- Is the fan-venting of the methane the only other way there is lost methane, except for the gob boreholes? Methane --

A. Yeah --

Q. -- leaves the mine?

A. -- yeah, that's -- air goes in, it's got to come out --

Q. Right.

A. -- yeah --

Q. So --

A. -- that's the only way.

Q. -- the fan ventilation system --

A. That is --

Q. -- is that methane measured?

A. Yes, it is.

MR. KELLAHIN: Okay, no further questions.

EXAMINER STOGNER: Any other questions?

MR. AUSHERMAN: (Shakes head)

EXAMINER STOGNER: You may be excused.

THE WITNESS: Thank you.

MR. KELLAHIN: I have a rebuttal witness I'd like to call after the break, Mr. Stogner.

EXAMINER STOGNER: Okay, let's take a ten-minute recess at this time. We'll reconvene here and work through till we -- probably later. It will not take very much time; is that what I'm assuming at this point?

(Thereupon, a recess was taken at 11:42 a.m.)

(The following proceedings had at 11:55 a.m.)

EXAMINER STOGNER: This hearing will come to order. I believe we have just finished up with San Juan Coal Company's testimony.

At this time, Mr. Kellahin?

MR. KELLAHIN: Mr. Examiner, during the break I have talked to counsel of record in this proceeding. We have a joint recommendation to you, sir. I will present Mr. Cox as a rebuttal witness. Mr. Cox will put into evidence his drainage calculation. We will then conclude our rebuttal, and that will be the end of our evidentiary presentation to you today.

We would request that you provide us an opportunity to provide a written closing statement, including a proposed draft order, and an opportunity for the San Juan Coal Company to respond to Richardson's Motion to Dismiss and that we establish a reasonable time frame to accomplish those activities and that you then take this matter under advisement and issue your decision.

EXAMINER STOGNER: Mr. Bruce?

MR. BRUCE: Mr. Examiner, we are agreeable to that. There is one additional matter or writing that I believe the attorney for the Division requested, and that is a jurisdictional memo.

MR. BROOKS: I did. Now, I believe that the Motion to Dismiss touches on those issues also, so those two papers may end up being --

MR. BRUCE: Combine them into one, okay.

EXAMINER STOGNER: Mr. Kellahin?

MR. KELLAHIN: All right, sir, recall Mr. Cox.

May the record reflect, Mr. Stogner, that Mr. Cox continues to be sworn under oath, testifying under oath and has been admitted as an expert petroleum engineer?

EXAMINER STOGNER: Very well.

DAVID COX,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Cox, let me ask you, yesterday we touched on issues of potential drainage calculations that would be typical in your opinion concerning what to expect from coal gas wells drilled within the special infill area; is that not true, we touched on that topic?

A. Yes, we did.

Q. At the time of your testimony you had not prepared an actual calculation, had you?

A. No, I had not.

Q. Over the evening and after the break, have you now prepared what you propose as a typical drainage scenario and calculation that is applicable in this case?

A. Yes, I have.

Q. Let me show you what is marked as Richardson Exhibit C-14. Mr. Cox, what I have distributed as Exhibit C-14, is this your work product?

A. Yes, it is.

Q. All right. Please identify, explain and testify about your display?

A. All right. What I have done here is, since the question was raised about what drainage areas would the recoveries per well correspond to, I have calculated the types of drainage areas that we will see in the Fruitland Coal if the current spacing is continued.

So what I've done is, first I've selected for a typical rate the median rate, average over the wells that were listed on Exhibit C-13 was 100 MCF per day, that half of them were higher than 100 MCF per day, half were lower. So that gives me a middle-of-the-road type of number.

Now, in terms of checking out potential drainage, obviously we don't have five or ten or fifteen years' production on these wells yet. So what I did is, I wanted to set reasonable bounds to what the limits of drainage could be.

So I took that 100 MCF per day and I said, let's assume that it produces 100 MCF per day, once the well reaches that level, flat for five years, without any decline, and then declines at 5 percent per year. So that would be a very shallow decline, and holding it flat for five years prior to that, what I calculate is, a well under those conditions would recover 716 million cubic feet and would have a well life of 32 years.

Now, my Exhibit C-6 had shown that there were 2.17 BCF recoverable under the average pressure case and to 50 pounds p.s.i.a. abandonment pressure --

Q. Yeah. Now, that 2.17 BCF recoverable -- per 320-acre spacing unit?

A. That's correct.

Q. Okay.

A. That is per 320-acres. So what I'm going to do now is to compute the effective drainage area that the well will be influencing as I ratio the 716 million cubic feet that such a well could recover by 2.17 BCF and then multiply by 320 acres. And I compute a drainage area in that case of only 106 acres, as the effective drainage area.

Now, if the decline rate, once the well begins to decline, is somewhat steeper, if it's 10 percent per year, then the ultimate recovery for the well would only be 442 million cubic feet over 18 years of economic life. That would lead to a drainage area that would only be 65 acres.

So clearly, what this is showing is that 320 acres is substantially more than what the drainage area effectively of these wells is for the typical well in this area.

Q. If the Division approves the increased density, if you will, by adding an infill well in the opposite 160 acres from the parent well in that spacing unit, would that second or infill well be necessary, in your opinion?

A. Yes, it will be.

Q. It will take at least two wells, in your opinion, in the spacing unit, in order to have a reasonable probability over a reasonable economic life, to recover the 2.17 BCF of recoverable gas in that spacing unit?

A. That is correct.

Q. Can this calculation be applied to the increased density area, the infill area?

A. Yes, this is an average or typical calculation for this area. Obviously some wells produce a little more, some wells produce a little less. There are variations in permeability and in stimulation effectiveness. But in terms of across this area, the average or typical kinds of numbers, yes, this is what would apply.

MR. KELLAHIN: That concludes my examination of Mr. Cox.

We move the introduction of his Exhibit C-14.

EXAMINER STOGNER: Any objection?

MR. BRUCE: No objection.

EXAMINER STOGNER: Exhibit C-14 will be admitted into evidence at this time.

Thank you, Mr. Kellahin.

Mr. Bruce, your witness.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Just a couple questions, Mr. Cox. Why did you pick a 5-percent per year decline?

A. I picked a 5-percent per year because that's a very shallow decline, and in my experience once wells begin declining well in excess of 90 percent of the wells decline at more than 5 percent per year.

Q. Now, unfortunately my engineer isn't here to coach me on this, but just looking at your equation here, if you had a -- for a well that was producing at 600 MCF per day, factoring that in, that would mean a drainage radius of -- well, you'd multiply it almost by a factor of 7, wouldn't you?

A. Well, if the well is producing 600 MCF per day, it's going to decline much more rapidly than 5 percent per year when it begins to decline. And I don't believe that I'll be able to expect that a well will produce in this area 600 MCF per day for five years and then decline at 5 percent. That's not a reasonable evaluation.

Q. Okay. So in other words, the producing lifetimes of these wells is going to be less than what you're talking about here?

A. Well, if the well produced 600 MCF per day, yes, in that case it may. Or it may be draining a slightly larger area. However, if the wells are mined out, they certainly will have a shorter lifetime. So this calculation assumes that the wells are allowed to produce from their entire drainage area over the economic life of the well.

Q. Well, what you're saying is, more than 90 percent of the wells have steeper declines than 10 percent, so chances are their lives are going to be much shorter than this 32 years, or maybe even shorter than this 18 years?

A. No, that's not what I said. First I said more than more than 90 percent of the wells that I have evaluated have -- once they begin to decline, have more than a 5-percent decline, not 10. And then secondly, the economic life depends on other factors besides just the decline rate.

Q. So that a greater producing rate does not necessarily translate into a greater drainage area?

A. No, it doesn't necessarily. There are other factors.

MR. BRUCE: Thank you.

EXAMINER STOGNER: Any redirect?

MR. KELLAHIN: No, sir.

EXAMINATION

BY EXAMINER STOGNER:

Q. Now, you chose an economic limit of 25 MCF per day. Now, these are -- most of these wells are or will be downhole commingled with the Pictured Cliffs. Is this just taken into account that this economic limit refers to stand-alone coal gas?

A. Basically, yes. What I've done there is, I've taken the economic and the cost information I received from Richardson and allocated that -- by the point in time that we're looking, 10 or 30 years in the future here, all of that, the cost would be allocated to the Fruitland at that point in time, because the Pictured Cliffs depletes more rapidly and has much less gas than the Fruitland.

Q. Now your drainage area you're showing is to be 106 acres. This is what I'm seeing, right?

A. Yes.

Q. And what's the radius of drainage for 160 acres amount to? That depends upon the height or the thickness of the gas, but it doesn't -- That's not a very big area, is it?

A. No, it's not a very big area.

Q. Okay. So with that in mind, why would you need the buffer zone that is a mile? Since what you're trying to do is accelerate the production before the mine gets there, why extend beyond that?

A. Well, I think one of the questions there is, when does the mine get where?

It's my understanding that some of these mine workings actually get to the limits or the boundaries of the mine areas as early as 2005 in Section 36 or 2008, I believe it is, over towards the -- further east there. And there's a huge difference between a well competing with other wells and interfering with other wells -- and that's part of what we're looking at here -- versus a mine face or versus mine workings approaching that.

The other factor here is certainly, there is a degree of variability here that we're looking at, and the cost associated with the completion of the Fruitland commingled with the Pictured Cliffs is small compared to the potential gain in reserves or the gain in reserves that can be obtained by the infill well.

So from a reservoir engineering standpoint, I think that these wells are needed.

The question on the size of the buffer zone is a completely different question that ties with, I think, the land and the mining considerations.

Q. Does Richardson participate in the Fruitland Coal Gas Committee that's addressing these issues at this time, or as the infill provisions?

A. I don't know.

EXAMINER STOGNER: Do you know?

MR. HAYDEN: No.

Q. (By Examiner Stogner) Do you participate with this group as an individual or with some other company?

A. No, I do not.

EXAMINER STOGNER: I have no other questions of Mr. Cox. You may be excused.

MR. KELLAHIN: That concludes our rebuttal, Mr. Examiner.

EXAMINER STOGNER: You're going to submit the written closing with the proposed draft, at which time, Mr. Bruce, I'm going to leave the timing up to you gentleman because I'm sure that time is an issue for you more so than me at this point.

MR. KELLAHIN: We'll discuss it, Mr. Examiner, and keep you informed.

EXAMINER STOGNER: With that, this hearing is adjourned. We'll leave the record open pending the additional information.

Thank you.

(Thereupon, these proceedings were concluded at 12:11 p.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 12734 heard by me on 14 November 2001.

_______________, Examiner

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 November 26th, 2001.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 2002