STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION COMMISSION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION FOR THE PURPOSE OF CONSIDERING:	)	
APPLICATION OF THE NEW MEXICO OIL CONSERVATION DIVISION FOR REPEAL OF EXISTING RULE 50 CONCERNING PITS AND BELOW GRADE TANKS AND ADOPTION OF A NEW RULE GOVERNING PITS, BELOW GRADE TANKS, CLOSED LOOP SYSTEMS AND OTHER ALTERNATIVE METHODS TO THE FOREGOING, AND AMENDING OTHER RULES TO MAKE CONFORMING CHANGES; STATEWIDE	)	CASE NO. 14,015

ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

COMMISSION HEARING

BEFORE: MARK E. FESMIRE, CHAIRMAN
JAMI BAILEY, COMMISSIONER
WILLIAM OLSON, COMMISSIONER

Volume XII - November 27th, 2007

Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Commission, MARK E. FESMIRE, Chairman, on Tuesday, November 27th, 2007, 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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C U M U L A T I V E I N D E X

Monday, October 22nd, 2007 (Volume I)
Commission Hearing
CASE NO. 14,015

(Continued...)

PUBLIC COMMENTS (Continued):

DIVISION WITNESSES (Resumed):

(Continued...)

* * *

Tuesday, November 6th, 2007 (Volume III)
Commission Hearing
CASE NO. 14,015

(Continued...)

(Continued...)

DIVISION WITNESSES (Continued):

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(Continued...)

Thursday, November 8th, 2007 (Volume V)
Commission Hearing
CASE NO. 14,015

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Friday, November 9th, 2007 (Volume VI)
Commission Hearing
CASE NO. 14,015

(Continued...)

(Continued...)

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Tuesday, November 13th, 2007 (Volume VII)
Commission Hearing
CASE NO. 14,015

(Continued...)

PUBLIC COMMENTS:

OGAP WITNESSES (Resumed):

DIVISION WITNESSES (Continued):

(Continued...)

PUBLIC COMMENTS:

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Wednesday, November 14th, 2007 (Volume VIII)
Commission Hearing
CASE NO. 14,015

(Continued...)

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Thursday, November 15th, 2007 (Volume IX)
Commission Hearing
CASE NO. 14,015

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Friday, November 16th, 2007 (Volume X)
Commission Hearing
CASE NO. 14,015

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Monday, November 26th, 2007 (Volume XI)
Commission Hearing
CASE NO. 14,015

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Tuesday, November 26th, 2007 (Volume XII)
Commission Hearing
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* * *

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* * *

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A P P E A R A N C E S

FOR THE COMMISSION:

CHERYL BADA
Assistant General Counsel
Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

FOR THE DIVISION:

DAVID K. BROOKS, JR.
Assistant General Counsel
Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

FOR NEW MEXICO OIL AND GAS ASSOCIATION; CONOCOPHILLIPS COMPANY; DUGAN PRODUCTION CORPORATION; and ENERGEN RESOURCES CORPORATION; and an INDUSTRY COMMITTEE comprised of BP America Production Company, Inc.; Benson-Montin-Greer Drilling Corporation; Boling Enterprises, Ltd.; Burlington Resources Oil and Gas Company; Chesapeake Energy Corporation; Chevron USA, Inc.; ConocoPhillips Company; Devon Production Company; Dugan Production Corporation; Energen Resources Corporation; Marathon Oil Company; Marbob Energy Corporation; Merrion Oil & Gas Corporation; Occidental Permian, which includes OXY USA, Inc., and OXY USA WTP Limited Partnership; Samson Resources Company; J.D. Simmons, Inc.; Williams Production Company, LLC; XTO Energy, Inc.; and Yates Petroleum Corporation:

HOLLAND & HART, L.L.P., and CAMPBELL & CARR
110 N. Guadalupe, Suite 1
P.O. Box 2208
Santa Fe, New Mexico 87504-2208
By: WILLIAM F. CARR

(Continued...)

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

FOR INDEPENDENT PETROLEUM ASSOCIATION OF NEW MEXICO:

KARIN V. FOSTER
Independent Petroleum Association of New Mexico
Director of Governmental Affairs
17 Misty Mesa Ct.
Placitas, NM 87043

FOR CONTROLLED RECOVERY, INC.:

HUFFAKER & MOFFETT, L.L.C.
155 Grant
Santa Fe, New Mexico 87501
P.O. Box 1868
Santa Fe, New Mexico 87504-1868
By: GREGORY D. HUFFAKER, Jr.

FOR NEW MEXICO OIL AND GAS ACCOUNTABILITY PROJECT:

New Mexico Environmental Law Center
1405 Luisa Street, Suite 5
Santa Fe, New Mexico 87505
BY: ERIC JANTZ

* * *

WHEREUPON, the following proceedings were had at 9:07 a.m.:

CHAIRMAN FESMIRE: Okay, let's go back on the record.

Let the record reflect that it is Tuesday, November 27th, at nine o'clock a.m.

This is the continuation of Case Number zero -- 14,015, I'm sorry. 14,015.

And the record should also reflect that Commissioners Bailey, Olson and Fesmire are all present, we therefore have a quorum.

I believe we were in the cross-examination of Mr. Small. Mr. Small, would you re-take the stand, please? And you understand that you're still under oath, don't you, sir?

THE WITNESS: Yes, sir.

CHAIRMAN FESMIRE: Mr. Brooks, I believe you were doing the cross-examining?

MR. BROOKS: Yes, sir.

SAM SMALL,

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

CROSS-EXAMINATION (Continued)

BY MR. BROOKS:

Q. Now just a few more questions. Good morning, Mr.

Small.

A. Good morning.

Q. Just a few more questions and I will hand you over to the Commissioners here, but I do have one or two questions here.

When we took the break yesterday afternoon, we were talking about the computation of the drying pad and the size of the drying pad that you used for your closed-loop system, do you --

A. Yes, and --

Q. -- recall that?

A. -- I was glad we had the break.

Q. Yes.

A. Yes.

Q. It is my understanding that you took the amount of waste that you assumed and you calculated the amount -- the size of the drying pad that you would need for the assumed amount of waste.

A. Right.

Q. Is that correct?

A. Yes, sir.

Q. And the amount of waste that you're assuming -- looking at page 14 of your paper, the amount of waste you're assuming in the case of the 7500-foot type well is 1120 cubic yards?

A. Yes, that's correct.

Q. Okay. You assumed two feet on top of your drying pad -- two feet of waste stacked on your drying pad?

A. When we -- It would probably be better if I run through the whole -- you know, we're talking 1120 cubic yards.

Q. Yes, sir.

A. Let me look through that -- what I did in that 1120, if I can find my calculations, I -- to come up with what went in the drying pad, it was not going to be 1120 because 1120 included that six inches of material plus the liner --

Q. Yes, sir.

A. -- as the total waste volume. So what I did in my numbers -- and I'll have to find them here in a minute, but I took that six inches, you know, and I used it -- and I know it sounds kind of arbitrary, but I took a six-inch cut beneath the liner for the total surface area of the pit and took the liner out --

Q. Yeah.

A. -- and I ended up with a volume of material that would be the contents of the pit, which would be comparable to what you would have in the closed-loop system. You know they wouldn't -- closed-loop system wouldn't have that cut from beneath the bottom --

Q. Okay, so you cut that out, so you --
A. So I took that out --
Q. -- reduced the 1120 cubic yards by the amount that -- of material that you're --
A. Right.
Q. -- going to scrape up underneath the --
A. That's correct.
Q. -- the pit?
A. Right.
Q. So what cubic yardage did you use --
A. Let me see --
Q. -- to compute your --
A. -- if I can find those numbers in --
Q. -- your drying pad size?
A. I had that page open -- I apologize for not having it handy --
Q. That's okay.
A. -- I should have had it. Everything got jumbled up last night on me.

Okay, what I -- okay, I ended up with the amount of waste that would go -- you know, be contained in the pit was 647 cubic yards.

Q. 647 cubic yards.
A. Yes. There was 473 yards of material taken, you know, from beneath the pit.

Q. Now you plan to stack the material two feet high on the drying pad?

A. I used the two feet -- I started out -- and I misspoke yesterday because I said the pit -- you know, the pad, was going to be 150 by 150, and that was just something I wanted to fix in my mind, really hadn't anything to do with the calculation.

If I used a one-foot lift, which you would have in a landfarm, it would come out to 150 by 150, so --

Q. So you actually used one foot --

A. No, I used the two foot, I just --

Q. -- instead two foot?

A. -- did that for -- to get an idea of what I was looking at. But I thought it was probably very unrealistic to use a one-foot lift on your drying pad, that you'd probably use at least something on the order of a two-foot lift. And it's not going to be spread -- you know, I have to do it to get a calculation of volume.

But the way they recommend doing it in the papers, they're going to put the material in and they're going to work the material and then kind of push it and stack it up.

Q. Well now, you're confusing me, Mr. Small --

A. Okay, I'm sorry.

Q. -- because you're telling us this morning that

you used a -- you said you used a two-foot height --

A. Yes, sir.

Q. -- but you're saying you calculated the 150 by 150 --

A. Okay, yeah --

Q. -- on the basis of one foot of height.

A. -- I apologize for confusing you. What happened is, I think yesterday in my testimony earlier I didn't have my -- I didn't realize I could have notes, so I was kind of winging it, I'm --

Q. Yeah.

A. -- what I was trying to recall. And I made a statement that the drying pad would be 150 feet by 150 feet.

Q. That's what you said yesterday.

A. That's what I said in my statement, and that was a misstatement for what I did. That was a calculation I ran just to see what would happen if you do the one-foot lift. That's not what I -- I just wanted to see what would happen with a one-foot lift if you -- it works out to about 135 feet by 135 feet, rounded up to 150 for just the sake of argument.

So that was just to get some concept, if you were to use a one lift -- a one-foot lift, just how big a pad you'd have --

Q. Okay, so --

A. -- but the calculations I used for determining the size were actually with a two-foot lift.

Q. Yeah, and then you would not disagree with me that a 150-by-150 pad with a stacked two foot of waste could hold 1667 cubic --

A. I wouldn't --

Q. -- yards --

A. -- disagree, I wouldn't disagree with you on that.

Q. -- which is considerably more than your type well would produce?

A. Yes.

Q. Okay. Now, did you use the --

(Off the record)

Q. Did you use the -- what size of pad did you -- yeah, what size of -- What size of drilling pad did you use in your cost calculations?

A. Okay, in the cost calculation, when I did the calculation, rather than fool around with the dimensions -- but the dimensions are there -- I just said you've got 647 cubic yards, you're going to fill it to two foot, which is, you know, approximately .34 yards. So if you take the .34 yards and divide it into 647, you'll come up, you know, with the yardage.

But if you want the dimensions, it works out to 31 yards by 31 yards or 93 feet by 93 feet.

Q. The size of the pad is going to make a difference, though, is it not?

A. Sure.

Q. Because the larger the pad, the more liner material you'll have?

A. That's correct.

Q. The smaller the pad, the less liner material?

A. That's correct.

Q. And liner material costs money to buy, it costs money to haul?

A. Yes, it does.

Q. So if you use a smaller liner -- if you use a smaller pad, you come out with a smaller cost, correct?

A. Yes.

Q. Now do you know if they sometimes pile waste considerably higher than two feet on the drilling pads in closed-loop systems?

A. The picture I saw and the article indicated it piles up higher, yes, sir.

Q. And if you piled it higher, you'd have an even smaller drilling pad?

A. Not necessarily, because it's like I was saying, what they're recommending before you pile this stuff up is,

you spread it out, let it dry and keep working it. That's in the paper we looked at yesterday, Mr. Rogers' paper, that they recommend, you know, before you stack it that you dry it out.

So if you're going to stack this stuff up much higher than two feet, it's not going to dry out very well. It's going to stay -- keep fluids in it. So you've got to get that lift down to where you get a maximum evaporation. I don't know that two foot is necessarily that number. One foot may actually be a better number, but I used two feet to -- you know, because I thought it would probably be a more realistic --

Q. Well --

A. -- and then they'll take that dirt and push it up, yes, sir.

Q. But my question was simply, if you pile the -- if the waste was piled higher than two feet, you could use a smaller drying pad?

A. Sure. Yes, sir.

Q. Okay. Are you aware that -- or do you know whether or not there are closed-loop systems that do not use a drying pad?

A. Yes, sir.

Q. Are there closed-loop systems that contain the waste in waste containers so it can be removed without

having to be spread on the ground or put in a pit?

A. Yes, sir.

Q. And did you do any work to try to estimate the cost of using that type of closed-loop system?

A. I really didn't because what you end up with is, you're going to have a lot wetter material you're hauling off. And you know, without knowing weights of that material I couldn't calculate the volumes of disposal or how many loads you'd be making on the road. I didn't have those numbers.

Q. Okay, I believe there's just about one other -- Well, there's one other area I know I want to go into here. When you were calculating the number of loads of solid waste that would be hauled off in your 20-foot dump truck --

A. Yes, sir.

Q. -- you described a procedure you used to determine the amount of -- as I understood it, the amount of fluid content that would be in those loads. You experimented with adding fluid to it?

A. I experimented -- it wasn't looking at the fluid content --

Q. Okay, I didn't fully understand what you were saying there --

A. Okay.

Q. -- so could you go over that procedure again for us, please?

A. Okay, when -- I collected dry drill samples from an old abandoned pit that I was aware of in southeast New Mexico, and the dry material has a pore volume in it that's just air, it has no -- nothing in it, just air, so looking at some literature and hydrology books and stuff, they indicate that you could have a pore volume anywhere from 30 to 40 to 50 percent in dry material.

And so what I did -- Like I said, it was kind of a Mr. Science experiment. I had two gallons -- I had a five-gallon container, and I went ahead and measured up two gallons in it, filled it with two gallons of water and put a measuring line.

Then I went ahead and got the dry drill cuttings and put them in that container, and I started adding water just to see if it was going to increase the volume of the material first. That was critical, to make sure that the volume didn't increase.

And then I brought it to a consistency that you could put in a truck and haul off. If it got any wetter, you know, it would be sloppy and you'd have to line your dump truck to haul it off, which I didn't want to get to that point. So I got it to what would realistically be a level where you could haul that material out of the pit if

you chose to do so. And under the proposed reg with the shortened drying time, if you were drying it in a reserve pit, you'd probably have -- you know, still have some fluids in it, because you've got a shortened period of time to dry.

Q. So you were attempting to saturate it?

A. No, I was not attempting to saturate it, I was just bringing it to a point where the consistency -- where you could pick it up in a front-end loader and put it in a dumptruck without it running all over and dripping out of the truck and -- you know, that would be saturated. This is way below saturation.

Q. Well, are you aware that in order to put it in a landfill, it would have to pass the paint-filter test?

A. Yeah, I was aware of that, but I also was aware of the fact that they were hauling cuttings off the drill- -- or closed-loop systems in tanks, and they're using liners in those tanks so there's liquids in those fluids too. So I assumed if it worked for them, you know, it's going to work here too. I mean --

Q. Now you used your weight of material after you added the water to determine how much you could put in the truck?

A. That's correct.

Q. And if it had been drier you could have put more

in the truck?

A. Yes.

Q. Okay, thank you.

You indicated that you got your cost figures by inquiries of people in the businesses that provided the services --

A. Yes.

Q. -- is that correct?

A. Yes, sir.

Q. Did you get any written -- did you get any of that in writing?

A. Just notes, little notes that they gave me, not -- not a formal -- I didn't request formal bids -- or not bids, but estimates when I went to most of the vendors. If I asked for a formal estimate then, you know, they get into who I'm working for, and a lot of them are very hesitant to give you --

Q. So you didn't --

A. -- that cost --

Q. -- you didn't get any actual formal cost estimates?

A. They were all verbal or written notes.

Q. Now what inquiry did you make about the availability of closed-loop systems? I believe you talked about --

A. I didn't make any inquiry on the availability.

Q. Okay. You used -- looking at your estimates of sampling costs, looking at page 11 for instance, in your southeast example you used a sampling and analysis cost of $1500, and in your northwest sample you used a sampling and analysis cost of $2500. Why was the difference between those two figures?

A. There was a couple of differences. You know, one, the sampling could be done in Hobbs at a local lab, and talking to the operators in the northwest, they send their samples off, I think to Lubbock, to get them analyzed.

And down in -- you know, the projects I was on in the southeast, we actually did our own sampling in-house, you know, on our sites, where again, talking to the fellows in the northeast, or operators -- the operators in the northeast --

Q. You mean northwest, don't you?

A. Northwest, I'm sorry, I'm not sure where I am.

CHAIRMAN FESMIRE: I do that all the time too, Sam.

THE WITNESS:

Q. (By Mr. Brooks) But they actually bring in a third party to do the sampling, they have someone come out and do their sampling.

Q. And do you know if Envirotech has a laboratory in Farmington?

A. I don't know.

Q. And isn't $1000 pretty high for the cost of shipping these samples? They're very small.

A. Like I said, you have the labor cost when you take the fellow -- or the third-party sampler, that costs -- that adds a considerable amount to the cost.

Q. Okay. In your sampling cost for delineation, which I believe is on page 10, you have a similar $1000 difference between northwest and southeast, I believe, because you have $550 -- this is on page 10 -- you have --

A. Yes, sir.

Q. -- $550 in your southeast example, and $1510 in your northwest example.

A. (Nods)

Q. And your delineation cost includes a background sample as well as a beneath-the-pit sample?

A. That's correct.

Q. And I believe we've already established that while we -- while it may be prudent to -- it probably is prudent to take a background sample, it's not actually required by the rules; is that correct?

A. That's correct.

Q. Okay. I think that's -- I have one other

question.

Your liner costs, you say so much per foot installed. Does that include the transportation to the site and installation at the site --

A. Yes.

Q. -- as well as the material?

A. That's correct, that was taking it out there and installing it, yes.

MR. BROOKS: Okay, I believe that's all my questions. Pass the witness.

CHAIRMAN FESMIRE: Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. On page 5 of Exhibit 13, there's nearly a $100,000 difference in the total cost of the column, Earthen Reserve Pit On-Site Disposal, and the last column, Closed-Loop Off-Site Disposal.

Your text talks about the differences being about 8 to 10 percent of the total costs of the well.

Is that $100,000 a significant impact on the payout for that well? I'm talking about commercial determinations and payouts --

A. Okay, well, I was looking at -- I'm sorry, I was just looking at your number. You said it was $100,000?

Q. Nearly $100,000.

A. The closed-loop -- Correct me if I'm wrong, I'm looking at $171,000 for the closed-loop off-site, and $128,000 for on site.

Q. No, the $75,000.

A. The $75,000. That's an on-site disposal. Okay, okay, I'm with you now, I'm sorry.

Q. Okay, now are we on the same page?

A. I wasn't sure, I wasn't in the same columns.

Q. Okay --

A. And your question -- could you repeat --

Q. The question is, is that a significant impact on the payout for that well?

A. It could be, yes, ma'am.

Q. Would that -- At today's prices, which we know are record-setting, would that translate to several more months of production of either oil or gas in order to make up the difference? Like maybe three or four months' worth of production?

A. I think that would be a fair assessment, Commissioner.

Q. Okay, which in -- because most of the oil wells, at least, in New Mexico are stripper wells, that could make a significant difference on whether or not that well is drilled, right?

A. That's correct.

Q. Let's shift gears completely.

A. Okay.

Q. Let's go back to your 38 years of experience as a petroleum engineer and environmental engineer.

On one hand, siting requirements do not allow a site within 300 feet of a watercourse -- or 200 feet of a watercourse, 300 feet of a continuously flowing watercourse -- and the reasoning behind that 200 feet was that there was so much truck traffic and safety reasons and the amount of -- the volume of traffic and trucks and equipment on that well site.

Now we heard Mr. Sanchez give his estimate of the size of a drilling location. In your experience, what is a reasonable size of a drilling location?

A. A reasonable size, my understanding in the northwest is, they're using an acre, from previous testimony. Southeast, 2.5 acres would be a reasonable size for a location.

Q. Okay. Now let's go back into the memory banks. With the fervor for the reuse and recycling of drilling fluids and drilling muds, would you explain the problem of incompatibility of fluids downhole and what kind of formation damage can occur?

A. Yes. Again -- you know, each mud system or drilling system is going to be different, and you're

correct, there's compatibility issues with the produced water in the holes. You design your mud system looking at the compatibility issues, whether you have lost-circulation zones, you know, that are going to take fluid, you know, in which case you're going to want to have lost-circulation material in that mud to keep from contaminating the zone and plugging it up or scaling with liquids getting in.

So each system is designed for the conditions you anticipate in the well, and you know, it would depend on the additives, of course, whether a well fluid would be -- or a drilling fluid would be compatible with that particular well.

Q. And once you have scaling on formation, it's almost -- it's very difficult, if not impossible, to retrieve as much of the production as you should be able to; is that correct?

A. I wouldn't say it's impossible. It depends on the type of scale. If you were to have a barium sulfate scale or a calcium sulfate scale, it would be a difficult process to clean up. A calcium carbonate scale, though, you could clean up with acid. It would require coming in there and acidizing the well to clean it up, bringing in, you know, hydrochloric acid to clean it up, but it could be done.

Q. So not only are there problems with, as you

mentioned, calling that wastewater from a drilling operation, maybe it should be a saltwater disposal, but you would also have very real issues concerning productivity of any well that is drilled; is that right?

A. That's correct.

Q. Okay. Before coalbed methane became the target, when Basin Dakota was the main target formation up in the northwest, do you recall hearing the OCD Aztec office talk about the problem of sliming and production becoming sour due to the inadequate cleaning of equipment by drillers?

A. I'm not familiar with that.

Q. You didn't hear that?

A. No, I did not.

Q. Okay. I did.

A. Good.

(Laughter)

COMMISSIONER BAILEY: That's all I have for you.

THE WITNESS: Thank you, Commissioner.

CHAIRMAN FESMIRE: Commissioner Olson?

COMMISSIONER OLSON: Yeah, I just have a couple questions.

EXAMINATION

BY COMMISSIONER OLSON:

Q. Mr. Small, in your cost estimates did you ever look at the need for remediation of any of the soils? And

I think you talked about six inches of soils removed as part of the closure. Did you look at any other contamination that could result as part of the leakage from the drilling pit?

A. No, and the reason I didn't was, you know, looking at the task force recommendation -- and, you know, I sat in on one of the task force meetings -- it seemed everybody was comfortable that a 20-mil liner with a geotextile padding beneath it would be adequate to prevent contamination issues, remediation issues with those pits, it would contain it.

Q. Well, were you here for the testimony by Mr. Bratcher with the Artesia district office?

A. (Shakes head)

Q. In his testimony he talked about it's common for them to find the current systems having leakage and having to do some type of cleanup associated with the current systems. And I was wondering how that factored into your current costs, your current methods. You're not accounting for that in the cost of your -- that you presented here of closure --

A. No.

Q. -- costs for current methods?

A. No, I'm not.

Q. And costs of cleanup can be significant, can't

they?

A. It could be, yes.

Q. And I guess on another line here, have you ever -- Now you've worked on some cases of groundwater contamination --

A. I have.

Q. -- southeastern New Mexico?

A. I have.

Q. And the costs of groundwater contamination -- I thought you were mentioning some costs of $20,000 to millions of dollars. Is $20,000 an actual cost for cleanup of groundwater, or is that --

A. No, that --

Q. -- for soils?

A. -- that's for soil. That didn't -- that was no groundwater impact in that particular cleanup.

Q. So --

A. It was in the range.

Q. -- you put the cost of groundwater cleanup to be in the millions of dollars, then?

A. Not necessarily. You know, each one is going to be different. You know, it depends on the degree of impact. You know, how much soil is involved, you know, in an excavation process. Like I said, you've got a wide range. There's landowner issues that you're dealing with

and, you know, there's a whole multitude of things that enter into that picture to come up with, you know, the million dollars. Not all of them are absolutely necessary to be there, they just are because of, you know, some issues.

Q. Well, would you say that a ballpark figure for smaller-scale groundwater contamination was in the hundreds of thousands of dollars?

A. Yes, I would.

Q. And it could be millions of dollars, depending upon the scale --

A. Yes.

Q. -- of the contamination?

And then there's a resource that's lost during this contamination, isn't there? A groundwater resource?

A. Till cleanup, yes.

Q. And that resource has a value too, doesn't it?

A. Yes. Yes, I'm sorry, need to talk up.

Q. And so I guess I'm understanding, none of your calculations take into account what the costs could be in terms of groundwater contamination, lost resources?

A. No, not -- the reason I didn't include groundwater contamination issues here -- you know, I can speak mostly for the southeast. I really can't talk a whole lot for the southwest [*sic*] in this regard, although

people have -- the same thing up there.

But I have yet to encounter a groundwater contamination issue that has anything to do with a drill pit or temporary pit. All the groundwater issues I came across involve old evaporation pits at tank batteries. And you know, there's reasons why those things contaminated. But I have never come across and I have not talked to anybody that's ever come across a groundwater contamination issue associated with a drilling pit. And so groundwater wasn't an issue I brought in.

And when you go in and you build the pit, you know, you're not building it with the intention of contamination, getting out in the environment. The whole purpose of the liners and everything was to keep that out of the environment.

And you could use a justification, if you would, that, you know, if you had a catastrophic failure in a closed-loop system, that you could conceivably contaminate a location also, you know, surficially and spend a considerable amount of money cleaning that up.

So I mean, there's -- you know, I don't know how you quantify that, because it's really not something you're planning to do. And like I said, you know, my personal experience, I've never seen a contamination issue associated with a pit, a drilling pit or workover pit.

Q. Well, I guess, though, but up until the last couple years, hasn't it been common practice of industry just to come in and rip the liners and just push -- just cover the pits? Pits were never done in a burrito system until the last couple years; isn't that correct?

A. I would assume that's correct, yes. I don't know that that's universal, but that's probably correct in a number of cases.

Q. And we have, at least in southeastern New Mexico, I guess a 70-year history of drilling, approximately; is that --

A. Correct.

Q. I guess, has -- I've heard a lot that there's never been -- people don't have knowledge of contamination around drilling pits, but has the industry ever gone out and installed groundwater monitoring wells around drilling pits to see the extent of contamination from drilling pits?

A. I don't know why you would do that, Commissioner. You know, for science, you know, maybe you'd want to do that. But I don't know why you would go out there looking -- putting holes in the ground, looking for it.

Now, you know, that speaks to a historical context, and we're talking about a proposed rule here that's carrying us into the future, you know, that whatever contamination out there is not going to be alleviated

through this rule, that contamination, if it exists, is out there. So this rule doesn't do anything to mitigate that.

Q. Well, I guess from what you were saying, you say you've never seen groundwater contamination from drilling pits, and drilling pits until the last couple years have not been closed in the system as proposed here, correct?

A. I guess that would be correct, yeah.

Q. So if any contamination would have occurred, it would have occurred from those past practices; is that correct?

A. At the well site, not necessarily. A casing leak in a well, a shallow casing leak -- I've seen cases where that's occurred and there's been contamination issues associated with the wellbore itself and not the drilling pit. So it could be that.

You know, there were practices in the past at well sites. You know, again I don't, you know, vouch for any kind of environmental sensitivity in doing it, but they had spread salt and tankbottoms on roads, on pads with weed-control issues. So, you know, there's a number of things that could contribute beyond just the pit.

Q. But a lot of these well sites -- most of them are relatively remote, aren't they? They're not next to people's homes and private wells in most locations; isn't that correct?

A. There's wells in Hobbs in the city limits of Hobbs, I'm sure you're aware of that, that are, you know, close to businesses and homes. There's wells -- you know, when we say close, in proximity to someone's windmill. You know, what do you consider close?

Q. Well, I guess what I'm getting at, it doesn't sound like industry has actually undertaken any study to show that there is groundwater contamination or not occurring adjacent to the drilling pits. They're just saying that we don't know it's ever occurred, because the only way it ever comes to light is if somebody complains that a water well is contaminated.

A. Well, you know, I'd, you know, always presume that there was a presumption of innocence on people's part until you came up with that. I mean, if -- I'm sure if the OCD wanted to go drill wells around -- monitor wells around and look at them and see, and they discovered contamination, then you would have an issue.

But you know, why would I go out there and assume that I contaminated groundwater and drill wells? Why would I make that assumption and spend that kind of money? I don't see that, I'm sorry.

Q. Well, but this is landfilling, highly contaminated, salt-contaminated waste; isn't that correct?

A. In some cases, it's -- or burial. I don't know

whether I'd call it landfilling but, you know, it's a burial process on location. Some of it might be highly contaminated, some of it may not be. Again, it depends on the individual well of what the material is going to be in that deep trench.

Q. And in most cases of types of burial wastes and especially highly contaminated wastes, there's usually monitor wells put in to guarantee that groundwater is not contaminated, and there's -- But in the cases of these pits none of that's ever occurred; isn't that correct?

A. As far as I know, that's correct.

Q. And I think I just have one last question. I guess -- I'm just trying to make sure I understand the purpose of what's being presented here. Maybe that's going to come out with some of the other IPANM witnesses. But you're just presenting these different costs. I guess I'm wondering, what is the IPANM's proposal based upon costs of these different types of systems?

A. I really can't speak for IPANM on that issue but, you know -- and part of the reason I didn't tackle those particular economics was the fact that each company has their own level of risk that they can assume on their drilling process, and I'd have to let the individual companies discuss what impact it would have on them.

Q. Because what I see presented is a wide range of

costs. If I was assuming it was going to be based entirely on costs, the industry would want to keep the current method, that's --

A. Well --

Q. -- just -- I'm just trying to clarify what you're presenting.

A. If it were entirely on costs, I would say that's the case.

But I think the fact that there are a number of companies that are using closed-loop systems right now, a number of companies have gone to 20-mil liners, you know, even though the proposed rule hasn't gone in, that I've talked to, you know, deep burials has been a process, as opposed to just burying...

So I wouldn't say that all the companies are driven strictly by a cost consideration. Certainly cost is a factor, but, you know, there's other things entering into what's going on here.

Q. And then I guess, you know, the cost of remediation is quite substantial too for groundwater contamination; is that correct?

A. That's correct.

Q. So it's important to prevent groundwater contamination; is that correct?

A. That's correct.

Q. It's cost-effective to prevent groundwater contamination?

A. That's correct.

COMMISSIONER OLSON: That's all I have.

CHAIRMAN FESMIRE: Mr. Small, I'm going to be jumping all over, and I apologize for that, it's the way I took my notes.

EXAMINATION

BY CHAIRMAN FESMIRE:

Q. You mentioned water incompatibilities in response to a question from Commissioner Bailey, and you talked about some scales were remediable and some were pretty permanent problems. You mentioned barium sulfate, right?

A. Yes, sir.

Q. Where in New Mexico is barium sulfate a problem?

A. Monument field, I've run into it on a number of occasions in Monument, and down, I believe, in the Drinkard field there are some barium sulfate issues.

Q. Are they pretty concentrated locations?

A. Generally.

Q. So you know where that problem is going to occur?

A. I know where it has occurred. I don't know where it's going to occur, but I know where it has occurred, based on the history, yes.

Q. So for instance, if you were planning a program

you wouldn't haul water from there someplace else, because you might induce the problem of barium sulfate; is that correct?

A. That's correct.

Q. But, you know, it's not going to add to the problem if you use that same water in the same area; is that a pretty valid statement?

A. Yes.

Q. Okay, you mentioned that you were part of the prior process of rulemaking on pit rules; is that correct?

A. No, that wasn't on pits, that was on leak -- or spills, sorry.

Q. Okay, so you were part of that process?

A. Yes.

Q. What was that process? How would you describe it?

A. Long, tedious, drawn-out --

(Laughter)

A. -- very similar to what you're experiencing here.

Q. How did it start? Could you just give me a narrative?

A. The OCD had approached industry about, you know, a task force similar to what you had here of industry representatives, environmental representatives, public representatives and regulatory agency representatives, to

get together and look at the spill rules that was currently drafted -- or currently written, and see about redrafting it.

Q. Okay. Now you mentioned environmental representatives and other representatives. Who else was present on those commissions?

A. I couldn't give you names, but I know Dr. -- that's where I first met Dr. Neeper --

Q. Okay, was he the --

A. -- and then there was a Chris Shuey was involved, and --

Q. Who was he with?

A. Chris Shuey was with Southwest Environmental -- I'm sorry, it was something like that. He was very involved in most of the hearings.

Q. Okay. Other than those two, who else was involved? Do you remember?

A. There was a -- probably four or five industry representatives, and I think two representatives from the OCD.

Q. Who is Swaco?

A. Swaco is a vendor of the -- is -- you know, I'm sure they probably sell other things too, but in the context that I was looking and working with Swaco, they're the vendor for the solids control equipment for closed-loop

systems.

Q. Are they a reputable company?

A. I have no reason to believe they wouldn't be.

Q. Now, you mentioned one of the things that entered into your analysis was the higher cost of the availability of closed-loop equipment; is that correct?

A. Peripherally, yes.

Q. What do you mean, peripherally?

A. One of the operators I talked to in the northwest used a closed-loop system they had to import from Wyoming, and it cost, as I recall -- it was $14,000 transportation down, and then they were looking at moving -- having to pay to move it back to Wyoming. So you know, those are -- there wasn't anything available in the area, so that's where they had to bring the equipment in from.

Q. But you said in the latter part of your testimony that a number of companies were using closed-loop systems; is that correct?

A. Yes.

Q. Where are those systems coming from?

A. It's my understanding -- and again, you know, it's hearsay, so if you're going to object, object, but that the Cimarex -- I believe that's proper -- has their own systems, they have their own equipment, and using it -- the companies I talked to in southeast that's coming out of

Texas, out of Midland-Odessa area, when they can get it.

Q. In fact, a lot of oilfield equipment down in the southeast comes out of the Midland-Odessa area?

A. Quite a bit of it does.

Q. But there are companies now that are in New Mexico who are building or using their own equipment, other than Cimarex; isn't that true?

A. I couldn't vouch for that.

Q. Looking at Exhibit 13-8, in talking about your waste volume to hole volume ratios --

A. Yes, sir.

Q. -- I know we've covered this a lot, but I need to be real clear. What is that material except for -- One hole volume is cuttings, some additional part of it is sloughing. What is the rest of that material?

A. The rest of it could be, you know, cement residue from circulating the cement and the pipe, it could be, you know, additives to the mud system, if you're using weighting agents you're going to --

Q. Okay --

A. -- have solids --

Q. Yeah --

A. -- it could be a number of different things, depending on --

Q. Okay. Just talking about it, cement, that can't

be anywhere near one hole volume, can it?

A. No.

Q. Other solid- --

A. Well, wait a minute, wait a minute. I -- I mis- -- I'd have to sit down. I don't know whether it would or not. It would depend on how much cement the company circulated. You know, it could be, potentially, yes, I --

Q. Well, the company is not going to circulate too much cement. I mean, that's expensive. They just want to make sure they've got clean cement --

A. That's correct --

Q. -- to the surface, right?

A. -- that's correct.

Q. Okay. So they're not going to circulate anywhere near a whole hole volume?

A. That's correct.

Q. Okay. Other solids from the mud, how much does that represent?

A. I couldn't tell you. It would depend on the mud.

Q. Would you say it would be a hole volume over the whole well?

A. Yes.

Q. Would it be two hole volumes, do you think?

A. Potentially --

Q. Okay.

A. -- if you're keeping the reserve that you need, yes.

Q. So, so far we've accounted for about three and a half hole volumes, and yet your ratio here is as high as 22 to 1.

A. Well, as I mentioned before, a lot of that material is coming from that cleaning -- when you're taking up your pit, you want to pick up material from beneath the pit.

You know, I mean, I don't know of any operator who can just get under and scoop up the liner and the material and not get dirt with it. But you're also, as I mentioned, going to probably pick up additional material just to make sure when you run your closure analysis that you're clean, so you don't have to wait on analysis and then bring equipment back out.

One of the -- you know, I got to kind of -- you know, I was kind of like you, that, you know, looking at the numbers and, you know, I'm trying to vouch for them. And so I kind of went back a little bit to Mr. Rogers' paper where he talks about a 4.6 to -- you know, the ratio between the material from the closed-loop system and what you have, so I'm, you know, okay.

So 4.6, closed-loop, it's got to be coming from the hole, right? Or from your mud system. That's the only

place you're going to get it in there, in the cement.

So if I'm going to say, Okay, I'll buy that number and work with it -- and just out of curiosity, you know, again, I just did a little calculation. I went and I took that volume of dirt that, you know, I calculated, you know, for the pad. I used the cubic yards, that 647 cubic yards I talked about that I used, as being the contents of the pit.

And when I ran the numbers here I went ahead and got an average for hole volume in those 10 -- 75 -- 7500-foot wells, and I came out with 113.4 yards.

And I apologize, if I ever do a paper like this again I'll be consistent in the units, I will not work between yards and barrels.

But it came up with 113 yards --

Q. But -- Mr. Small, you've said enough to make my point here.

A. Okay, well, what you're -- what I came up with was 5.7 --

Q. Okay.

A. -- so my numbers are pretty close to their 4.8. So the only place -- you know, and that's assuming that you're pulling off the six inches, so that's --

Q. Right.

A. -- where it's coming from, yes.

Q. But what I'm saying is that a significant amount of the waste that you generate is the result of having to close the pit, right?

A. Correct.

Q. Okay. And that waste doesn't occur in a closed-loop system?

A. It does occur in a closed-loop system, underneath the drying pad, you know, we went -- you know, that's the -- what we were discussing before, that you have a drying pad, and the recommended -- again, Mr. Rogers' paper -- and, you know, people seem to like him, and he's one of the only people that's written a paper, but he's recommending -- he's put down a liner pad, and then you're going to put six inches of clay on top of that liner, and then you're going to put your cuttings on top of that.

So now you've got your cuttings --

Q. Let's stop there. That six inches of clay and your cuttings, that contributes to the 4.6 times the hole volume in that total waste calculation, doesn't it?

A. I don't -- it may, it --

Q. Yes.

A. -- yeah.

Q. So if you use the closed-loop system, you're going to generate considerably less waste, right?

A. You're going to generate less waste, yes.

Q. Okay, let's go to your table at 13-5 -- I'm sorry, that's the wrong table; 13-4 -- and when you compare off-site disposal in your four type wells, starting with the southeast 7500-foot well, you've got earthen -- under the earthen reserve pit, off-site disposal, commercial disposal facility, it's $75,500, right?

A. Correct.

Q. And you use that same volume when you compare it to a closed-loop system for off-site disposal?

A. Yes.

Q. Okay, well that might be correct at your 20-to-1 ratio, but what would that number be if we used, say, the 4.6-to-1 ratio?

A. I'd have to run the number.

Q. Okay.

A. I didn't run the numbers. You know, I'd just be giving you a wild guess here. I'd have to actually do the math.

Q. Would it be about three-quarters less?

A. Potentially.

Q. So if it's three-quarters less, three-quarters is $75,000. And please don't make me do the math, I forgot how to do it since I became a lawyer.

A. You're asking me to do it.

Q. But we're looking at about $55,000 out of that,

right?

A. Potentially.

Q. So if you take $55,000 off the $75,000 -- I mean off that cost, then suddenly it becomes much more economical to use the closed-loop systems, as long as you use an off-site disposal?

A. It gets closer, yeah.

Q. Well, we just said $55,000. $55,000 from $132,500 is certainly less than $99,500, isn't it?

A. Yes.

Q. Okay, so it is -- if you use the figures that other people have used, specifically the Rogers paper, it becomes much more economical -- as long as you have to use off-site disposal, it becomes much more economical to use a closed-loop system, doesn't it?

A. If you use those numbers, yes.

Q. Okay.

A. If you use those numbers.

Q. Okay. And again, you disagree with those numbers because you think that volume is going to be the same, in spite of what's been published in the Rogers paper?

A. Yes.

Q. Okay. Now you cited another paper, the World Oil paper.

A. Yes.

Q. How did that come out?

A. You know, that's pretty much the same paper. It's just what was published in the journal, as opposed to this is a presentation. It's pretty similar. I think the authors are -- you know, a lot of them are the same.

Q. Okay, so we can assume you did a pretty thorough search, and those were the two examples that you came up with, and both of them said that you significantly reduce the volume of the waste; is that correct?

A. Yes. But I would like to point out one thing. In their paper they studied three wells. That's all the wells that they had data at the time when they put their paper together. So all their calculations are based on three wells.

You know, I'm not saying because I used 15 I'm any better, I just -- I have a bigger database. But they used only three wells to come to their conclusions.

Q. Okay, Mr. Small, at that time they used three wells.

Cimarex does this pretty regularly, don't they?

A. I'd assume they -- I've not talked to Cimarex people. They had told me -- when we were at the IPANM meeting, their drilling engineer told me they still use reserve pits, you know, when they can if they're too far away from the disposal site. They're still using reserve

pits. They use them selectively, which -- as I said...

You know, don't get me wrong, you know. If you think I'm against closed-loop sys- -- I'm not against closed- -- I think they have applications and -- you know, I just don't think they should be bought across the board, because I don't think the applications are universal. I think there are applications for them.

Q. Okay. And you pointed out, they still use a closed-loop system, and -- I mean, they still use a reserve pit where they can bury the wastes on site; is that correct?

A. Yes, sir.

Q. I've got another math exercise for you.

A. Oh, man.

Q. What is the average depth of a pit, including the slopes? What -- If you were to just have a square pit, what would the average depth be? Fluid depth?

A. Oh, the fluid depth?

Q. At the maximum point in the --

A. At the maximum point it's most likely going to be probably six foot.

Q. Six foot.

A. Yeah.

Q. How deep are the tanks used in a closed-loop system?

A. I couldn't tell you off the top of my head.

Q. Would they be over eight foot?

A. Probably.

Q. Okay. So I guess the problem I'm seeing is, we're arguing that the average pit, not including freeboard, has a six-foot maximum water -- fluid depth.

If you line up a bunch of eight-foot-tall tanks, how is the footprint of those tanks going to exceed the footprint of the pit?

A. How is it going to exceed -- it would -- The only way it'll exceed it, if you have more tanks than what you have --

Q. More fluid on location than you could have --

A. Right.

Q. -- in the pit?

A. Right.

Q. But for an equal volume of fluid, you know, eight-foot-deep tanks, as opposed to -- eight-foot usable tanks, as opposed to six-foot-deep pit, how do you get a greater footprint from the tanks than you do from the pit?

A. You wouldn't necessarily get a deeper -- or a bigger footprint, no.

Q. I've got to make an admission here. I have never drilled a closed-loop well onshore. I have been on offshore rigs where they were using closed-loop systems,

and they had in those systems a de-gasser. Is that not part of the closed-loop system here?

A. I've not heard anybody mention using a de-gasser, but -- you probably could, but I have not heard anybody mention using a de-gasser.

Q. Okay. And are the tanks in a closed-loop system closed?

A. No.

Q. Okay, they're open to the surface?

A. Correct.

Q. And you mentioned one of the safety concerns was a concentration of explosive gases.

A. Yes.

Q. How would that occur?

A. In an open-top vessel, you know, whether it be a tank or something like that, you've got the -- you know, the walls are going to impede any kind of air movement across it, and H_2S is a gas that's heavier so it's going to tend to settle on top, and you won't be able to get a good air flow across it to clear it out, whereas in a reserve pit it's a lot more open, you know, air can move across it and move it away and, you know, keep it from concentrating.

Q. Okay. I see your point on the H_2S, but that still doesn't answer the question about how does that cause an explosive hazard --

A. Well, it --

Q. -- with an open-top tank?

A. -- okay, if natural gas accumulates in the top of those tanks, you're going to have the same thing. As it breaks out of the fluids in those tanks, there's going to be a concentration right in at the top of those tanks.

The potential fire hazard -- you know, whatever equipment on location could cause that, lightning storm or whatever, you know --

Q. But wouldn't --

A. -- ignition source. I don't know where you necessarily get that from.

Q. But wouldn't you have that same risk in a pit?

A. Again, when you have air moving across the pit, you know, it dissipates the -- so it's not concentrated. Yeah, I mean, you will have some, but it is not concentrated like it would be in that tank, in that headspace in that tank. And I realize it's not got a cap on it, but you still have a headspace between the top of the fluid and the top of that tank wall, and whatever is going to accumulate is going to accumulate right in there.

Q. Have you ever known an explosion to occur in an open-top tank?

A. Yes.

Q. Where's that?

A. Down in Monument, there was a lightning strike on an open-top tank.

Q. What was in the tank?

A. Oil, and then the vapors, the gas vapors.

Q. But not drilling mud?

A. Not drilling mud, no.

Q. Now you've done a lot of workovers, you mentioned; is that correct?

A. Yes, sir.

Q. And when you do a workover, you use a reverse unit, don't you?

A. Yes.

Q. And the tanks associated with the reverse unit, you don't generally suck out of the pit when you're doing a workover --

A. No.

Q. -- do you?

You generally use what is essentially --

A. Well, excuse me, it depends on -- you know, when you're talking workovers it depends entirely on the workover. If you're using a reverse unit in your workover, you're correct, where you're going.

Q. Okay. And the only reason that you would have a pit in a workover is for waste disposal; isn't that correct?

A. I'd say that in most workovers that would probably be right. But I can think of drillouts, if you were doing a drillout of a well, you know, maybe cleaning drilling cement out or something, you might also use it as a reserve pit, just like you would a drilling pit.

Q. Okay. But for the most part closed-loop systems aren't anything new to industry, they've been using them for workovers in this part of the country for years, right?

A. Well, closed-loop system in the sense of the tanks, not -- you know, when we're looking at the regulation we're talking tanks, but a closed-loop system, if you're bringing in solids-control equipment, you know, that -- then that's not been commonly used.

The tank -- you know, steel tanks have been used, you know, they have. That's where I've used them.

Q. Now you were talking about -- your economics and the analyses you did are all based on single wells, they're not on multiple-well programs?

A. Yes -- well, if you say one or two wells, you know -- you know, not a -- not a five-well program or anything like that. One or two wells, yes.

Q. For development wells -- and most wells we drill in New Mexico are development wells, right?

A. That's probably a reasonable assumption, although when you say most, you know, I couldn't -- you know, I

don't have the numbers, so I can't give you a breakout, but I'd say there were more development wells drilled than there are wildcats, yes.

Q. And most companies, when they're going to drill development wells, they contract a rig for multiple-well programs, don't they?

A. Yes.

Q. So when you contract a rig for multiple-well programs, why can't you build a mud system for multiple-well programs?

A. You probably could in some cases, and I think companies -- there's companies doing that in New Mexico. I mean, they're -- you know, they are -- there are people already doing that, where they can recycle.

You know, again, it depends on what happens to your mud when you're drilling, you know, how degradaded [*sic*] it becomes and how much reconditioning you have to do, because if you have to do a lot of reconditioning the cost advantage starts going away. So then you start looking at just going ahead and getting new mud out there and disposing of the other.

So you know, it certainly can be done. You know, I wouldn't say it can be done everywhere, but it certainly can be done, yes.

Q. Okay. Now your costs -- they're based on 12-mil

liners, right?

A. No, twe- -- the -- the current -- ?

Q. Yes.

A. Okay.

Q. And you know that one of the proposals in the proposed rule is to require 20-mil liners?

A. Yes, it is.

Q. In answering one of your questions -- and I didn't write down who asked it -- you said one of the things that you were confident about is that a 20-mil liner wouldn't leak. Is that a correct quote?

A. My confidence is based on the task force finding because, you know, to be honest with you, I had not studied liners. But you know, I sat in on a task force meeting or two where liners were discussed and, you know, I have to make the assumption that because the task force felt comfortable with a 20-mil liner as being protective for the environment, then you all must believe it too.

So I can buy that if everybody's on board with it and says that's fine, I'll abide by the task force findings, so yeah, that's good.

Q. Okay. Now you said that in your experience you had never seen groundwater contamination caused by a drilling or workover pit; is that correct?

A. That's correct.

Q. Are you -- Were you present in earlier testimony in this case where 10 examples of groundwater contamination caused by drilling and workover pits in the last year and a half were presented?

A. I wasn't here.

Q. But that would surprise you?

A. It would surprise me.

Q. Why is that?

A. Because it's just -- they're such a short-lived pit, you know, that generally -- you know, again speaking from ones I've had experience with, they're dewatered so you're not having -- keeping that head on for the long period of time.

Where I've seen contamination issues in the evaporation pits, those pits were open, you know, maybe 10, 15, 20 years with fluids in them a lot of the time, and so there was a lot of potential exposure there, where I think in the drilling pits it's usually a much shorter-duration exposure.

Q. Well, if you don't remove the waste, aren't we just talking about a matter of time?

A. Not necessarily, not necessarily. I -- I was looking at the way you all are recommending closure with the liner on top, which, you know, basically you're capping it and putting an impervious system up there to keep it

from coming in contact with any kind of leaching fluid. So there's no -- there shouldn't be any way for that leach once you put that cap on.

If you keep the thing open, you know, and you were to leave it open for, you know, a lot of years and collected a lot of rainwater -- which isn't going to happen in the southeast, but if it were, then you would have an analogous situation, yes.

Q. What happens if the liner fails?

A. If the liner fails and you close it the way you're recommending with a barrier, impermeable barrier on top --

Q. No, I'm talking about the liner that you use as the impermeable barrier --

A. Well, I'm talk- -- well, I'm talking the way you're recommending closing it. You know, I think your -- what do you call it, the burrito? Is that right? Something like that. I think I read that in the paper.

But the -- It's a total system. You've got the liner in the bottom. You know, if it were to fail and yo had nothing on top and it was raining and you had water leaching through it, you'd get some contamination, leaching out of that pit.

But as long as you have that impermeable barrier on top, which is what they use in most landfill closures,

is some type of impermeable barrier on top to prevent leaching, no, you should have any problem. It should stay right where it is. It's a solid material.

Q. For your four type wells, did you go ahead and do a total cost estimate on those wells?

A. No, I didn't.

Q. Yet we've used the figure 8 to 10 percent increase in costs for closing it as this --

A. Yes.

Q. -- as this rule recommends. Is that pretty accurate?

A. I think it's a reasonable number, yes. It's going to obviously vary, you know, drilling costs aren't all going to be the same, and these costs are -- you know, these are representative and, you know -- obviously, you know, if someone's going to say -- if I'm going to go out and drill a 7500-foot well, this exactly what I'm going to run into, I'd say, well, you'd better check your own -- do your own calculations and convince yourself you're comfortable with.

But I'd say those numbers are probably, you know, reasonable, yes.

Q. Okay. So the increase in the cost of drilling the well will be between 8 and 10 percent on an average well?

A. Correct.
Q. It will vary depending on where it's at --
A. Yeah.
Q. -- and how deep --
A. Sure.
Q. -- the well is, but we're talking 8 to 10 percent?
A. (Nods)
Q. Okay, and the AFEs for these wells are prepared -- did you say a year in advance?
A. Yes.
Q. Let's talk about an oil well down in the southeast.
A. Okay.
Q. Does that 8 to 10 percent still -- still hold?
A. Oil well, probably.
Q. Okay.
A. I think -- I think it would be reasonable to say it's going to be in that range.
Q. Now if I remember from my days back at Texaco when I used to have to call you for advice, you take the AFE and then you run economics on it --
A. Yes.
Q. -- right?
And do you have an oil price in that economic

evaluation?

A. (Nods)

Q. And this was done about a year ago. What was the price of oil a year ago? Do you remember?

A. Probably in the $60 range.

Q. And what is the price of oil today?

A. Pushing a hundred, $98 -- I didn't look this morning whether it was $95, $96.

Q. So we're talking about a 65-percent increase?

A. Correct. What do you think it's going to be next year?

(Laughter)

Q. That's a good question.

A. Is it going to be back to $60, or is it going to be over $100? You know, that's --

Q. Let's --

A. -- that's what --

Q. -- let's explore that, then.

A. Okay.

Q. Okay. That wouldn't apply to the northwest, because basically that's a gas province, right?

A. Correct. Well, they've got oil wells up there too, but primarily gas they're looking at, that's right.

Q. Do you know what BTU parity means?

A. I'm sorry?

Q. Do you know what BTU parity means?

A. How are you using it?

Q. In comparing the price of oil and gas.

A. Okay, yes.

Q. Okay. And generally the BTU equivalent is 6000 cubic foot of gas per barrel of oil; is that --

A. I'll take your word for it. You know, I'm not going to pull that number out of my head, but I'll take your word for it.

Q. Is that a number you're comfortable with?

A. Yes.

Q. Okay. If the price of oil comes down to $60 a barrel, at BTU parity what's the price of gas going to be?

A. You know, BTU parity, I -- now you're talking natural gas --

Q. Yes.

A. Okay, if you're -- your natural gas is -- is just like oil, it's -- it's driven by demand. So if the oil price comes down, gas price doesn't necessarily track it and come down. Gas price may go up, you know, if you have a cold winter, you know, other disruptions in your gas, it's going to go up.

The same with the recent oil fluctuations, there's fluctuations in there that you can't determine --

Q. Exactly.

A. -- which are going to come --

Q. But even if oil were $60 a barrel --

A. Uh-huh.

Q. -- at parity gas would be $10 an MCF, right?

A. If you're using your number.

Q. Okay. Now you mentioned a number of companies were using closed-loop systems and 20-mil liners, and you said they weren't necessarily cost-driven. Aren't all companies cost-driven on the long -- I mean, when you come right down to it?

A. They're cost-driven, but they're -- yeah, there's also -- you know, a lot of companies are adopting, you know, a green outlook because, you know, Wall Street dictates that in a lot of cases. You know, you want to sell your stock, but a lot of people won't buy it if they don't think you're at least proactive in heading that direction.

So I'm not going to say they're just purely altruistic on -- altruistic on the part of the company. But I do know a number of people working for the company that are very concerned with the environment and are willing to go ahead and spend the extra money if necessary.

Q. And the reason -- I think I understood you to say, the reason that they go ahead and spend that money is because it increases the value to the shareholders or the

owners to do it right; is that correct?

A. Not necessarily. It could. It's a question of the perception, you know, the public has of a company. You know, if it -- the company perceives you as being -- or -- if the public perceives you as being, you know, a bad player, not being above board, then the public takes it out on a company.

So it's -- it -- and -- so it's a public perception thing, as well as, you know, stock. Yes, there is a value to being green, yes --

Q. Okay.

A. -- if that's what you -- I assume that's what you're probably wanting to get out.

Q. Now any increased costs associated with what this rule -- any increased costs created by this rule, they would be intangible drilling costs, wouldn't they?

A. Yes.

Q. And after years of running economics, what's the effect of the -- being able to write those costs off 100 percent the first year?

A. Well, it's obviously a tax advantage.

Q. So it's a reduction in the cost to the producer in this case, right?

A. Correct.

Q. Are you familiar with the term hurdle rate?

A. No, I'm not.

Q. Sorry, I found a whole new page of them.

Mr. Baizel and Commissioner Olson both hit this, but I think I'm going to ask it anyhow.

The costs -- the increased costs under the proposed rule -- well, let's talk about the costs under current conditions. They include no cost to remediate the pits where the liner has been breached or where there's a release; is that --

A. That's correct.

Q. And Commissioner Olson covered this, but I do want to ask again.

The costs to remediate a pit are pretty substantial, aren't they? The costs to remediate any kind of release from a pit?

A. Yes.

Q. They're much more than the cost to prevent it in the first place, aren't they?

A. I'd say that's reasonable.

CHAIRMAN FESMIRE: That's all the questions I have.

Ms. Foster, would you like to take a break before you begin your redirect?

MS. FOSTER: Yes, please.

CHAIRMAN FESMIRE: Okay, why don't we take a 10-

minute break and reconvene at 25 till?

(Thereupon, a recess was taken at 10:25 a.m.)

(The following proceedings had at 10:40 a.m.)

CHAIRMAN FESMIRE: Okay, let's go ahead and go back on the record.

Again, let the record reflect that this is the continuation of Case Number 14,015, that all three Commissioners are present, we therefore have a quorum.

And I believe we were about to start with the redirect examination of Mr. Small.

Ms. Foster, are you ready?

MS. FOSTER: Thank you, Mr. Chairman.

REDIRECT EXAMINATION

BY MS. FOSTER:

Q. Mr. Small, I'd like to start off, since a bunch of people asked you about this, about the -- estimating the cost of remediation. Do you remember those conversations that you had?

A. Yes, I do.

Q. When you prepared an AFE -- which I believe Mr. -- Commissioner Fesmire stated he had prepared AFEs in his lifetime as well -- did you estimate the cost for a potential failure on your systems?

A. No.

Q. And why was that?

A. That's a very high degree of uncertainty associated with that, you know, the degree of severity of any kind of a failure where that would enter into it.

Q. All right. In fact, in the systems that you've worked on, did you have any failures on the systems that you worked on, and did you work those costs in?

A. Could you define system? I'm sorry -- when you're saying systems?

Q. Well, in your testimony you stated that you had done some completions and some workovers and worked on very many different systems.

A. Okay, okay.

Q. When you prepared the costs for those systems, did you work in a cost for failure?

A. No.

Q. Did you work in a cost for a potential remediation?

A. No.

Q. And did you see any failures in the systems that you worked on that remediation would be needed?

A. No, other than, you know, small spills on site that, you know, you could clean up with, you know, just front-end loaders, scoop them up. No, I -- I never saw anything that would be significant cost-bearing on it.

Q. And in your experience now as an environmental

consultant, you said that you worked on some pit remediation projects?

A. Yes.

Q. Could you guesstimate in your professional opinion what percentage of drilling pits actually have failure that would need extensive remediation?

A. The -- As I stated before, I have not experienced a drilling pit that we had to do any kind of remediation, you know, as far as contamination beneath the pit or anything.

Q. Okay. Now when you say remediations, is that doing more work than just cleaning up a spill, for example, on the surface or on the vadose zone?

A. Not really. In the southeast it's a lot of dig-and-haul, so it would be very similar to those.

A true remediation project would be -- in my mind, would be an on-site situation where you might use bioremediation techniques, maybe, you know, a leach process for salt contamination. So that would be a remediation project.

We call it -- they end up being called remediation, but dig-and-haul is an accept- -- you know, I guess an accepted method of doing it, but that's what you would do with a spill too.

Q. All right. Now, moving to Mr. Rogers' report,

Mr. Rogers is with Cimarex, is he not?

A. Yes, according to the report, yes.

Q. All right, and I'd like to talk about this 4.6 number that I believe Commissioner Fesmire addressed.

Looking at the last page of the text on Mr. Rogers' report, the paragraph before the section entitled, Effect on Drilling Costs, do you see that?

A. Yes, I do.

Q. Okay, it talks about the 4.6. Could you read the sentence that starts with Figure 7?

A. Figure 7 shows one pile quantity estimation diagram for the new system.

Q. Next sentence?

A. Pardon me?

Q. If you could just read to the end of the paragraph.

A. Oh, okay. The volume of cuttings estimated in the pile is 819 cubic meters. This represents a ratio of 4.6 times the gauge hole volume. This is dramatically lower than the 21.6 ratio of hole volume for cuttings and fluid left in the pit for disposal under the previous operating mode.

Q. Okay. And so this paper describes how it is that he, Mr. Rogers, gets to his 4.6 times volume, correct?

A. Correct.

Q. And is this paper actually based on -- did he actually arrive, in reality, using -- did he actually arrive at the 4.6 in actuality, or is this just theoretical?

A. I'd say it's probably theoretical.

Q. Okay. And how many wells does this paper actually address?

A. The paper addresses three wells.

Q. All right. And the 4.6 volume, what level of efficiency is that on the equipment in terms of the drying efficiency? You can look at -- I'll direct you to figure 1 in his document.

A. Figure 1, 4.6 would be about -- probably around 80 percent, between 70 and 90 percent.

Q. Okay. And how is it in a closed-loop system that you can achieve such high efficiency?

A. I believe they used two Cyclone de-sanders with centrifuges to get that in the paper.

Q. Okay, directing you to the section, Eliminating the pit, if you could just read through that and tell us what type of equipment was used.

A. Okay, I --

Q. Start at the paragraph on the bottom, it --

A. Okay.

Q. -- outlines the equipment.

A. The A system has been -- Is that where you want to start?

Q. Yes.

A. A system has -- has been developed and used by Cimarex in New Mexico that can process --

Q. Mr. Small, you can just read it to yourself and just --

A. Oh, okay.

Q. -- tell us what it -- what it makes reference to in that paragraph.

A. Okay, I -- okay.

Okay, they're using two shale shakers, and one is a 175-mesh, one is a 200-mesh. They're also using a mud cleaner to process the fluid, and the mud cleaner consists of de-silting hydrocyclones over shale shaker. It's plural, so I would assume that there's two.

Q. Anything else?

A. They've got the centrifuge. That's another Cyclone. They're using chemical flocculants.

Q. Okay, and they're also using a mud dewatering --

A. Yes.

Q. -- right?

Okay. Now looking at figure 9 in Mr. Rogers' paper, that's a cost comparison -- theoretical cost comparison for the closed-loop system, correct?

A. Yes.

Q. Could you tell us, looking at that figure, what the cost was for solids control equipment that you just listed?

A. They had a low cost, $100,000, and a high cost of $127,000.

Q. All right. And moving to your numbers, what was the cost of the closed-loop equipment, generally?

A. Let me go back. Too many numbers in my head, I'm sorry.

For a deep -- or the 7500-foot well it was $57,000, and -- for the total equipment package. And then for the shallower well it was $33,500.

Q. Okay. And what equipment did you actually use on -- in your figures, in your modeling?

A. I used a shale shaker, I used one dehydrator, cyclotron -- or Cyclone dehydrator, de-sander and had tankage.

Q. Okay. So the Cimarex figures are twice the cost for equipment --

A. Yes.

Q. -- for the closed-loop system?

A. Yes.

Q. And if you have that much more equipment would you expect a higher efficiency rate in drying your

cuttings?

A. Yes.

Q. Now, looking at figure 4 in Mr. Rogers' report, could you describe to the Commission what figure 4 is?

A. Figure 4 is a representation -- or a picture of a drying pad.

Q. Okay, and are there cuttings on that drying pad?

A. Yes, there are.

Q. All right, and could you describe for the Commission what you see when you look at that picture in terms of drill cuttings?

A. They're stacked up, you know, fairly deep. You know, I can't really guesstimate from that, but they -- they're pretty well exposed to any kind of a weather event.

Q. Now -- Okay, exposed to a weather -- what do you mean by that? Looking at that picture.

A. If you had a very heavy rain out there, most likely that material would wash off of that pad and get into the area around it.

Q. Okay, is there a berm around that pad?

A. No, there isn't.

Q. All right. And you can see from the picture that it's actually on some plastic, correct?

A. Pardon me?

Q. You can see from the picture that it's actually

on a liner?

A. Yes.

Q. Now the disposal costs that you had for both the drying pad as well as a pit included a discussion of removal of six inches beneath the pit.

A. Yes.

Q. Why is it that you worked that into your costs?

A. It's -- it's in there because when you're taking up that liner and the material, it's very difficult to do that without some spillage, whether it's going to be this or it's going to be a pit. There's going to be a certain amount of spillage as you're taking it up.

If you leave that contamination behind in that dirt, then you're going to have to noti- -- when you do your testing of your area beneath the pit, you're going to sample it, and if your sample comes out, you know, too high to close according to this pit regulation, then you're going to have to come back in and do a lot more digging.

Q. Okay. But are you saying that that six inches is specifically intended, or is that an unintended consequence of using a 'dozer out there and removing the liners?

A. It's probably a little bit of both. It's unintended because there's really no way you're going to be able to just get underneath that liner and pick it up, so you're going to have to pick up a certain amount of dirt

with that anyhow, and then -- you know, and again, talking to operators, a lot of them will take out a little extra just to make sure they've -- they've got a clean location underneath when they do the test.

Q. All right. And the cost analysis that you did, where on the range of conservatism would you think that range -- that your report comes?

A. I'd say again, in discussions with the operators in the southeast, northwest, mine are probably pretty conservative cost estimates.

MS. FOSTER: Okay, thank you.

Mr. Chairman, at this time I would -- I neglected on my direct to move Exhibit Number 13 into evidence, so I would move it into evidence at this time.

And I have no further questions of this witness.

CHAIRMAN FESMIRE: Any objection to Exhibit 13 being admitted?

MR. BROOKS: No objection, your Honor.

MR. JANTZ: No objection.

MR. HUFFAKER: No objection.

MR. CARR: No objection.

CHAIRMAN FESMIRE: Seeing no objection, Exhibit 13 will be admitted to the record.

Are there any further questions of this witness, solely on the subject of the recross-examination [*sic*]?

MR. BROOKS: Yes, your Honor.

RECROSS-EXAMINATION

BY MR. BROOKS:

Q. Mr. Small, you said one of the reasons you didn't include the costs or liability associated with a potential cleanup was that there was a very high degree of uncertainty in assessing those things; is that correct?

A. Correct.

Q. Okay. There are other things that go into the economic analysis that have a very high degree of uncertainty, are there not?

A. There are costs you know you're going to incur. You may not be able to pin it down exactly, but there are costs you know you're going to incur. You know, spill, remediation, whatever you want to call it. You don't know that that's going to occur, and you plan for it not to occur, so you wouldn't include that.

Q. Over a large number of wells, though, isn't there some kind of probability that it's going to occur in some well or other?

A. I guess that's a fair statement. I mean -- you know --

Q. And likewise, for instance, your estimated ultimate recovery for your well, which is the basis for your economic analysis, is subject to a high degree of

uncertainty, is it not?

A. It has a certain degree of uncertainty, yes.

Q. Okay. Let's see, there was some mention of the fact that you had used three wells -- that Mr. Rogers had used three wells in his analysis, and your computations on your chart -- on page 8 of your paper, used a larger number of wells. I'm not going to ask you anything about the computations, just -- none of those wells used closed-loop systems, correct?

A. None of them used closed-loop systems, that's correct.

Q. Okay. The -- Ms. Foster asked you some questions about Rogers' estimates in his figure 9, and -- figures 8 and 9. Now, he came -- his conclusion was -- no, I -- Let me pass that. I'm going to try another question, if it was a question.

Okay, now your picture about the drying pad that you didn't have berms and so forth --

A. Yes.

Q. -- you showed that -- that was one of the pictures in the Rogers article?

A. That's correct.

Q. I think you've testified that it would be prudent to berm it. However, isn't it true that the drying pad waste is going to be -- is not going to have free liquids

in it?

A. No, that's not true. Matter of fact, one of the statements he makes in his paper, that the reasons for using clay and for using the liner pad underneath it is to trap any free liquids that might drain from the material.

Q. Well, let me amend my statement. It is not intended that it have a large volume of free liquids --

A. No.

Q. -- as a pit would?

A. Right.

Q. So you're not probably going to have a large-scale flow off the drying pad, as you would with a pit?

A. That's not necessarily true. You know, if you have a heavy rainfall -- and it's not uncommon to have a two- to three-inch rainfall -- that stuff will turn to a slurry, it's -- you rehydrate it, essentially, into a slurry, and it's going to run right off the location. I mean, this -- you can look at the angle. That's not a two-to-one angle on there, that dirt there, so -- you know, that dirt's going to wash right off. It's just an erosional process, just like...

Q. Okay. Now I think I understand again the question I was going to ask, which is just a summary question here.

Tables 8 and 9 of the Rogers paper were

constructed to compare the cost of a closed-loop system versus the cost of using a pit; is that correct? Table 8 has the pit construction cost.

A. Yes.

Q. And in each case, the Rogers article, when they total up all the costs, they show a lower cost for the closed-loop system versus the pit, correct?

A. That's correct.

Q. Unlike your figures, which show a higher cost --

A. That's correct.

Q. -- for a closed-loop system?

Now just in summary, and I don't want to go over these figures because I don't want to take the time to go over all these figures, but wouldn't it be fair to say that the Rogers article uses, for whatever reason, considerably higher figures for a number of cost items --

A. Yes.

Q. -- than you did? In both the pit and the closed-loop --

A. Yes.

Q. -- system?

MR. BROOKS: I think that's all I have. Thank you.

CHAIRMAN FESMIRE: Commissioner Bailey?

COMMISSIONER BAILEY: No more.

CHAIRMAN FESMIRE: Commissioner Olson?

COMMISSIONER OLSON: Just a couple of questions.

FURTHER EXAMINATION

BY COMMISSIONER OLSON:

Q. Mr. Small, you were mentioning that there was no failures of systems that you'd worked on for drilling pits. I guess -- are you referring to short-term failures of just while the pit was in operation?

A. Yes.

Q. So you're not referring to the long-term burial of these wastes and not seeing impacts from long-term burial of drilling wastes?

A. I hadn't seen any impacts, but that -- you know, when I was referring to what I had seen as far as failures, it was while they were in use, correct.

Q. And was there any sampling done to confirm that there was not releases from them?

A. In the later ones where we -- you know, the -- 15 wells there and then some others, yeah, we did the post-removal sampling that the OCD is request -- or was requesting at the time, was going to require for chlorides, BTEX and TPH, and they were clean.

Q. Okay. And then in terms of the long-term burial where you're saying you haven't seen any problems from those, I guess I come back to, I guess, the questions I was

asking earlier, though. At those sites, though, you never actually -- at any long-term sites, you've never actually installed monitor wells to see what the impacts are from long-term burial?

A. No.

Q. Okay. And then just one last question.

We talked a lot about this waste generation, and the question was coming up again. You were mentioning in your testimony that there are people drilling with closed-loop systems.

Did you actually contact them to find out how much waste they're actually generating --

A. Yes.

Q. -- so we can look at actual waste generation?

A. I did contact them.

The problem you get into in most of them, you know, is anedocal [*sic*]. They're saying they're generating as much or more, but they don't quantify it, you know.

So that's why I didn't use, you know, numbers that would have, you know, raised my costs up, because I didn't want to use, you know, just one or two well anedocal situations.

If they had measured volumes, then I could have used it.

Q. So you just couldn't get any measured volumes

from the --

A. No.

Q. -- folks that --

A. No.

COMMISSIONER OLSON: Okay. That's all I have.

CHAIRMAN FESMIRE: I have no further questions.

MS. FOSTER: I'm shocked. I'm sorry.

(Laughter)

CHAIRMAN FESMIRE: I gotta respond.

(Laughter)

CHAIRMAN FESMIRE: I will agree with you on the first premise. On the second one, that's probably correct.

(Laughter)

CHAIRMAN FESMIRE: Ms. Foster, do you have your next witness?

MS. FOSTER: I do.

CHAIRMAN FESMIRE: Thank you, Mr. Small.

MS. FOSTER: Mr. Chairman, Commissioners, at this time we would call Al Springer to the stand.

CHAIRMAN FESMIRE: Mr. Springer, would you raise your right hand and be sworn, please?

(Thereupon, the witness was sworn.)

MS. FOSTER: So that the Commissioners can get to the right point in your book, Mr. Springer will be talking mostly about Exhibit 22.

MS. FOSTER: Good morning, Mr. Springer.

THE WITNESS: Good morning.

MS. FOSTER: Mr. Chairman, may I commence?

CHAIRMAN FESMIRE: You may, ma'am.

MS. FOSTER: Thank you.

AL SPRINGER,

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

DIRECT EXAMINATION

BY MS. FOSTER:

Q. Mr. Springer, if you could please state your name and your background for the Commissioners and for the record.

A. Al Springer, I've got a degree in aerospace engineering from the University of Colorado in '73, I've got two years of postgraduate work at Colorado State University in structural analysis.

I got in the oilfield in approximately '79. I worked for Schlumberger Well Services as an open-hole log engineer for about two years.

And in 1981 I went to work for Yates Petroleum. As an engineer the first year, I worked primarily doing reservoir studies. Second year was completion design for wells. And about three years into the program they asked me to take over the drilling department, so I became

superintendent for Yates Petroleum at that time.

And we were quite busy, we were operating as many as 27 drilling rigs at a time back in the early '80s. That was in about '82, '83.

I held that position where I did all the engineering, primarily, for all the drilling. I had anywhere from five to eight drilling foremen that worked for me, and they stayed on the locations and they drilled the wells.

We drilled primarily in southeastern New Mexico, we drilled a little bit in the Farmington area, the Four Corners area, we drilled a fair amount in Wyoming, and we have drilled spotted wells in Texas, Louisiana, Nevada, Utah and Colorado, California. Kind of hit quite a few of them, but most of those have been one or two wells, outside of New Mexico and Wyoming.

I did that job until about 1996, when I requested to get out of the operations side of it. I'd kind of gotten burned out running all that stuff by myself, so I asked to take over the engineering side of the drilling department, so I had engineered. I basically trained new engineers, drilling engineers, for the company, and we also did all the well design for the drilling for all of the company and all over the country.

Did that until about a year ago, and we've kind

of re-organized again, and they took all my people away from me, and they call me senior engineering advisor now, so I get to play around doing stuff like this.

Q. Okay, and did you actually put together Exhibit 22 for purposes of this hearing?

A. Yes, I did.

Q. And so therefore you're familiar with it?

A. Yes, I am.

Q. All right, looking at Exhibit 22, then, if you can just pull that up on the screen. Thank you.

Okay, why don't you, using the narrative form -- if it's okay with the Commission, I would like to have this witness using the narrative form go through the slides.

CHAIRMAN FESMIRE: Sure.

THE WITNESS: Okay, what this is meant to be originally, and still is, is basically a primer for a lot of people here that may not understand the operations of the two basic systems, those systems being general circulating systems that's been used, you know, in the oilfield for many, many years, and the closed-loop systems and some of the variants that come from that.

We're going to look at the two systems, one, the conventional drilling system which uses an earthen pit. And we call it a reserve pit for a good reason.

And the other system is going to be closed-loop

system. The systems are really pretty similar except for the closed system, closed-loop system, does not use an earthen reserve pit. The similarities and dissimilarities we'll get to as we go through.

On the conventional system I'll go through the components, some of the different stages of circulation that we go through, where the cuttings go and the actual footprint.

In this particular site -- this is just a kind of an introductory slide to show you how the system works. I think most of you are familiar with the process.

But you can see, right up here is the mud pumps. We draw from our reservoir, either the steel-pit reservoirs here, which we can circulate, or from the big earthen reservoir. We draw fluid from that, that's pumped up through the kelly and the kelly hose down the hole, where it collects cuttings and when we have drilled upwards a bit, it brings them up the annulus. And they flow back, either over a shale shaker, and the cuttings go out to the reserve pit, or directly to the reserve pit, which takes the mud and the cuttings to the reserve pit.

Those are the two different types of circulation systems. Let's see...

When it comes to the size -- size and -- the rig and the location, the primary function I think that we take

into account is the depth and the number of casing strings, the hole size. There are other issues that we have to take into account when we're sizing these reserve pits and the equipment also.

And some of the problems that we run into in southeast New Mexico, which is what I'm going to be talking about primarily, is in the shallow formations we have a problem with water flows sometimes, saltwater water flows. We also have a bad problem with lost circulation in the shallow formations.

One of the nice things that having a reserve pit gives us is the ability to have a large capacity, both to have on hand for lost circulation, and also it gives you a large capacity should you encounter severe water flows, which are not uncommon, particularly saltwater flows.

Coming to this next slide, I've broken it up into two different circulating systems, so...

The top system, the reason why we break it up -- and some people may wonder why the big reserve pit and why we circulate through that. And the reason why, I would say generally in southeast New Mexico we drill the first half of our hole on clear water, we try to drill it on clear water. The surface holes are on fresh water. That doesn't mean that they stay clear, because they do gain mud as we drill through the clays in the earth. That goes into

solution in the mud. That comes up.

And what the reserve pit does is allow us a simple, easy way to circulate around that pit. As you can see in this top diagram here, we're coming up out of the hole right here, and we're going right out into the reserve pit.

As this goes around -- and you've heard this before -- these cuttings and these fine silts drop out. By the time it gets back over here it's relatively clear again. And then it's picked up by the pumps and pumped back down the hole.

We're not adding any muds, anything to the chemicals other than basically what is obtained by the earth itself, because generally we like to keep the weight low. So there is no reason to try to go into the working pits, as we call it, these steel pits right here.

Now as we get down further and we have a need to go from a water-based fluid to a mud -- and what we're looking for when we go to a mud system is, we're looking to control certain things.

So we're looking to control the weight, to control influx or the loss of fluids from the wellbore or into the wellbore, we're looking to control the viscosity, which is generally controlled by how much clays you have, or polymers you put in the mud. That helps you lift the

cuttings up out of the hole. And we're also trying to control water loss, which prevents seepage of fluids into the formation as you drill.

When we get to that point where we need to control those parts of the mud system, we go into the working pits, then we quit circulating the whole reserve pit here. We then start circulating through this system here, which is not unlike a closed-loop system, except we still have our earthen pit here.

What happens now is, we're coming up over here. Rather than putting our mud and our cuttings directly out to the reserve pit like we do up here, we come over the shale shaker. That's a series of screens. The mud goes through these screens, the cuttings are separated from them. The cuttings then are shook out into the reserve pit. The mud, the liquid part of the fluid is dropped down into the system, it comes over to another compartment where you may have more cleaning equipment.

Often, the wells that we drill -- and I'm going to use some examples -- the wells we drill mostly are in the range of 9000 to 13,000 feet in southeast New Mexico, and...

So we have a fair amount of equipment. We have de-silters, de-sanders and mud cleaners on there. And so we do a cleaning process as we go through this series.

The only thing we're using our reserve pit for at that point is safety, in case we do get flows or kicks. That gives us a buffer, that gives us room to take on fluid while we resolve the issue and whatever needs that are mandated by the problem.

Let's go to the next slide here. Here's a picture of a well, a reserve pit. This is taken from up on the floor. This is a well that we drilled about, oh -- we drilled two wells off of this same reserve pit, and they were drilled from about seven to 10 years ago. This is on the northern edge of Carlsbad.

As you can see, we've got the reserve pits out here. You can see this white out here. We just got through running our deep intermediate casing. In this well we had a surface casing that was probably set around 350 feet. We had an intermediate casing, first intermediate casing, that was probably set in the neighborhood of 1500 to 2000 feet, and then we set a deeper intermediate string of casing down to approximately 9500 feet.

You can see the flow line comes from the well back here. It's hard to see. It flows in here. Very diverse, you can go straight out to the reserve pit or through the shale shaker. Right now, it's -- if you looked at the valves, if you could see them, it's flowing out to the reserve pit because we just got through circulating

cement back to surface, and that's what this white stuff is that's out here.

That gets to be a little bit of an issue on what do you do with your cement when you're dealing with closed-loop systems, because you don't have the luxury of having this nice reserve pit to take those fluids and any other excess fluids that you get when you get kicks and various other things, sometimes, particularly drilling deep, higher pressure wells.

Some of the other equipment that we have on this, this is the shale shaker, double shale shaker. The de-gasser was mentioned, that's the de-gasser right there. Right here is a mud cleaner, which is basically a six-cone -- six -- looks like a 10-cone de-silter on top of a shale shaker or screen. The screen -- the de-silters, hydrocyclones, take out the cuttings down to approximately 60 microns.

And then the trouble is, is as you weight up -- and in this well we're going to weight up -- we have to purposely raise the weight of the fluid because the formation pressures are higher once we start drilling, once we get to the Wolfcamp, about 9500 feet in this case, the formation pressures start to get higher. So we have to increase the weight of the mud in order to suppress that, rather than having a blowout or having it come to surface

on us.

So we try to do all of the controlling of the bottomhole pressures, whether they be light or heavy, by the weight of our mud. In this case we're having to raise the weight so, you know, all this nice mud-cleaning equipment is nice, but if it takes out the weight you're putting in, it's not doing any good.

And barite is a very high-density solid, and that's what we add, generally. And the little screen on the bottom, it takes all that barite out, along with the other stuff. But what the screen does is, it catches -- it's just the right size to catch that barite and pulls it back off and puts it back in the mud. And then the finer microns of cuttings, probably less than 20 microns, they get taken out to the reserve pit.

So the waste off of that goes to the reserve pit, the waste off the shale shakers goes to the reserve pit. It's not unlike what you're seeing in a closed-loop system, except they go to either your drying pit or they get hauled away immediately.

The mud works its way down to the end of the steel pits, and there it's picked up by the pump again and pumped downhole after it's been cleaned.

So in a sense we're doing a cleaning job here too.

I think some people get the idea that when you use a reserve pit, that we're not doing any cleaning of mud either. That's not true.

Now on some really shallow wells, they don't much cleaning. I have to agree with that. Most of our wells, we do, because we're in them longer and we have to maintain the mud.

The reserve pit is way too big and costly to go ahead and mud up and try to maintain the weight, the viscosity and the water loss that we would need to do the well as we go along.

Let's see here.

Getting into the closed-loop system, we're going to look basically at the same thing. We're going to look at the components. We've got a couple of different methods for -- Actually, there's a variety of different methods and processes people use in setups for closed-loop systems. We'll look at some of those. They're not all the same by any means. The principle is basically the same, but the setups aren't.

We'll look at two particularly, continuous cuttings removal as we drill a well, and the other one is storing the cuttings on location, either in a pad or -- and removal at a later, or disposal on a deep-trench burial. Then we'll look at a little bit of footprint.

Going back here, you can look at this reserve pit here. That was a well -- One nice thing about a reserve pit in this situation, it has been talked about in some of the prior discussions about utilizing resources as many times as possible. This reserve pit we used for another well that we drilled approximately two and a half years later, so we got double use out of it because we didn't reclaim it at first.

One of the nice advantages of doing a reserve pit is that if you leave it in place and let evaporation happen, you can use it again for completion. And you can use it if you've got a development phase like we did here in this Carlsbad area, and you can use it again. But we had to keep the reserve pit there for probably almost two and a half years.

That was probably a 7-mil reserve pit liner back at that time. When I first started, I think we were using 4-mil liners. Times have changed, so we're up to 12-mil, which seem like they're stat as all get out, and the proposal now is for 20-mil. So it's getting pretty secure.

Liners are not failproof. I think it's already been addressed that one of the most valuable things that you can do for a liner is put some kind of undercushioning protection on it, particularly against sharp objects and that, to keep it from puncturing.

Footprint on -- I looked at a couple wells. We are currently drilling a closed-loop system well south of White City, about seven miles. It's a 12,000-foot well. It's about a mile -- it's about four or five miles, actually, from another well called the Lupine. The well that we're drilling is called the Grange.

It's -- The Lupine, and the reason why I bring it up is, it's another 12,100-foot well that we drilled in the same area that used the regular reserve pit system, as compared to the system that we're using on the Grange, and that's a closed-loop system, and that particular system is the system where we haul the cuttings continuously and you don't leave the cuttings on location at all. And I'll get into some of the cost of that and some of the footprints.

The footprint for that Lupine well, which is a conventional system -- when I'm talking -- we can talk footprints as the whole location, or just of the equivalent reserve pit area. It's easier just to -- most of the location -- outside of the reserve pit in most of our wells are about two acres.

And then you add on to that for a reserve pit, you add on -- For a regular system, for us, for a 12,000-foot well, you add about .42 acres.

For a system -- well, I'll get to the other ones as we go through.

Let's talk about the components. This little diagram that's up on the screen right now, I think a lot of you have probably seen. It came out of the World Oil article that Cimarex/M-I Swaco published, and it's a good diagram to understand what are the workings of closed-loop systems?

Again, your wellhead is over here, your pumps are here. They draw from a reservoir. In this case, it'll be coming out of these pits over here. They draw from there, pump downhole, comes back up, it returns to the steel pits or the working pits, still the same -- same name.

The way this system is set up here, they have two shale shakers to handle the volume. So they go over the shale shakers, same function as what I talked before, they take the bigger cuttings, and they drop them out here. They -- rather than dropping them into a reserve pit, they're dropping them right down here on a little pad area that they have built up underneath here.

Okay, the liquid goes down, it goes -- it flows then on down through here. It got a mud cleaner, which is the de-silter on top of a shaker. That's processed, that's dropped down here, and then the go down here.

And this is probably the one thing that most drilling systems, conventional systems, don't have, is this system here, which is what they call their dewatering unit,

which basically consists of one or two centrifuges, and I think the key element is a chemical injection pump that pumps chemicals in there that causes the fluids to flocculate.

When we get down to this area here, we're talking about a lot of really fine particulate matter that gets in the mud. We're talking generally of particulate matter that's less than 10 -- 15 or 10 microns, and it's pretty hard to separate out.

With these high-speed centrifuges and with the flocculation chemicals, the flocculation, I think it's been described before, causes these small clay particles to clump together, thus giving them a little more mass. And this allows you to pull them apart easier and separate them in those high-speed centrifuges.

You can clean down to probably four microns using those, which is pretty good. It's pretty good, but that still means that you have 4-micron solids in your mud. And that stays in the mud until you -- even, I think, in some of the other papers, you will have to eventually get rid of that mud, because you can't get it out, and it's not useful.

And that'll have to be dumped or hauled off.

But the stuff that comes out above there, the microns above that weight, say 15 above, those are all

dropped over here on this pad. And most of the water has been taken out of them and put back in here. They're still kind of wet.

And that's why in this particular system they've got this little loader, front-end loader, that they go in here -- they go in here and shovel up those cuttings that have dropped, they turn around and dump it in here.

That brings us to -- Let's see, we've got to talk about some other things that's very important, that's often neglected. The extra tanks.

Over here they've got fresh water and brine storage. These are water supply tanks. We talked about having to have enough water on a location to drill a well and to handle problems when it comes up. If you have lost circulation, which we do a lot in the shallow portions of the hole, the surface and intermediate portions of the hole, you have to be able to keep up with that loss, so you have to have some reserve water on hand.

They've got four tanks here set up. So that's always nice. If you're in an area that has much worse lost circulation, you have more than that. If you have more tanks, then it's going to require a bigger footprint.

Looking at the other end of the spectrum, you know, the water flow situation, which is a severe and critical situation in southeast New Mexico, because those

water flows frequently are saturated brine and water flows, drilling to the salt beds out there, and there are pockets that basically have overburden pressures on them, which is probably twice the pressure that you're going to see in normal formations.

You drill into those, and you hit any of those that have any permeability or trapped-in pressure, and they come flowing in extremely high. And there's methods of handling that. We set up on our systems the BOPs to shut in wells.

Part of that BOP system is also a diversion, because when you're drilling the shallow portion of a hole and you only have, say, 300 feet of surface set and you get a saltwater brine kick on you that can exert several thousand pounds of pressure if you shut it in, you can have some problems.

And the problems are being, one, you can inject those salt fluids into your shallower formations, because you've got it closed into the top and you're going to break it down. Other problems is, you run the risk of actually broaching -- by that I mean coming around the shallow cement casing that you have, and coming to the surface. And that can be a real problem, because you don't want to have to contend with that.

Usually the way that's dealt with is, by having

the large reserve pits you can divert that saltwater flow into the reserve pit. That gives you time and you can keep your fluids -- it gives you time to go ahead and finish that section of the hole and run casing and get it cemented off.

The cementing process is a little tricky because you have to cement normally down the center and up conventionally to where your water flow is, and then you have to bradenhead squeeze from the top to seal off the water flow from the top. And we usually use -- a lot of times we'll use a casing packer too on top to shut off the flow so we don't contaminate our cement.

So if you're in an area that has saltwater flows -- and you can't always predict it. That's the problem, you can't always predict it. You have a problem -- you have this one pit over here, that they've got over here, to handle fluids, and that's it.

And that pit -- it doesn't show the size of it, but I would guess that it might be 150 to 200 barrels. And when you get a water flow that might be as much as -- we've seen them as much as 60 barrels a minute -- that's not going to do you much good. You won't even hardly be able to think of which valves to close.

Another issue that's nice about the reserve pit, it gets more complicated here, is you see all these

different tanks and all this, and if you've got a problem -- I don't know how many of you have been on a rig, but there's a lot of piping going on and a lot of valves. And when something happens you have to be able to open the right valves and close the right valves to get it in the right tanks.

It's a lot easier in that one reserve pit where you just had to open one valve and close one valve to go to the reserve pit if you have the strong flow. Here you've got a difficult situation.

My experience with these things is that the contingency for little spills on closed-loop systems is great, because it's very difficult -- the training that we currently have on location and the personnel is not adequate for what it's going to take.

What will eventually be required is that we're going to have to hire more people to monitor and control and be ready to handle these little incidences that happen as we're drilling that have been normally buffered by using a reserve pit and the bigger volume that it takes.

Q. (By Ms. Foster) Actually, Al, before you move from that slide --

A. Okay.

Q. -- the Cimarex slide, yeah -- could you estimate what the footprint or the pad size is on that?

A. Yeah, I sure can. You can't estimate it from the slide. What I did -- we have not used any with the cutting pad, we have -- not drilling with the cutting pad, so I didn't have any actual dimensions.

So Cimarex is drilling a well that is north and west of us about 50 miles, so I hopped in my car and drilled [*sic*] out there. It was north of Loco Hills about 13 miles.

And I went out there and I was a little bit surprised because they didn't -- they weren't using closed-loop system, they were using a deep-trench reserve pit out there.

So I knocked on the trailer and talked to the tool pusher and just for curiosity asked him why they weren't -- because Cimarex/Swaco gave us a presentation down in Carlsbad, and they basically said, you know, they liked the system so well that they're going to it everywhere in New Mexico. So I was a little bit surprised to go out there and see that they weren't using it.

So I talked to their company man on location and I asked him if he'd been in the area long and if they were using closed-loop systems much.

And he said no, he had not been in the area, he had been drilling all the wells over in -- in and around Fort Worth, in the Barnett shale play over there, and that

they did not use closed-loop systems at all over there. They used reserve pits on all of their wells over in the Barnett shale. So I found that interesting.

So I hopped back in my car and went back to the office, and I was trying to find -- they have a couple other wells that are drilling in New Mexico. One of them was with a contractor that I know, so I gave him a call and asked him if they were using closed-loop system on that system.

And sure enough, they were. They were.

So I said, Good, so maybe I can get some measurements on it.

And he says -- So I asked him if he could have his tool pusher go out there and actually measure the pad and the location back there so we could have some measurements to get the footprint off of it.

So he called back and he says, you know, he did that, and it's only 75 by 75.

Now wait a second, wait a second. 75 by 75, that's the actual size of their hauling pad. But -- and this is what I have found on all the wells that I've seen with closed-loop systems, is, we're looking at this cutting pad, and we say that's the footprint.

But you'll see some pictures here. We've got more than that. You have to be able to work and access all

the way around that pad. So you've got basically a road, a working area, that goes all the way around this. And that area, in almost every case, takes up more room than the actual cutting pad.

And he had accessed both in trucks -- we'll get to a system that we're using out on our location on the Grange where it's a continuous haul thing. You think, well, continuous haul, you don't even have a pad, that should even be less. Well, it is less than this, but it's not less than closed-loop -- I mean, a conventional system.

The differences are small, but the main point is, it certainly is not less. And in every case that I've seen, they've been greater by a small margin.

Q. So you did -- I think you stated earlier, but just for clarity, the size by acreage for the reserve pit that you calculated --

A. This area -- this -- I had them go back and measure the extra space that you had to have for access around it. The actual working space, the part they had to build up so they could run their backhoes and their trucks, and it came out to be .75 acres.

Q. Okay, that's for the closed-loop system. And then by comparison to the reserve pit, that was how many acres?

A. It was .42.

Q. .42. Okay, thank you.

A. Okay, this is on our well, the Grange. It's south of Carlsbad, south of White City, actually, about seven miles or so. This is a closed-loop system.

This is a system that we had put in by one of the people that actually runs out of southeast New Mexico, but...

This picture is awfully crowded and it's awfully busy, so I'm going to try to explain what's going on here, but the nice thing about it --

Q. Just so the Commissioners are clear, in the exhibit that IPA sent, this actually is one of four pictures on your components page, which is page 9, but it is enlarged here so that we can pull out the components more easily for your observation.

A. Thank you. Yes, I did, I put each one of those photos on an individual slide so we could see them better.

What we have here, I'll try to explain it.

This is our shale shaker. Our mud return comes from over below the -- right here and goes over the shale shakers. The shale itself gets shook over into a tub that's down here that's on rails. It's down below there. It's dropped into that. The mud goes down, it's sucked up, and it's gone through this mud cleaner, this right here. This takes the -- everything from about 60 microns off of

it, and it dumps it back into the pits too.

And then we get into a deal where we've got -- there's remaining mud. And you can see, we've got another cleaner -- the shale shaker -- excuse me, a de-silter down this way. You can't see it in this particular picture.

But after these fluids have been cleaned down to that point of probably about 15 microns or so, they're sucked back up into this area here. They've got the flocculent put into them, and they've got two high-speed centrifuges up here that polish the mud, so to speak, by taking off as much as they can out of those remaining few solids. And then the solids that are taken off of that then are dropped into the tank.

This piece of equipment here is a de-gasser. It's not currently hooked up on this.

This is the same rig, same location. This is looking back towards the rear of the rig. All that equipment that we had, you can see some of the upper structure, here's that de-silter, mud-cleaner here, the shale shakers over here. But this is looking down the row of pits. Here's that other de-silter here, that goes on out.

You can see that -- it's difficult to see here, but we've got a fair amount of area that's cleared out here. This is so truck traffic can come from behind here

and come in here. You cannot see it, but we've got a set of rails put in there that is rented, some rails and like little rail tubs that go in through here that catch the cuttings and put it -- dropped off by truck and go through the system. They're filled up on the other side, they're picked up by a truck and hauled directly to a disposal site.

This one here is our one holding tanks which acts as our reserve pit for various things like circulating cement back to surface and any types of flows that we might get. It's not a whole lot, it's not a whole lot.

Let's go back just one second.

In fact, here is an example of one of the problems. We had a deal where we pumped a sweep around, we got a big surge of fluid come up to the surface and it swamped this equipment. And you can see how -- being swamped, you can see some of the liquids and fluids that have washed out back over through here.

So it's very easy to -- trying to avoid these little bitty spills that come from the slightest little nuances of a well, can be a real challenge, particularly when you get complicated. Just look at all the valves and pipes you've got on there.

So you can see even on this well, even though you've got your row of equipment, your tanks here, you've

got essentially another row of rails, of collection gathering equipment here, and then you've got another tier of mud-cleaning equipment, and you're -- you're -- basically you're calling it your dewatering area.

And then you've got some tanks here. You can't -- water supply tanks are over here on the end, they're stacked up here.

Access road is here, access road comes out here. I did not count that into the footprint, because that access over there is there on conventional and all the systems.

But I did have to add some road on the end here and this working area that you have all the way through here.

Footprint on this particular well is .59 acres. It's less than the other one, but it's still bigger than the conventional reserve pit.

Now a conventional reserve pit would be right up against this here, and it goes out here. You don't have to have working areas around the outside of it. You do have to have an access right over on this end, so --

DR. SHAMA: Would you repeat the size of the footprint and define footprint for me, please?

THE WITNESS: The --

CHAIRMAN FESMIRE: Sir, we'll --

DR. SHAMA: If it's -- If it's impossible for me to talk, of course, that's fine. Thank you.

CHAIRMAN FESMIRE: It's probably not proper right now. We'll ask later.

THE WITNESS: This picture here is of another well. I threw it in to help show some of the components. You can see the dewatering unit, as they call it, which is the centrifuges on top, and that's also where you add some of the flocculent chemicals.

This one is set up and it's easier to see. In this particular case they actually have trucks that drive through here, and the truck bed would stay underneath here as it's loaded up. And you can see right here where the cuttings, the solids, would drop from up here. The shale shaker is over here, they're dropped over from the side, and that's how the cuttings are loaded and hauled off.

Okay, this back on our well, the Grange, the one that we're currently drilling south of Carlsbad. I put this photo in here to show you -- see how the truck traffic comes all the way back out here. You have -- the steel pits are back -- back in this area, which is common, and then you've got a row of these little tanks. You can see the rails that we have. We have to rent these and these rails that collect the solids.

And then you've got this injector and chemical

assembly back here that feeds your dry cleaning, you've got extra tanks back here, plus then you have to have access, you've got trailers for your extra -- These systems require two people on them to run them, one person per 12-hour shift to run them continuously.

And believe me, it's needed. If you look at some of the adjustments on some of that equipment, if those de-silters are not adjusted correctly, then rather than emitting just the solids they start emitting all your liquids to your tanks here too.

So you're hauling a lot of liquid waste with you, and you're not gaining some of the benefit that you get from dehydrating the cuttings.

Let's see, the tubs and rails, we pay $275 to lease those. The equipment -- that's per day. The equipment, the salt -- the shale shaker was already on the rig. The dewatering system, the mud cleaner, all that system that I showed you in that first slide, we pay $2600 a day for. That includes the two people that are out there 24 hours a day to run it.

It does not include the rental for the equipment here that collects the goods, does not include tank rental, which is supply tank rental, or any of our other tank rental. And it does not include transportation.

What I have found out on this, transportation, we

fill one of those bins -- on an average it's going to look like we fill one of these bins per day, is what it -- Right now it's more than that, but it will probably come out to be one bin per day. It costs us $1010 to haul off and dispose of each bin.

Q. (By Ms. Foster) Now Mr. --

A. That is an actual, real cost.

Q. Mr. Springer, there's white stuff all over the front part of this picture here on this location. What is that?

A. This -- That brings up a good point, thank you. That is gyp, primarily.

This -- the reason why we're drilling -- the reason why we're drilling a closed-loop cave -- "cave" -- is because of caves in the area -- closed-loop system in this particular area is because of caves. This has a large quantity of gypsum caves, and it's a big part of their hydraulic drainage in that particular area.

And we worked with the BLM -- this is a BLM location -- and we agreed to do a closed-loop system because of those cave systems, it's so close to their hydraulic network that they're using now.

And the reason why it's white is because of the gypsum that's on the surface.

Q. Will you need to prepare that location prior to

bringing out your closed-loop systems and your tank --

A. Yes, we do, we have to do that. It has to be -- it has to be prepared. You have to have a surface that can be ran on by trucks when you're hauling loads, and it has to be worked, because you've got trucks dumping off these tubs on that end, they're coming in that end, you've got them coming up here, loading up these bins on this end. And you've got other equipment, you've got a forklift that's working all the time, moving some of that equipment around.

Q. Okay.

A. So the costs add up.

CHAIRMAN FESMIRE: Ms. Foster, would this be a good time to ask for public comment and then take a lunch break?

MS. FOSTER: If you so desire, Mr. Chairman, that would be fine.

(Laughter)

CHAIRMAN FESMIRE: You're getting way too easy to get along with.

(Laughter)

CHAIRMAN FESMIRE: At this time we'll ask if there's anyone who would like to make public comment on the record.

MR. KRASILOVSKY: Can we have questions?

CHAIRMAN FESMIRE: As part of that comment you can make -- you can ask questions to be answered by the witness later.

They don't have to answer them if they don't want to.

MR. KRASILOVSKY: I have a questions about the two systems --

CHAIRMAN FESMIRE: Okay, why don't you come forward, stand up.

We've got two ways of making comments here. You can make a statement of position, or you can be sworn and give testimony.

MR. KRASILOVSKY: I just want to ask a question.

CHAIRMAN FESMIRE: Okay, you can probably do that as comment.

MR. KRASILOVSKY: Okay. My name is Eduardo Krasilovsky, I live in El Dorado.

My worry is about -- mostly is about groundwater contamination. Now -- groundwater contamination. I want to know what's the difference between these two systems with respect to the possibility of contaminating the groundwater.

You have talked about the difference, you know, between the two systems above ground. What could -- what they do to the environment above ground.

What's the difference between the two systems underground, if there is any?

CHAIRMAN FESMIRE: Mr. Springer, you have the option --

THE WITNESS: I prefer not to answer it, because that's not what I'm addressing in my presentation.

CHAIRMAN FESMIRE: Okay. Thank you very much, sir.

MR. KRASILOVSKY: Thank you.

CHAIRMAN FESMIRE: Is there anyone else who would like to make a comment?

Sir -- Would you like to come forward, please, sir?

DR. SHAMA: Sure. Where do you like me to stand?

CHAIRMAN FESMIRE: Stand right there if you want to stand.

Like I told the previous person, we do have an option here. You can give a statement of position, or you can actually be sworn and give testimony, if you would like.

DR. SHAMA: I would like to give sworn testimony, sir.

CHAIRMAN FESMIRE: Okay, would you raise your right hand, please?

(Thereupon, the witness was sworn.)

CHAIRMAN FESMIRE: And would you start with your name, please, sir?

DR. SHAMA: Sure.

AVI SHAMA,

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

DIRECT TESTIMONY

BY DR. SHAMA:

DR. SHAMA: I'm going to read my testimony so it becomes part of the record, so there are no questions as to the accuracy and the words I use.

I, Dr. Avi Shama, professor of management at the University of New Mexico (retired), make the following sworn statement on November 27th, 2007, at the hearings of the New Mexico Oil Conservation Division. This statement is about the factors which affect the decisions of business companies like you guys -- I never met you, Al, but you sound like somebody who is a businessman -- and people from the Conservation Division who are -- make a policy about how to better the society of New Mexico.

This statement is based on my research in this field as to the mindset of the business people making decisions and policymakers like you making decisions, and address the oil drilling in New Mexico, and especially the pending request by Tecton Energy to drill oil wells in

Galisteo Basin.

Let me address the mindset of the businessman and the mindset of the policymaker.

Factors affecting business decisions.

Public and private companies offer products and services to their customers at a price that maximize the profits for those companies. To maximize profits, those companies:

Price products in reference to the competition. An oil company would price the product or oil in reference to the other -- to the competition. Since most of that product is a commodity, the price is almost fixed.

Second, these companies minimize cost by having someone else pay some of the production costs.

These companies use lobbyists to change regulation or seek favorable variances. Among other things, that's why we're here. Among other things, that's why we see newspaper articles.

Those companies push the envelope, i.e., break the spirit of the law, without getting caught. If I can do something without getting caught, I'm going to do it. That's the mindset.

And they comply minimally with existing regulations and requirements.

The end result of this mindset are:

Happy shareholder, as they make more money on their stocks.

Happy managers, as they make more money on their stock options.

And unhappy taxpayers who pay the extra costs, such as environmental cleanup, increased health care costs and so forth, for the by-products of those decisions.

An example -- a classical example of these decision -- of this kind of mindset, tobacco products. I don't care, I'm supplying -- I'm supplying cigarettes. Since health care costs will go higher, taxpayers will pay for them. Who cares? My shareholders are going to be very happy, they'll make more money. Tobacco products are like that.

Enron is another example. If I can even defraud people, as long as I don't get caught, I'm fine.

In my opinion, Tecton Energy works within this framework.

On the other hand, let's talk about factors which affect policy decisions like you folks, or like our government.

Their factors combine economic and social approaches.

In the economic approaches they do economic cost and benefit analysis, which means weighing the dollar costs

against the dollar benefits to society. Essentially, this is the same kind of factors that govern the businessman decision.

Policymakers, however, often use another set of variables, and those are called social cost-benefit analysis. This approach weighs the social cost -- for example, adverse effect on water and health quality -- against social benefits -- for example, preserving water quality and clean.

Just one more minute and I'm done with that.

Let me give you an example.

In a recent *Albuquerque Journal* article dated November 10th, 2007, pages 1 and 2 -- Mr. Robert Gallagher, are you here?

(No response)

THE WITNESS: All right. Mr. Robert Gallagher, the president of the New Mexico Oil and Gas Association, threatened that if the New Mexico Oil Conservation Commission -- I assume that's you guys -- interpret the existing regulations in ways that protect the health and environment of New Mexico, then an unnamed Texas company will drill 68 fewer oil wells in New Mexico, or a total of $13.6 million in extra costs for those 68 wells. Clearly, this company is trying to get the New Mexico taxpayers to pay for that extra cost.

We talked about footprints before, and the footprint, if I'm not mistaken, that was cited by Al -- I'm sorry, I don't remember -- I don't know your last name -- as being .75 acre. Is that -- is that figure correct?

MR. SPRINGER: For one --

THE WITNESS: For one oil well. .75 of an acre is nothing.

But a policymaker will take the footprint to include how many trucks are coming in and out? What noise is being produced? What are the side products of drilling that may be hazardous to health, to the environment or the other folks? All these are external variables that a businessman does not consider or would like others to pay for.

Tecton Energy is interested in drilling oil wells in the Galisteo Basin. Like any other company, Tecton is likely to be motivated to maximize shareholder value by minimizing costs and shifting other costs to the New Mexico taxpayers.

On the other hand, policymakers like yourselves and regulators who represent New Mexicans might use the social cost-benefit framework and demand that Tecton Energy pay the full social cost, not only the economic cost, of its operations.

And since Tecton Energy is proposing to use a

water-intensive fracturing technology in its operation whose negative impacts on the Galisteo Basin have not been fully investigated, documented and discussed by the New Mexico public and the political and appointed representatives, a temporary moratorium on such drilling may be the prudent way to go.

There are a lot of things we don't know, and we can talk here a lot. I'd much rather see a third party, uninvolved -- not Al, not me -- a third party to come in and investigate and point out to us all the side effects that we might suffer down the road before saying, All right, come over here.

Let's remember, New Mexico is no longer a third-world country. We can afford to take the time and make prudent decisions.

Thank you, sir.

CHAIRMAN FESMIRE: Thank you, Doctor.

Mr. the attorneys, are there any questions of this witness?

Mr. Brooks?

MR. BROOKS: No questions, your Honor.

CHAIRMAN FESMIRE: Mr. Carr?

MR. CARR: No questions.

CHAIRMAN FESMIRE: Ms. Foster?

MS. FOSTER: I have one question.

THE WITNESS: Would you introduce yourself to me?

MS. FOSTER: Yeah, my name is Karin Foster.

THE WITNESS: Whom do you represent?

MS. FOSTER: I'm with the Independent Petroleum Association of New Mexico, I'm an attorney on this case.

THE WITNESS: Thank you.

MS. FOSTER: Okay?

EXAMINATION

BY MS. FOSTER:

Q. You mentioned that there are external variables that the policymakers need to consider, for example, additional trucks on the road, greenhouse gases and things like that with the additional trucks and the impacts on the environment, right?

A. These are just two examples of external variables.

Q. Right, that the Commission needs to consider as policymakers.

A. Sure.

Q. If -- And as part of what they have to consider, would you consider those external variables part of the cost, the social cost analysis that policymakers have to entail -- look at as well?

A. The policymaker ought to consider those variables before deciding to give permission to anybody to drill

wells there.

Q. Okay.

A. That's what I was considering. And it's not only water -- damage to water quality. Fracturing technology is relatively new technology that can have such an incredible impact on the environment.

Existing regulation now suggests that you cannot drill a well within -- another well within about half a mile of an existing water well. Do we know that that's enough for that kind of technology not to deteriorate the water quality 15 days down the road, 10 years down the road? We don't. And for anybody to suggest that, show me the data and I will tell you that I am mistaken.

Q. Okay. So is -- Doctor, is your testimony that, you know, the Commission needs to take not only the economic benefits but also social cost-benefit analysis, and if that is not part of a regulatory process, that maybe they should slow the train down and have it be part of a regulatory process?

A. Absolutely, absolutely, because in the final analysis regulators are representing waters. They're really in charge of making sure that this society functions well and has good water to drink and has an environment that is conducive to life.

If they don't do this job, eventually voters will

turn around. So yes.

MS. FOSTER: Thank you, I have no further questions.

CHAIRMAN FESMIRE: Mr. Jantz?

MR. JANTZ: No questions.

CHAIRMAN FESMIRE: Mr. Huffaker?

MR. HUFFAKER: Nothing, Mr. Chairman.

CHAIRMAN FESMIRE: Professor, thank you very much.

At this time, we'll --

DR. SHAMA: It might be useful if you will be able to compare. Thank you.

CHAIRMAN FESMIRE: Commissioner -- I'm sorry. Do you --

COMMISSIONER OLSON: I don't have any questions.

CHAIRMAN FESMIRE: Okay. At this time we'll go ahead and break for lunch, and we'll reconvene in this room at 1:15.

Thank you.

(Thereupon, noon recess was taken at 11:58 a.m.)

(The following proceedings had at 1:22 p.m.)

CHAIRMAN FESMIRE: Okay, let's go ahead and go back on the record.

This is the continuation of Case Number 14,015,

Let the record reflect that Commissioners Bailey,

Olson and Fesmire are all present, we therefore have a quorum.

We were in the direct examination of Mr. Springer.

Ms. Foster, are you prepared to proceed?

MS. FOSTER: Yes, Mr. Chairman, thank you.

AL SPRINGER (Resumed),

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

DIRECT EXAMINATION (Continued)

BY MS. FOSTER:

Q. Okay, Mr. Springer, I believe that you had just started discussing the slide, slide number 10. If you could continue with your narrative, please?

A. Yes, we just got through talking about the components, and we're going on and talking about some of the different types of closed-loop systems, so this slide here shows an example of a closed-loop system with a drying pad in the center there.

And you've got two different situations with closed-loop systems. You can -- well, actually even with the drying pad. You can have a temporary drying pad where you can store the cuttings that you retrieve from your cleaning system there temporarily and haul them out as your pit fills up and dries out, haul them off to a disposal

site.

Or, in some circumstances, if you meet site requirements you can do as it looks like they're going to do in this example here up in the Rockies of burying it deep-trench, and that's what the pit in the lower portion of the slide shows, where they'll take the cuttings, actually bury that according to a deep-trench burial.

To do the deep-trench burial we have to meet certain site requirements, and some of these you have to be greater than 50 feet from groundwater, 300 feet from a continuously flowing watercourse, 200 feet from any other watercourse, 300 feet from a residence or a school, it can't be within a municipal boundary unless they specifically approve of it.

And if you meet those, you have some additional requirements that you cannot be within 100 miles of the disposal, and you also need to get surface owner agreement, whether that be private, state or federal. And you have extra sampling requirements. You have to meet the 500-milligram-per-liter chloride in the leachate, to be able to do that too.

So you have quite a few requirements in order to even bury it on location there. Most of the time, a lot of the time, you're going to have to haul those cuttings off to a disposal site.

CHAIRMAN FESMIRE: Mr. Springer, you're talking about the proposed rule, not at this site --

THE WITNESS: Yes, I'm talking about the proposed rule, I'm sorry. I'll make that clear.

So this slide primarily shows the cutting put and some of the options you can do with that.

On our well down south of White City we have what I call a continuous cuttings removal, where -- removing the cuttings as they're dropped into the pits. These little rail cars here, there's -- actually there's two cars. One of them's set up underneath the cleaning system, the dewatering system up above. This is a car that's setting there waiting to take this place, it'll be pushed forward, and this one will take its place when this one's full. A truck will come in, drop off another car, and it will pick up the other one on the other end.

This is a continuous removal system, and no cuttings are stored on location at any time, other than in these temporary pits which are hauled off to disposal. And those are supplied, in this particular case, by the actual site that takes the cuttings.

One thing that I have noted in this system that I do not particularly care so much about is, you end up getting a lot more liquids in your cuttings that you dispose of, so you're getting rid of a lot of fluids along

with your cuttings in this system, because you're not allowing them to dry out as much as you would with the cutting pad.

Q. (By Ms. Foster) Now while you're looking at this slide, then, Mr. Springer, what is the concern with hauling off the wet cuttings then?

A. Well, it's -- for one thing, it's -- as some people -- and I'm not familiar with this part of the world. I know I've heard a lot of people say it has to meet certain requirements at the disposal site to be taken, one of them that it can't be too sloppy. It has to -- I've heard people say it has to meet a paint-filter test.

Frankly, I'm not sure that a lot of the times we've shipped those out, that they would meet that, to be honest with you. But they've always taken it. Of course it's their site also, so I don't know how to address that.

But, well, the other concern is, it costs us more because it costs more to take something to a disposal site than we're -- if it's just liquids we could dispose of it in a disposal well, and it's generally closer, at least in southeast New Mexico.

Q. Okay, thank you.

A. One of the things -- Let's just go on to the next slide here. Going to take a look at different footprints. And this is -- this is the regular reserve pit with the

working pits combined with it. That's the system that we use in southeast New Mexico, "we" being Yates Petroleum, use most.

One nice thing -- one thing that I don't think I've heard addressed, and I have not been here that much, is evaporation issue, you know. I saw the paper that Cimarex talked about, and they did not discuss evaporation issue. I've seen issues in a lot of other states. I know that we don't want to leave the pits open very long because of some potential problems with leakage and that.

But if we can leave them open, we can use the pits for multiple purposes, like I mentioned before where we could use them for completion purposes and also other wells.

But as we've done in other states, like in Arkansas -- and we're going to start doing it here too -- you can use sprinkler systems. Once you finish with a well, you can actually put sprinkler systems. And the arid climate that we have both in southeast New Mexico and northwest New Mexico, sprinkler systems -- by pumping through a sprinkler system back over the reserve pit causes the evaporation to improve greatly. And I think the limit that's going to be imposed is about six months, and we have to close them, so it's going to be hard to get it totally evaporated.

But that, really -- you know, we talked about all of the extra waste that's created by dumping and by using reserve pits because of the water volume. But if we can return that water volume to the air and the environment, we're better off all the way around. We don't have to haul it.

And then all we're left with is the basic solids that we started out with, because the actual quantity of solids hasn't changed. What we're doing is adding dilutant to that and make the volume bigger that carries it, but the quantity of solids is the same in all situations. We just either have a more concentrated quantity or a diluted quantity.

So I think one of the issues that probably has not been addressed enough is the use of evaporation to help remove a lot of the liquids that we have on our locations in New Mexico.

Footprint we already talked about on this one. I've gone out and measured pacific [*sic*] footprints on pacific wells. I've not done an exhaustive study by any means, but these are the ones, these are the actual facts I had.

The Grange that we're doing in southeast New Mexico, which is continuous hauling, that's .59 acres. As a comparison -- I didn't compare it with this one, I

compared it with the -- another well that was six miles away from there that was a regular closed-loop system. It's going to be very close to this one, because they're about the same size, and it was .42 acres for a regular, general system with a reserve pit and steel pits.

The Cimarex well that used a drying pad -- let's go through here, like this one here -- this is not Cimarex by any means, but it's an example of a drying pad -- it was actually the most, and it had .75 acres.

And primarily what you get is, you don't get it from the drying pad, but you get it from these working areas that you have to have around it and truck access that you don't see over here, but particularly on our continuous hauling you have to be able to get around with trucks.

So when you look at this area around here -- and I only looked at the area that was actually working area, that trucks actually worked on. I didn't look at some of these areas back here that were just kind of scraped off and they're using a little bit for storage there. Some of these places where you have to put in extra tanks and that, you just can't plop those down. The location has to be prepared for those, because you'll puncture the tanks just like you'll puncture liners on your plastic liners.

Q. Okay --

A. Yes?

Q. -- Oh, I'm sorry, I thought that was your last slide.

A. I've got -- this one is the Grange, which is our continuous carry -- continuous cuttings removal system. And you can see, we still have a large working area back -- back in behind here. Besides, we have lots of equipment that fills in -- you've got two rows of equipment beyond the steel pits here that have to be in there. We've got extra tanks and working area.

In this case I went out there and actually stepped this one off myself, and it was .59 acres.

So you know, those aren't great differences, you know. When you look at the overall total footprint of the pad, which -- when you add the rest of the location, it's probably two acres. So you're looking at small differences.

But the main point is, they're not smaller. When you take into account the fact that you have working areas around all those things that you don't have in a normal reserve pit, you have to count that. And when you do, your size is bigger than it generally appears when you say I have a 75-by-75 pit, or something to that effect.

And that's it.

Q. Okay. Now Mr. Springer, you mentioned that Yates Petroleum is actually in the middle of a closed-loop

drilling project right now?

A. Uh-huh.

Q. Do you -- For the Commission, do you have any numbers on cost?

A. I do have some costs on that. It's a well currently in progress. It's a 12,100-foot well south of Carlsbad, actually south of White City.

We're using closed-loop system down there because we worked with the BLM on that, because it's in cave/karst area, primarily gyp caverns, and we didn't want to get into their hydraulic system by accident or any other way.

I have -- we are -- At the time I accumulated these costs we were 30 days into the well. It's a 60-day well. So I've got about half of the exact costs and what the costs are, the actual tickets that we've accumulated up to 30 days. I've got certain categories that I've accumulated, and I'll go through those.

The first category is for the cleaning equipment and those two operators. They come by a pacific vendor, and usually when we talk about costs, that was basically $2600 a day is what we're paying. That pays for the equipment, mud-cleaning equipment and those two operators out there 24 hours a day to operate it. That fee came to, after 30 days, $83,443.

We have the rental of the rails and the tubs,

that's $275 a day, that's $9900 that we have accumulated up to that point.

Extra water supply tanks was $4500 up to that point.

And then the trucking and the disposal to the waste site, now this counts the trucking and the disposal fee and everything, up to that point was $36,360. And forklift was $3780.

So after 30 days those costs came to $138,000. So those are actual costs occurred for the equipment and hauling up to that point.

I did not look at the cost of preparing the site, and I have not looked into reclamation, we haven't gotten into that yet. And those costs will have an impact on the overall summary.

I did -- I can project out to the end of the well what it's going to cost, and it will probably be -- the average cost up to that point was $4600 a day that we spent on that equipment and disposal.

We are hauling less -- from now until the end of the well, we'll be hauling less cuttings to disposal, so our fee is going to drop, I estimate, from $4600 down to $3700 a day, primarily to less hauling of cuttings, for another --

Q. Mr. Springer, before you move on, why is it that

you estimate that your hauling costs will decrease down to the $3700 a day, the farther -- the deeper you go?

A. Okay, because penetration rate is slower, we're dealing with higher rates, we're probably carrying, you know, 12-pound-per-gallon mud, penetration is slower, the mud weight is high, the viscosities are high, and the rock's harder, the rock's harder.

And we're drilling a smaller bit, we're probably drilling a 6-1/8-inch bit, which does not penetrate generally as quickly as some of the bigger ones. You would think that that's not -- it's a smaller hole, it should drill faster, but in this case you can't put as much weight on it because the bearing life just isn't there, so...

The primary difference is the penetration rate, so you just aren't cutting as much hole. It's a smaller hole, it takes -- you don't drill as many feet in a day, and so I've cut the penetration rate probably in half, and I've cut the cuttings removal in half.

So you project that out for another 30 days, and that's $111,000, and basically the total comes to $249,000, basically a quarter of a million dollars, which is approximately offset by the fact that you don't have as high reclamation costs, but you still have some reclamation costs.

As you can see when I showed some of those

pictures of the spill in there, we have to -- we have to put a liner down below that equipment for those very instances. We have to caliche over that stuff to protect against those things.

And one of the difficulties about using closed-loop systems is that you have so little of a buffer that little mistakes, little tweaks -- you don't have the time or luxury to be able to just divert it to a reserve pit. You end up having these little spills, a lot more so than you do with a reserve pit. That doesn't mean that you don't have problems with a reserve pit either.

So those are basically the costs I had.

I think we've covered the footprints.

I think that's about it.

MS. FOSTER: Okay. Mr. Chairman, at this time -- I actually neglected to do it earlier -- I would move Mr. Al Springer in as an expert as a professional engineer with an expertise in closed-loop systems, and I would also at this time move Exhibit 22 into evidence.

CHAIRMAN FESMIRE: After his testimony we're going to --

MS. FOSTER: -- make him an expert, yes. Thank you, sorry.

CHAIRMAN FESMIRE: Is there any objection, Mr. Brooks?

MR. BROOKS: No objection, Mr. Chairman.

CHAIRMAN FESMIRE: I think you're kind, Mr. Brooks.

Is there anyone else that would have an objection?

MR. CARR: No, sir.

MR. HUFFAKER: (Shakes head)

MR. JANTZ: (Shakes head)

CHAIRMAN FESMIRE: Mr. Springer will be admitted as an expert now.

Let's address the evidence, the -- What exactly are you asking be admitted to the record?

MS. FOSTER: The slide presentation that he just gave. That's Exhibit --

CHAIRMAN FESMIRE: Exhibit --

MS. FOSTER: -- 22 --

CHAIRMAN FESMIRE: -- 22?

MS. FOSTER: Yes.

CHAIRMAN FESMIRE: Is there any objection to the admission of Exhibit 22 into evidence?

MR. BROOKS: No objection, Mr. Chairman.

MR. CARR: No objection.

MR. JANTZ: No objection.

CHAIRMAN FESMIRE: Exhibit 22 will be admitted into the record.

MS. FOSTER: Thank you, and I have no further questions for Mr. Springer. I pass the witness.

CHAIRMAN FESMIRE: Okay, Mr. Carr, do you have any questions of this witness?

MR. CARR: No, I do not.

CHAIRMAN FESMIRE: Mr. Jantz, do you have any questions of this witness?

MR. JANTZ: No, I do not.

CHAIRMAN FESMIRE: Mr. Huffaker?

MR. HUFFAKER: Nothing, Mr. Chairman.

CHAIRMAN FESMIRE: Okay.

Mr. Brooks?

MR. BROOKS: Very little here.

CROSS-EXAMINATION

BY MR. BROOKS:

Q. On the -- You mentioned a 75-by-75 drying pad at one point, or a couple of points in your presentation?

A. Yes.

Q. Was that for a particular well, or was that a generic number?

A. It was both, it was both. I used it as a generic number, but it was also a particular well. It was a well that Cimarex was drilling out in -- on the border east of Lovington, New Mexico. I called the contractor and had them go out and actually measure their pad, and that's what

they measured, 75 by 75.

Now that was just the cuttings pad, not the work area around it.

Q. And what was the depth of that well?

A. Those are about 9000-foot wells, from what the contractor told me.

Q. Did you used to do pits in that area around Carls- -- around White City where you're drilling the drainage wells? Has that been done in the past?

A. Done what?

Q. Pits, has there been --

A. Reserve pits?

Q. -- yes, in that area?

A. I used the Lupine, which is in that same area, same depth well, as a comparison for footprint. We used a regular reserve pit system and steel working pits on it, and that was the one where I got the .42 for -- acre.

Q. Well, what is the difference between those other wells in the area and the Grange well that caused you and the BLM to decide to do the closed-loop system?

A. We were setting on top of supposedly one of the biggest gyp caves in the country.

Q. And the others?

A. And the other was not setting over --

MR. BROOKS: Yeah, okay. That's all my

questions. Pass the witness.

CHAIRMAN FESMIRE: Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. The waterflows are still a real issue that's been going on for better than 50 years, hasn't it?

A. I suspect it will continue to be, yes.

Q. Is it still so strong that it collapses casing at times?

A. Yes, it can, it can. If the casing is not designed correctly, it certainly can.

Q. Still only in the Rustler formation?

A. Well, it's usually in the Rustler, but below the Rustler, through the salts are the primary areas. The Rustler is -- generally lays right on top of the two big salt formations that we have in southeast New Mexico.

Q. I've heard of those flows going for days on end, a tremendous volume. Is that your testimony, that they're still going that strong, that heavy?

A. They sure can, they sure can. In fact, in some cases we've used the reserve pit to give us time to build other reserve pits to catch that, because you couldn't keep up with it, hauling -- even with 10, 12 trucks hauling continuously.

What you try to do is -- you can't really shut it

in, because you're afraid to broach, and so you try to get your drill through it and casing set as quickly as you can.

Q. To satisfy the cynical minds, has anybody heard of any kind of business relationship between Cimarex and Swaco?

A. I don't know, I can't answer that.

Q. You mentioned this site that you had the photographs was on federal lands.

A. Uh-huh, Grange.

Q. Will you be reclaiming to gold book standards?

A. Gold book standards, I assume, means Cadillac-type standards?

Q. Well, the BLM best management practice is the gold book.

A. Oh, their gold book, I see what you mean. Yes, we will.

Q. I'm not sure that I understood correctly. Did you say that there was a liner and then caliche for the pad location itself?

A. No, it -- the liner is put down -- remember one of those rail cars ran through -- Let's see if I can get to that. Right there, see that are that the rail cars run through, and all the way under, the area where the cuttings drop down into the top of the, you can -- in fact, you can see it's not covered with caliche back here, it's just a

liner on top there.

Q. Oh, okay. I see off to the right there, it seems to be --

A. Uh-huh, you can see the wrinkles and --

Q. -- raised up a bit.

A. Uh-huh. So that area along that strip, I guess you'd call it, along the pits there, is what's lined.

COMMISSIONER BAILEY: Okay, that's all I have.

CHAIRMAN FESMIRE: Commissioner Olson?

EXAMINATION

BY COMMISSIONER OLSON:

Q. I guess just one question, following along what Mr. Brooks was saying. You said this one site you're using down there south of White City, you used closed-loop systems because of underlying caverns? Was that what you were saying?

A. (Nods)

Q. I guess if the testimony that we're hearing from industry is that the pits don't leak when they're lined, why would you need to use the closed-loop system?

A. I didn't say I agreed.

(Laughter)

Q. (By Commissioner Olson) So it was a settlement thing?

A. It was -- yes, it was an agreement between Yates

Petroleum and the BLM and some environmental groups that were heavily demonstrating the area.

COMMISSIONER OLSON: Okay, I think that's all I have.

EXAMINATION

BY CHAIRMAN FESMIRE:

Q. Mr. Springer, let's talk about that 60-day well. Is that the Grange that you were talking about, or is that a different well?

A. That's the Grange, the Grange is a 60-day well.

Q. Okay. And the quarter-of-a-million-dollar cost that you were talking about, is that your calculation of the incremental cost over not using the closed-loop system?

A. No, no, that's just the cost of the equipment and hauling the cuttings. There's a lot of other things that go into accounts, and we've talked about those with other people as far as the preparation of the location and also the closure of the location.

Q. What about the waste volumes? You've kept pretty close tabs on the waste volumes, haven't you?

A. Waste volumes, basically they're going to average out one of those little trailers per day. It's going to be pretty close.

Right now it's more than that, but by the time we finish it's going to be -- which is going to be basically a

thousand dollars a day where we're at.

We're in kind of a prime situation, because we're only a mile from the highway, so transportation time is really pretty quick.

Q. Okay, so you're averaging about $1000 a day in waste hauling --

A. Right.

Q. -- so over the life it's going to be something less than $60,000, right?

A. It's going to be around $60,000, that's correct.

Q. And how deep is that well?

A. It's a 12,000-foot well.

Q. So $60,000 to haul almost all of the waste? Most of the waste?

A. Most of the waste.

Q. On a $12,000 -- on a 12,000-foot well.

When we look at Mr. Small's calculations, on his type well in the southeast, for a 7500-foot well, he's got $75,000 -- $75,500 to dispose of the waste either from an earthen reserve pit or from a closed-loop system. And your actual calculations are going to be not quite twice as deep?

A. I have not included the fluids that will have to be removed from all the pits and tanks.

Q. Okay.

A. That has not been accounted for. So that still needs to be accounted for.

Q. And how much do you think that would run?

A. I do not know off the top of my head.

Q. But you've got a -- you've got a pretty good handle on that, don't you?

A. Well, no, I don't, and I hate to hazard a guess, because we'd probably haul it to disposal, and I'm not sure where the disposal location is there, because we don't -- apparently there's a lot of other companies that do a lot of development where they can use their fluids from one well to another.

Some of their fluids, a lot of the fluids, are not usable again.

We do not drill that type of thing. We have a tendency to drill, wait and evaluate and see before we come back, we'll go somewhere else and drill, come back to an area if we'd like to.

Drilling in southeast New Mexico is getting to be an economic challenge, because the large fields and big developments just are not there like they used to be. And so we have to be a little more picky and choosy about it.

Q. But I guess the point I'm trying to make is, the amount that he's got in here for the waste disposal on a 7500-foot well is significantly more than what you're

saying --

A. There's a significant --

Q. -- on a 12,000 --

A. -- amount of volume still left in all those tanks.

Q. Okay, and how much are we talking?

A. Oh, you're talking probably three of those tanks, and those are -- what? 1200 barrels there. You've got your holding tank, which is probably another 200 barrels, and then you've got all your steel pits, your working pits, that have to be hauled off and removed, and that's probably going to be another 600 barrels.

Q. So you're looking at 4400 barrels right there?

A. I think so.

Q. And how much would that cost to haul and dispose?

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

Q. Okay. But it's going to be significantly less than -- or maybe close to the cost that he's got in there for a 7500-foot type well, isn't it?

A. Could be, I don't know.

CHAIRMAN FESMIRE: Ms. Foster, that's all I had. Do you have any redirect of this witness?

MS. FOSTER: No, Mr. Chairman, I don't.

CHAIRMAN FESMIRE: Okay. Mr. Springer, thank you very much.

And I guess we're ready for the next witness.

MS. FOSTER: Okay.

MR. SPRINGER: Thank you.

MS. FOSTER: Actually, Mr. Chairman, my next witness is going to be Mr. Tyson Foutz.

I actually have to load his slides onto Mr. Hansen's computer.

CHAIRMAN FESMIRE: Okay. Is that going to be a big enough effort that we should take a break, or is it just some --

MS. FOSTER: A short -- maybe a five-minute break? Would that be possible?

CHAIRMAN FESMIRE: Okay, why don't we go ahead and take a five-minute break and reconvene at five minutes to 2:00?

(Thereupon, a recess was taken at 1:50 p.m.)

(The following proceedings had at 1:55 p.m.)

CHAIRMAN FESMIRE: Okay, let's go back on the record.

Again, the record reflect that this is Case Number 14,015, that all three Commissioners are present, and I believe, Ms. Foster, you were ready to start your direct examination of Mr. Tyson Foutz?

MS. FOSTER: Yes, thank you, Mr. Chairman.

Mr. Foutz just informed me prior to his testimony

that he actually shortened down his presentation quite a big, so he only has three slides in his presentation. They're actually distilled down from your original Exhibit 37.

What he has done is kept the cover page, which is page number 37-1. He has condensed 37-10 and 37-11 into his second slide. And then 37-7 is his conclusory slide. So he only gets three slides.

CHAIRMAN FESMIRE: 37-7?

MS. FOSTER: -- is his concluding slide. Okay? Just so you'll be able to follow our documentation.

May I commence questioning the witness?

CHAIRMAN FESMIRE: You may, ma'am.

MS. FOSTER: Thank you.

MS. FOSTER: Mr. Foutz, would you please state your name for the record and give us and the record some of your background, please?

MR. FOUTZ: My name is Tyson Foutz --

MR. BROOKS: Mr. Chairman, was the witness sworn?

CHAIRMAN FESMIRE: Ah, that's a good point. No, he was not.

Mr. Foutz, would you stand up and raise your right hand, please?

MR. FOUTZ: Yes, sir.

(Thereupon, the witness was sworn.)

CHAIRMAN FESMIRE: Thank you, Mr. Brooks.

TYSON FOUTZ,

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

DIRECT EXAMINATION

BY MS. FOSTER:

THE WITNESS: Okay, back to your question. My name is Tyson Foutz, I'm a petroleum engineer with Merrion Oil and Gas in Farmington, New Mexico.

I have a drilling background and well control, and have been involved in drilling operations offshore in the Gulf of Mexico and offshore eastern Canada, and in all major petroleum producing provinces in the lower 48 and the Cook Inlet in Alaska. And the only place I haven't been involved in drilling is the new play in central Utah.

So that's kind of my background. I'm mainly involved in drilling, completions --

Q. (By Ms. Foster) Okay, and are you --

A. -- field operations.

Q. -- are you currently employed?

A. Yes.

Q. And who are you employed by?

A. Merrion Oil and Gas.

Q. And how long have you been there?

A. Since June of 2006.

Q. Okay, and what is your title over there with Merrion Oil and Gas?

A. Petroleum engineer.

MS. FOSTER: Thank you.

At this time I would move Mr. Tyson -- Tyson Foutz into -- into evidence --

(Laughter)

MS. FOSTER: -- in as an expert in the area of petroleum engineering, with a background in drilling and well control.

CHAIRMAN FESMIRE: Mr. Brooks?

MR. BROOKS: No objection.

CHAIRMAN FESMIRE: Mr. Foutz, what's your educational background?

THE WITNESS: I have a bachelor's of science in petroleum engineering, received in May, 2000, from Colorado School of Mines.

CHAIRMAN FESMIRE: Okay, and have you worked for Merrion Oil and Gas all of that time since you graduated?

THE WITNESS: No. I spent six years, approximately, with Cudd Well Control.

CHAIRMAN FESMIRE: Okay. And so after that you went to work for Merrion?

THE WITNESS: Yes, sir.

CHAIRMAN FESMIRE: Okay. Mr. Brooks, you have no

objection?

MR. BROOKS: Still no objection, your Honor.

CHAIRMAN FESMIRE: Is there any objection?

MR. CARR: No objection.

MR. JANTZ: None.

MR. HUFFAKER: (Shakes head)

CHAIRMAN FESMIRE: Okay. Mr. Foutz will be so admitted. Let me ask one follow-up question.

You're not a registered professional engineer?

THE WITNESS: No, sir.

CHAIRMAN FESMIRE: Okay.

MS. FOSTER: May I continue?

CHAIRMAN FESMIRE: You may, ma'am.

MS. FOSTER: Okay, thank you.

Q. (By Ms. Foster) Okay, in your work with Merrion Oil and Gas in Northwest New Mexico, have you been involved with drilling closed-loop systems at all?

A. Yes.

Q. And how many projects have you been involved?

A. Three.

Q. And how recently were those projects?

A. October, November of this year.

Q. November, 2007?

A. Yes.

Q. Okay, so you -- and are those wells completed so

you have final --

A. We're in the process of completing them.

Q. Okay. Looking at your next slide in your presentation, if you could please, using a narrative, give the Commissioners information on what you have listed here.

A. Okay. Of the three wells we drilled with the closed-loop system, I have approximate costs listed here. These costs are either the final bill or the lowest estimated cost for each particular component or service.

The reason I don't have all three wells is because when I was preparing this testimony for submittal by the deadline, we were still in the process of drilling the third well, so I didn't really have many of these costs together.

So here you have it laid out, kind of a line-item cost for each of these wells, and these two wells were drilled off of a pad by the river in the City of Farmington. All three wells were in the City of Farmington.

The rationale for closed-loop systems on these two wells was proximity to the river and the water table. It was about two foot below ground at these locations, and it would flow to pit liner.

The third location we drilled was near a bunch of gathering lines and underground gas lines that we would

have had to relocate to dig a reserve pit, so we used the closed-loop system.

These are three 80-acre infill Dakota wells. Okay. You can see our costs for the wells. These two wells were drilled with the drying area and averaged about $232,000 incremental cost. Everything tangible is an expense to us, and taking of course off the cost that the alternative method would have caused, which was the reserve pit construction and closure, so...

I added 7-percent sales tax figure onto that too, so...

Q. Okay. Now going through your numbers there, I see that you have dewatering chemicals of acid and polymer on your locations for $8600 -- or over $8000 in each case?

A. Yes.

Q. Or close to $8000.

What exactly is that?

A. That's a last stage of solids control on these systems. They have a dewatering system to take the very fine solids, and you flocculate them chemically and are able to pull them out of the system that way.

Q. All right. And the cost of your closed-loop drilling system and services, does that include installation and transport to location?

A. No, that's rental only.

Q. All right, and did you get your closed-loop system from a New Mexico operator or --

A. No, this -- it was transported from Casper, Wyoming, for a cost of about $14,000 each way. So $28,000 round-trip trucking bill on that.

Q. Okay, and why was it that you had to transport it all the way from Wyoming?

A. Because there were no systems available in the area. No -- let me rephrase -- there were no adequate systems available in the area. There are systems people will try to sell you as a closed-loop system, but they're basically cuttings holding bins. That's just increasing your volume and shuffling mud around.

Q. Okay. So this system that you purchased and brought down from Wyoming, what hardware did it have on there?

A. It had a centrifuge, de-sander, de-silter and the dewatering system.

Q. All right, and you said that you used a drying area --

A. And -- and -- oh, it had a catch tank too for the cuttings. Yeah, we had -- we built a drying area for both these wells. It was approximately 125 foot long by 50 foot wide.

Q. All right. And you used drying areas on both of

these wells?

A. Yes.

Q. And did you have success with your drying areas?

A. No, no.

Q. Okay, could you explain to the Commissioner what happened with your drying areas?

A. The drying-area idea came from the Cimarex paper, which has been talked about a lot here. Not being able to talk to anyone at Cimarex, I just couldn't get ahold of anyone, and these permits were coming through.

We built this drying area. Talking to my closed-loop vendor, he assured me our cuttings would be very dry, which they were not.

The system is designed for a bigger rig, I'm estimating 1000-, 1200-barrel pit capacity, big triple diesel electric, something like that. I had 550 barrels a pit. That isn't enough retention time for proper solids control using this system.

Q. Okay, and not enough retention time means what result?

A. It means you get a lot of your mud kicked out of the system. Along with the drilled solids you get a lot of your low-gravity solids you use for mud additives, your bentonite and barite, if you're using it to weight up, which we had to. We had a shallow water flow on both of

these wells that caused us to have to weight up on our mud.

Q. And what did you do with that wet stuff?

A. Put it in the drying area.

Q. Okay.

A. Let the -- let the liquids accumulate on top, vacuumed them off and transported them to a water disposal facility.

Q. All right. And do you have that additional cost in there?

A. I believe so. On this water hauling and disposal, which is -- let's see, where did it go? -- right there, I basically had this slurry cuttings transfer and water-hauling and disposal. It's broken up by the tickets I received from the vendors. You use one company to haul water, you use one company to haul slurried solids, and that's kind of why that split is.

Q. Okay. And your next entry there is the open-top flowback tank?

A. Yes.

Q. Is that an additional piece of equipment? What is that for?

A. Normally we run a choke line off our choke manifold to the reserve pit. And since we didn't have a reserve pit on this location we had to rent a flowback tank and put a muffler on it, just so we'd have somewhere to go

with the choke line.

These wells, we did not expect any type of overpressured situation, which would necessitate going to a choked well, shutting the well in and circulating under the ram. So we were pretty confident we wouldn't need it, but better to have it and not need it than need it and not have it.

Q. Okay, so that's a safety issue right there?

A. Yes --

Q. Now --

A. -- and it's not -- yeah, it's a safety issue in itself. The dry gas blowing across a metal pit isn't a good idea. It tends to generate static electricity and kind of can contain your flowback gas in a -- if the wind can't get to it down in a pit, it can get to an explosive concentration. So there's all kinds of issues with that.

We didn't think we'd need to use it, and we didn't, but it's something -- that's, you know, an issue, a technical issue that needs to be resolved. What do we do with our choke line? You know, what do we do for these well-control situations?

Q. Okay, and you didn't need to use it in this instance. Do you know of any company that had to use the choke line situation in closed-loop?

A. No.

Q. Okay. Now you stated in the beginning that you actually had done some work offshore?

A. Yes.

Q. Do you know what they do with drill cuttings offshore?

A. A lot of places they slurry them and -- grind them, slurry them and re-inject them. You can do that in a lot of the offshore operations, because the formations are a lot more permeable.

Tight gas and tight formations, like we have in the Rockies, that's not really an option because of the low permeability. You know, we can barely get injection wells to take saltwater, you know. Add a bunch of chunks of ground up rock to it and you're going to plug off pretty quick.

Q. Okay. Now if you could move on to your next slide you have your conclusory statement, if you could please go over those.

A. Yeah, this -- these three wells we drilled, and they're all in the city limits, so we were close to services. We are close to the permitted disposal facilities, which there are two of them that I'm aware of in San Juan County that are operating under a temporary exemption to accept drilled solids.

We were able to drill these wells because they're

not truly -- they're 80-acre infills from a permitting standpoint, but they're directional, so they were TD'ing them under existing structures that have been there for the better part of two decades, back when Dakota wells were probably spaced on 640s or 320s. So we're basically tapping a 320.

And we've got three sister wells to go with this, you know, because it's an infill program, but those won't get drilled with a closed loop. The payout just won't be there. We don't have the acreage to go to with this system, so we'll have to figure out something else there.

The average, $232,000 for these two wells.

The third well will bump that number higher. It cost more because of the dewatering system. We had to use it a lot more extensively. The two wells that these costs come from in this presentation, we had actually a freshwater flow at about 3000 feet and didn't have to do dewatering because we had water coming in on us. So that number is going to go up.

These wells, these infill Dakota wells, barely make the economics as it is. You add a quarter million to them, you go from an $800,000 drilled and completed to a million drilled and completed, and they just don't work.

So that's 20 Basin Dakotas we had slated for next year I'm recommending we don't even try to drill. We've

got acreage in Colorado, Utah, Wyoming, stuff that makes a better -- makes better sense economically.

This closed-loop -- if we have to go closed-loop, it's going to -- it's going to kill us, in New Mexico, so...

Q. Now, have you -- are you familiar with the proposed Rule 17 here for this hearing?

A. No.

Q. Okay. Have you reviewed it all or talked to anybody about it?

A. The proposed rule -- this proposed -- the closed-loop?

Q. Yeah.

A. Yeah, I've read that. Sorry.

(Laughter)

A. The number -- you scared me with the number.

Q. Sorry.

A. That's fine.

Q. Now, based on what you understand of the proposed rule and your drilling program for Merrion Oil, do you have any specific recommendations to the OCD?

A. Yeah, what surprised me, I had people coming to me wanting these cuttings for their land, to put in salt flats down by the river and stuff, and I actually went to Brandon at the Aztec OCD office and asked him if we could

do this, and he said the surface waste rules don't permit it.

It's -- We have a bunch of fresh water and dirt in a pit, and we're hauling it to disposal, and it really surprised me when I moved back to the Basin that we were lining reserve pits. And I thought, well, maybe that's if you're air drilling and getting condensate back, or flowing fracturing treatments back to your reserve pit instead of a tank, that you'd want to line your pit.

But if you're just drilling a basic well using the mud systems we use in the northwest -- the most benign mud systems I've ever been around, okay -- it doesn't make a lot of sense to line those pits, to me. That would be my suggestion, to eliminate the rule that you have to line the pit.

Q. Okay, under the current --

A. Yeah --

Q. -- under the current pit rule that --

A. -- that way your fresh water can go off into the ground that you used to drill, and -- and that's, you know, in the northwest, you know, the fresh water you're using. I -- Having the pit liner, you know, causes issues with getting the pit closed in a timely manner.

Q. Okay. Now did you do any chloride testing in your pits or of your drill cuttings?

A. Yes.
Q. Okay.
A. Yes, we did.
Q. And what were your chloride levels for your --
A. Drill cuttings were 450, I think.
Q. 450 --
A. Yeah.
Q. -- milligrams per kilogram?
A. Yeah.

MS. FOSTER: All right. Okay, I have no further questions of this witness. I will pass the witness, thank you.

CHAIRMAN FESMIRE: Mr. Carr?

MR. CARR: No questions.

CHAIRMAN FESMIRE: Mr. Jantz?

MR. JANTZ: No questions.

CHAIRMAN FESMIRE: Mr. Huffaker?

MR. HUFFAKER: Nothing, Mr. Chairman.

CHAIRMAN FESMIRE: Mr. Brooks?

MR. BROOKS: Yes, a few.

CROSS-EXAMINATION

BY MR. BROOKS:

Q. Good afternoon, Mr. Foutz.
A. Good afternoon.
Q. I don't have a lot of questions for you, but I

have a few here.

These wells were drilled with closed-loop systems for reasons of the area that didn't have to do with the proposed pit rule, correct?

A. Yes.

Q. So they would have been drilled with closed-loop systems in any case?

A. Yes.

Q. And did you -- did your closed-loop systems go a lot higher than your estimate, or were these wells justified based on the estimate -- on these costs of closed-loop systems that you're talking about?

A. The estimates ran well over what I projected. However, I was shooting for about 60 percent of what the projected cost was, so that's my own fault for being optimistic.

The reason these wells pay out, because we're drilling them directionally, and they're not true 80-acre infills, we're really penetrating a 320 with each of these, because they're under existing structures.

So that's -- the justification came in -- you know, we'd planned on drilling these wells for a while. We were waiting on directional vendors to get cheap enough and numerous enough, so...

Q. Yeah, I didn't totally understand what you said

about the estimates, but if you had known that it was going to cost this much would it still have been worth your while to drill these wells, based on your economic analysis?

A. Oh, these three, yes.

Q. Okay. Now you were talking about your drying pads that you had problems with, and I didn't totally follow what the problem -- why you had these problems.

Did you say that the drying pads were designed for a different type of rig? Is that what --

A. No, the closed-loop system is designed for a different type of rig.

Q. And what did -- how did that cause your problems with the drying pads? Did that cause the -- was that why the waste was --

A. It was slurried, it was more of a slurry than a -- you know, usually you want two phases, you want basically water and dry solids. And we had water, some dry solids, but mostly slurry.

Q. And you would have expected -- and you think the waste would have been drier if you had been using a system that was appropriate for the type of rig you were using or vice-versa?

A. I don't know.

Q. Well, I thought you were speculating that the fact that the system was designed for a different type of

rig caused your drying-pad problems; was that not -- was that not what you were saying?

A. The closed-loop system, yeah, was not appropriate for the drilling rig I was using. I've never seen a closed-loop system that was appropriate anyways. I mean, I haven't seen a good one yet. Now I haven't been to the southeast and seen Cimarex's system, but...

Q. Okay. The $28,000 for hauling the rig from Wyoming -- the closed-loop system from Wyoming and back, is that included in your costs there?

A. No. No, this -- I don't believe I put it in there. I think it's the -- it's the one big cost that was left out.

Q. Okay, the only thing you subtract out is $13,500 for reserve pit construction and closure, correct?

A. Yes.

Q. So you're assuming that that's all it would cost you if you were using a pit? You don't subtract out anything else?

A. Yeah, these costs were exclusive to the closed-loop system.

Q. Yeah, but you're not assuming you save anything else by using -- by not using a pit, other than $13,500 for pit construction; is that -- that's it?

A. Yeah.

Q. And based on the other testimony that I've heard in this case, I would assume that means that what you had -- what -- your alternative plan here that you're comparing this to is evaporating out the liquids and closing the pit in place?

A. Yeah, cutting the liner off and burying it.

Q. Yeah, without removal -- not burying -- not bury in a specially constructed trench, but just bury it where it is --

A. Yeah.

Q. -- where the pit is?

A. Uh-huh.

Q. And you said cutting the liner off, that's not the folding over that Mr. Carr's clients are proposing? You're just going to cut it off -- cut off the liner so it doesn't come up to the surface?

A. Yeah.

Q. And then bury the pit without a cover over the waste?

A. Yeah.

Q. Okay. You said something about -- when you were talking about your recommendation for unlined pits, you said something about unless you were putting frac water in the pits; did I understand you correctly?

A. Flowback.

Q. Okay. And you have something for -- you have an item for frac tanks and mud -- frac tanks and mud storage and cleaning of frac tanks on your exhibit?

A. Yes.

Q. Now is that something you would do only with a closed-loop system; is that --

A. Yeah, on this -- on -- during the drilling operation, usually frac tank is something that shows up after the drilling rig is gone and you're completing the well to hold frac water and store flowback water till you can take it to a disposal site.

We had to rent frac tanks, in addition to all the other equipment, to hold clabbered-up mud and other stuff that you'd normally have in the reserve pit.

Q. So this is not for your frac'ing operation?

A. No, no.

Q. And you said -- was -- this 450 chloride level that you -- was that 450 parts per million chlorides that you --

A. Oh, good Lord --

Q. -- when you were talking about -- Ms. Foster asked you if you'd tested the water, your water for chlorides?

A. Yes, we tested the cuttings. Not the water --

Q. Okay.

A. -- the cuttings. They were tested by a company called Envirotech that has one of the temporarily permitted facilities that can accept drill cuttings, and they do a field test on the drill cuttings to determine if the chloride content is below, I think, 1000 -- and I'm not sure what the units are, you have to forgive me on that, but I don't -- I'm not going to speculate because I'll --

Q. Okay.

A. -- I'll guess the wrong --

Q. Okay.

A. -- one, I know I will, so I'm not going to guess which...

Q. Are you aware that the Water Quality Control Commission standard for potable water -- or for drinking water is 250 milligrams per liter of chlorides?

A. No.

Q. But if the -- assuming that is true, would your suggestion that you just let the liquids flow back into the ground -- would that be putting fluids into the ground that could potentially have -- could go to drinking water and carry more chlorides than the drinking waters do?

MS. FOSTER: Objection. I'm sorry, I don't understand his question. I don't think the witness does either.

MR. BROOKS: Let me rephrase, Mr. Chairman.

CHAIRMAN FESMIRE: Okay, because I don't know how to respond to that objection.

Q. (By Mr. Brooks) Well, I don't know if the witness understood my question, but your suggestion would entail -- I understand that much of the fluid is going to evaporate, correct?

A. Uh-huh.

Q. But your suggestion of not having the pits lined would -- you would concede that that would entail some of the fluids going down into the ground where they might reach ground or surface water?

A. I don't know, depends on what the location -- what kind of dirt the location is on, you know.

Q. So you wouldn't concede that that would be what would likely happen?

A. No, I don't know for sure.

Q. Supposing it did, though. The chloride measurement --

MS. FOSTER: Objection. The witness stated no, so...

CHAIRMAN FESMIRE: He can answer in a hypothetical. I'll overrule the objection.

MS. FOSTER: Okay.

CHAIRMAN FESMIRE: You've qualified him as an expert.

MR. BROOKS: Yeah.

MS. FOSTER: Okay.

Q. (By Mr. Brooks) If you assume that the fluids did -- some of the fluids did flow back into the ground, in the first place the fluids that are going to evaporate, they're not going to carry any salts with them, right?

A. I don't know that.

Q. Well, maybe I'm taking you out of your expertise. I've already asked you about the chloride standard, so I will leave it at that.

A. All right.

MR. BROOKS: Thank you, Mr. Foutz. Nothing further.

CHAIRMAN FESMIRE: Commissioner Bailey?

COMMISSIONER BAILEY: I have no questions.

CHAIRMAN FESMIRE: Commissioner Olson?

EXAMINATION

BY COMMISSIONER OLSON:

Q. Yeah, Mr. Foutz, you're referring to this rule as the closed-loop pit rule.

A. Yeah.

Q. What do you base that upon?

A. The time I read through the rule, it -- I don't have it in front of me, but you had to be -- if you were outside of 100 miles of an approved disposal facility, then

you had the option of burying in place; is that correct?

Q. That's my understanding of the rule.

A. Okay. Well, if you're within 100 miles of a facility, which I'm assuming we are because I hauled these cuttings off to one, then you have to use this closed-loop system; isn't that correct?

Q. Well, I think I was asking you the question. Do you understand that the rule does not require the use of closed-loop systems in all circumstances?

A. Yes.

Q. And it does allow for use of earthen pits?

A. Yes.

Q. So I don't --

A. Under an exemption, right, you can get an exemption for an earthen pit.

CHAIRMAN FESMIRE: Mr. Foutz, why don't you answer his questions? He'll ask, you'll answer, for this part of it.

THE WITNESS: Okay.

Q. (By Commissioner Olson) I'm just trying to understand what your basis is for calling this a closed-loop pit rule. It seems to me that maybe you don't fully understand the rule. Do you understand that closed-loop systems are only required in certain circumstances under this rule, you're not allowed to have a lined pit?

A. Yes.

Q. Okay, so it's not a closed-loop pit rule then, is it?

A. In certain cases it's not, no. Rule 17, you said?

Q. And you were saying that all your generating is fresh water, and I guess I'm assuming fresh muds --

A. Yeah.

Q. -- is that your testimony?

And you had an analysis, you said, where you analyzed -- is that just from one of the pits, or --

A. It's from that cuttings drying area.

Q. Cuttings drying area?

A. Yeah.

Q. You had 450 --

A. Yeah.

Q. -- milligrams per liter of chloride? Did you analyze for any other constituents?

A. No.

Q. Just for chloride?

A. Yes.

Q. And you understand there's other contaminants in -- that could be in the water or the mud?

A. Yeah.

Q. And you didn't analyze for those, just for the

chlorides?

A. Yes.

Q. And you said this is fresh water. I guess you didn't analyze actually the water that you were generating from this site, you just analyzed the cuttings?

A. Yes.

Q. And I guess -- are you assuming that the chloride level of the water was around 450?

A. No.

Q. What do you project it to be?

A. I don't make those projections.

Q. Well, you said it was fresh water. I was trying to figure out what the basis of your statement is.

A. Well, I call the water-hauling company and request a load of fresh water. And the only differentiation that I can make is that it's not 2-percent KCl water, which is used in completion operations. It's a fresh water from a freshwater source, City of Bloomfield, city of whatever, or a watershed, a creek, pond, something like that.

Q. Did you see any of the testimony presented by the Division that showed actual analysis of water and drilling pit contents for northwestern New Mexico?

A. Huh-uh, no.

Q. Would it surprise you that they saw contaminants

above the water-quality standards?

A. No, it wouldn't surprise me.

Q. So why were you saying that the waters that you're generating at the site and the muds are fresh?

A. Because they basically are. Maybe I generalized too much when I answered it originally. But I guess in comparison to other mud systems I've used, you basically boil a northwest New Mexico drilling system into bentonite and water, fresh water.

Q. And there's no other contaminants in these --

A. I didn't say that --

Q. -- muds?

A. -- but I said that's the basic -- if I'm going to compare it to other drilling systems used in other parts of the state and other parts of the country, that's how I would classify it if I was talking to another drilling engineer.

Q. Well, you consider it fresh water. Would you drink this water?

A. I have before.

Q. You have before?

A. Yeah. Not on purpose, mind you, but --

(Laughter)

Q. And you drink --

A. I didn't say it was potable. I wouldn't drink it

on purpose, no.

Q. And so you're not saying this is fresh water, you're just saying it's cleaner than water, say, in southeastern New Mexico?

A. Well, no. I mean, I'll stand by and say I called it fresh water, you know, it's fresh in comparison to what I'd call saltwater, which would be a completion fluid, you know. You've got to forgive me for being general -- generalizing stuff like this, but no, I'd call it fresh water.

Q. And fresh water, to you, can have contaminants in excess of drinking water standards? That's what your definition of fresh water is?

A. Yes. From a drilling standpoint, yes.

Q. Do you understand that's not how it is defined within the state as what water quality standards are for drinking water quality?

A. I had a kind of a feeling it wasn't, but --

(Laughter)

COMMISSIONER OLSON: That's all the questions I have.

EXAMINATION

BY CHAIRMAN FESMIRE:

Q. Mr. Foutz, let's talk about your third -- the third slide, the one that had your conclusions.

A. Okay.

Q. The third [*sic*] conclusion, you recommended reducing and possibly eliminating the New Mexico drilling program for higher present-value opportunities in Colorado, Utah, and Wyoming.

A. Yes.

Q. Exhibits Number 37-12 and 37-13, are they the -- are those the basis of your conclusions? I mean, is -- are they the reason that you reach this conclusion?

A. 37-12 and -13, which are -- the cost-breakdown exhibits? I'm sorry --

Q. No, those were the economic -- Ms. Foster -- well, maybe we should start -- Were these part of the exhibits that you had originally intended to present today?

A. Yeah, I submitted them just in case I wanted to focus on them, but if you guys want to touch on them, that's fine too.

Q. I do.

MS. FOSTER: May I --

CHAIRMAN FESMIRE: Ms. Foster?

MS. FOSTER: -- approach the witness?

CHAIRMAN FESMIRE: You may, ma'am.

MS. FOSTER: Can I know what you're asking -- What are you going to talk about?

CHAIRMAN FESMIRE: And I'm specifically talking

about 37-12 and 37-13.

Q. (By Chairman Fesmire) First of all, what economics program did this come from?

A. This is a spreadsheet.

Q. Yeah, but they're the output for an economics program, aren't they?

A. No, they're a spreadsheet, just Excel spreadsheet, programmed with the typical formula you use in present-value analysis.

Q. Okay, so there's something proprietary to --

A. No.

Q. -- to Merrion, or --

A. No.

Q. Did you buy it as a program?

A. No, no, not at all.

Q. Something you wrote?

A. No, George Sharpe, who is our investments manager, wrote this spreadsheet.

Q. Okay. So let's talk about a couple of things. You put in a $70-a-barrel oil price for your analysis; is that correct?

A. Yes.

Q. And you didn't escalate it?

A. No.

Q. Okay. And you put in a $5.50-an-MCF gas price?

A. Yeah, for MMBTU, yes.

Q. Okay, for MMBTU. And you didn't escalate it?

A. No.

Q. Okay, so this is basically an unescalated economics case, isn't it?

A. Yes.

Q. Okay. But you did escalate the operating cost, didn't you?

A. Oh, yes.

Q. Why did you do that?

A. Because those have escalated a lot lately.

Q. So have gas prices, and so have oil prices.

A. Now oil price, I'll agree with you. Gas price, we're not really getting -- after basis, that $5.50 is a little high right now.

Q. Okay. You know, we subscribe to *Platt's Gas Daily* that shows the prices paid at the New Mexico hubs.

A. Yeah.

Q. And if I were to represent to you that the price is significantly higher today than that $5.50, would you agree to that?

A. If you had that data, I'm sure I would.

Q. So you didn't escalate the gas price, you didn't escalate the oil price, but you did escalate the operating costs?

A. Yes.

Q. Okay. And you discounted it at 16 percent; is that correct?

A. Yes.

Q. Okay. And it showed that without the closed-loop system, basically the $800,000 investment for this well --

A. Yes.

Q. -- you ended up making money, discounted at 16 percent, didn't you?

A. Yes.

Q. Okay. But this is -- this is a before-tax analysis, isn't it?

A. Well, there's a before-tax and an after-tax column there.

Q. Where's the after-tax column?

A. It's -- the box in the upper right-hand corner that says Economic Results, and there is a before-tax and an after-tax summary column.

Now there's after-tax line items that are cut off of this spreadsheet, but they're over here. It just itemizes them and they're summarized, but --

Q. Okay, but you didn't show us the after tax part, did you?

A. No, but I can.

Q. But you didn't?

A. Yeah, it's right here next to the before-tax part on the indicators.

Q. Yeah, but the numbers aren't there on my copy.

A. Do you have a different copy than this?

Q. I don't know.

MS. FOSTER: Well, Mr. -- Commissioner Fesmire, that's the reason why we had this witness transfer the numbers, because we opted not to include this as part of his exhibit --

CHAIRMAN FESMIRE: Okay.

MS. FOSTER: -- to discuss.

CHAIRMAN FESMIRE: But he's testified that this has been part of his decision and the reason that he made the recommendations that were part of his testimony.

MS. FOSTER: Okay, and he just offered to you, Mr. Chairman, that he can get it for you if you would like.

CHAIRMAN FESMIRE: Okay. And the point I'm trying to make is that it wasn't presented to us, and I want to make another point too if you'll allow me. The --

MS. FOSTER: My pleasure.

CHAIRMAN FESMIRE: Ms. Foster, we're going to continue. Okay? I'm going to ask the questions that I need to ask.

MS. FOSTER: I am unaware, though, Mr. Chairman, that you would have the right to ask on something that is

not included as part of the exhibit. This was included and sent to the Commission prior to the hearing, that is correct, but he has opted not to want to discuss it today.

CHAIRMAN FESMIRE: But he has testified that this was the basis of his conclusion that was part of his testimony today.

MS. FOSTER: Okay, and he offered to give you the additional information if you would like it, Mr. Chairman.

CHAIRMAN FESMIRE: I have heard that, and I also made the point that he didn't in the presentation, in the pretrial fi- -- in the prehearing filings.

Q. (By Chairman Fesmire) Now, Mr. Foutz, the additional cost that you would incur in the use of the closed-loop system, that amounted, according to your numbers, about $250,000, didn't it?

A. Yeah, two thirty for these two wells, approximately.

Q. And those additional costs are all intangible drilling costs, aren't they?

A. Yes.

Q. Okay. And how -- for an independent oil company like Merrion, how are those intangible drilling costs treated by the Internal Revenue Service?

A. You have to ask accounting about that. I'm -- all I know is that there's two different kinds of costs I

use in my AFEs, and these economic forecasts.

Q. Okay. So you don't know where these numbers came from? Is -- or why that they're broken out as -- into intangible drilling costs?

A. Yeah, the tangibles -- tangible costs are capitalized, I believe -- this is my thoughts, that tangibles are capitalized and intangibles are expensed.

Q. Okay, and what does it mean when they're expensed?

A. It means they hit you right now on your balance sheet.

Q. Okay. But for tax purposes, what does it mean?

A. Well, I don't know.

Q. Okay. If I were to represent to you that it means that you can write it off the first year, would that make a difference in your economics, as long as you had other income to write it off against?

A. I don't know.

Q. So in a pre-tax economic analysis, the proper way to treat this would be to reduce the costs by the intangible drilling costs, would it not?

A. I don't know.

Q. Okay, let's look at the Exhibit 37-13, and from this exhibit you're telling us that Merrion Oil and Gas can't make money if the costs of the closed-loop system are

included; is that correct?

A. These Dakota -- the Dakota infill program with the 20 wells that I talked about in this last slide, not on those wells?

Q. They can't make money?

A. Can't make an acceptable rate of return. I'm not sure, I won't know that unless we drill the things and produce them.

Q. Okay, but according to this model they can't make an acceptable rate of return?

A. Yeah.

Q. And what is that acceptable rate of return?

A. I believe 16 percent.

Q. Okay. But according to my calculations, even if you included that these wells would make about an 11-percent return on your money?

A. Yeah, 10.6 before tax, 11.8 after, with the closed-loop system.

Q. So Merrion Oil and Gas's hurdle rate is 16 percent, right?

A. Yeah --

Q. There --

A. -- I suppose you could look at it that way.

Q. There are other opportunities that they have out there that they can make up to 16 percent if they don't do

this; is that right?

A. Yes.

Q. Okay. But there are other oil companies who have a lesser hurdle rate, aren't there?

A. Yes.

Q. And in fact, most of the -- most other oil companies have a hurdle rate down around 7.5 or 8 percent; isn't that true?

A. I don't know.

Q. Okay. Well, if I represent to you that there's been testimony to that effect prior in this hearing, would that surprise you?

A. No.

Q. Okay. So even though Merrion Oil and Gas can't make money at this, there are other companies who can; is that correct?

A. I'm assuming there are, but you'd have to talk to them. The numbers presented here are a unique case for our company.

Q. Okay. And that 16-percent hurdle rate means that you have other options to spend your money at 16 percent?

A. Yes.

Q. Okay, and you agree with me that there are other companies that would take a much lesser rate of return because they have more money to invest?

A. Yes.

Q. Okay, so these reserves wouldn't be wasted, they would just have to be produced by some other operator --

A. No --

A. -- is that correct?

A. -- I don't think so.

Q. Okay, what do you mean, you don't think so?

A. They spend a lot more to drill the same well I drill. I drill them a lot cheaper than they do.

Q. Okay. So do you think that Merrion Oil and Gas could drill this, if anybody could?

A. Yes.

Q. Okay, but there are other operators who can drill just as cheaply; is that correct?

A. I'm not sure.

Q. But the point I'm trying to make here -- and I think -- I think you answered this, but I want to reiterate it -- the return, even if you include your costs on the closed-loop system, is still in the neighborhood of 11 percent on the money invested?

A. If the well yields a half a BCF of reserves, and we don't know that they will.

Q. Okay, but that's why you run the economics, so that you can figure out those kind of questions, right?

A. Yeah.

Q. Now you said you -- and this was a quote, and I can't remember exactly in what context -- "I hauled these cuttings off to a facility." What facility did you haul them off to?

A. Envirotech and IEI both have landfarms.

Q. Okay, so these cuttings were landfarmed?

A. Yes.

Q. You said you worked offshore.

A. Yes.

Q. And what kind of drilling system did they use offshore?

A. Well, they used a closed-loop system.

Q. But you stated that, I haven't seen a closed-loop system that was appropriate. Was it not appropriate for offshore?

A. Well, yeah, I suppose it was.

Q. Okay, so --

A. I should have specified on land.

Q. So you don't think closed-loop systems should work on land?

A. No, I wish they would work better.

Q. Okay.

A. These closed-loop systems we use serve the purpose, just not as well as I'd like.

Q. Okay, and could you elaborate on that?

A. Yeah, we had slurry instead of dry cuttings and water.

Q. So if there were more experience in closed-loop systems by the operators, the drilling engineers or you, they might have been able to work better in this situation; wouldn't -- is that a true statement?

A. I'm not sure. I'd like to think so, but I don't know.

Q. Okay. So these costs could be probably significantly reduced with a little more experience with the systems; is that true?

A. I don't know.

Q. Now you mentioned that sometimes you would call out a load of 2-percent KCl water. What's in 2-percent KCl water?

A. Potassium chloride.

Q. Are there any salts -- other salts in the 2-percent KCl?

A. I'm sure there are.

Q. Okay, what other kind of salts would they be?

A. Whatever would be naturally occurring in the fresh water they use to mix the KCl?

Q. What about the KCl itself? Is it always pure?

A. I don't know. I'm assuming no.

Q. Okay, and when you assume no, you're telling me

that there are probably other salts like sodium chloride?

A. Yes.

Q. Because that occurs in the KCl deposit -- in the potassium chloride deposits, right?

A. Yeah. When you call bulk KCl out of Moab or Carlsbad or somewhere, they guarantee you a purity. It's usually 95 percent and up, usually.

Q. Okay, I have no further --

A. Could I just -- could I clarify that --

Q. You may, sir.

A. -- when I called for the load of 2-percent, it's for a completion operation, not a drilling operation. This isn't something I dump in the reserve pit, 2-percent. That stays contained in a frac tank or a flowback tank or in the wellbore.

Q. Okay, and none of it gets into the pit?

A. Reserve pit?

Q. Yes.

A. No, we don't flow back or complete using the reserve pit.

Q. What other kind of pits are there? I mean, you're talking not about a pit in the ground, you're talking about a tank, right?

A. Yes.

Q. Okay. So you always control the KCl, and it goes

back into a tank?

A. Yes.

Q. Why is that?

A. Because I'm supposed to.

(Laughter)

CHAIRMAN FESMIRE: Then we've done part of our job.

Ms. Foster, I have no further questions. Do you have a redirect on this witness?

MS. FOSTER: I do have one question.

REDIRECT EXAMINATION

BY MS. FOSTER:

Q. Mr. Foutz, upon reviewing the rule as you have and coming to this hearing, would it be a fair statement to say that you're a little bit confused by the rule as written currently?

A. No, I'm --

Q. Proposed rule?

A. Yeah, I only read through it the one time.

Q. Okay, but in terms of applying it as a drilling operators, is the rule straightforward for you?

A. No, not at all.

MS. FOSTER: I have no further questions.

CHAIRMAN FESMIRE: Is there any recross on this witness?

MR. BROOKS: No, sir.

CHAIRMAN FESMIRE: Commissioner Bailey?

COMMISSIONER BAILEY: No.

CHAIRMAN FESMIRE: Commissioner Olson?

COMMISSIONER OLSON: No.

CHAIRMAN FESMIRE: With that, Mr. Foutz, thank you very much.

Ms. Foster, do you have another witness?

MS. FOSTER: I do, Mr. Chairman. I would call Tom Mullins to the stand.

CHAIRMAN FESMIRE: Mr. Mullins?

MR. BROOKS: Ms. Foster, which exhibits is he going to be testifying from?

CHAIRMAN FESMIRE: Mr. Mullins, would you stand to be sworn, please?

(Thereupon, the witness was sworn.)

CHAIRMAN FESMIRE: Ms. Foster, I missed which exhibits we're going to be working with.

MS. FOSTER: Mr. Chairman, we'll be working with Exhibits 4 through 10.

And actually I was informed by Dr. Neeper that Exhibit 10 did not get printed out -- or transferred onto my CD, and therefore did not get printed in your books. I actually have one copy and could make copies for the Commission when we get to that portion of the testimony.

CHAIRMAN FESMIRE: Is the witness going to testify off of it?

MS. FOSTER: He will be testifying at it during the latter portion of his testimony.

CHAIRMAN FESMIRE: Okay, we're going to need a copy. We can probably make it at break, huh?

MS. FOSTER: Okay, thank you.

May I begin questioning the witness, Mr. Commissioner?

CHAIRMAN FESMIRE: You may, ma'am.

THOMAS E. MULLINS,

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

DIRECT EXAMINATION

BY MS. FOSTER:

Q. Mr. Mullins, for the record could you please state your name and your background?

A. Yes, my name is Tom Mullins, my legal name is Thomas E. Mullins. I live in Farmington, New Mexico, 22 Road 3777. I have been a resident of San Juan County for 16 years. I have -- I'm a registered professional engineer in the State of New Mexico in the discipline of petroleum engineering.

And I suppose I should tell you a little bit about my background.

I graduated from the Colorado School of Mines with a bachelor of science in petroleum engineering in December of 1991.

I started my permanent career with Meridian Oil Company in Farmington, New Mexico. I worked for them for five years and five days. The extra five days was to get my pension before I went out and started my own company. In that capacity I served as a production engineer, a reservoir engineer, an acquisitions engineer, an operations engineer. Operations activity dealt with casing repairs, what we would call LOE, lease operating expense activity, which was different from capital budget activity. We're probably going to get into some discussion about operating costs and workovers and things like that.

When I left Meridian Oil, which was Burlington at that time, I started my consulting practice, which is the name of my company that I work for currently, which is Synergy Operating, LLC. We're an independent producer. I've been in business since 1996 here in New Mexico. We also have a consulting company, we manage workover and drilling operations and have currently approximately nine wellsite consultants that work for us in northwest New Mexico.

When I left Burlington I started consulting activities for Conoco, then began an operational role with

on us.

So we try to do all of the controlling of the bottomhole pressures, whether they be light or heavy, by the weight of our mud. In this case we're having to raise the weight so, you know, all this nice mud-cleaning equipment is nice, but if it takes out the weight you're putting in, it's not doing any good.

And barite is a very high-density solid, and that's what we add, generally. And the little screen on the bottom, it takes all that barite out, along with the other stuff. But what the screen does is, it catches -- it's just the right size to catch that barite and pulls it back off and puts it back in the mud. And then the finer microns of cuttings, probably less than 20 microns, they get taken out to the reserve pit.

So the waste off of that goes to the reserve pit, the waste off the shale shakers goes to the reserve pit. It's not unlike what you're seeing in a closed-loop system, except they go to either your drying pit or they get hauled away immediately.

The mud works its way down to the end of the steel pits, and there it's picked up by the pump again and pumped downhole after it's been cleaned.

So in a sense we're doing a cleaning job here too.

I think some people get the idea that when you use a reserve pit, that we're not doing any cleaning of mud either. That's not true.

Now on some really shallow wells, they don't much cleaning. I have to agree with that. Most of our wells, we do, because we're in them longer and we have to maintain the mud.

The reserve pit is way too big and costly to go ahead and mud up and try to maintain the weight, the viscosity and the water loss that we would need to do the well as we go along.

Let's see here.

Getting into the closed-loop system, we're going to look basically at the same thing. We're going to look at the components. We've got a couple of different methods for -- Actually, there's a variety of different methods and processes people use in setups for closed-loop systems. We'll look at some of those. They're not all the same by any means. The principle is basically the same, but the setups aren't.

We'll look at two particularly, continuous cuttings removal as we drill a well, and the other one is storing the cuttings on location, either in a pad or -- and removal at a later, or disposal on a deep-trench burial. Then we'll look at a little bit of footprint.

that we have here today, and that proposed alternative was to vacate the Application of the OCD currently and to continue the enforcement of Rule 50 as it stands right now.

I believe I'm the only party that sent in that entire proposal, and I do think that's a valid proposal for the Commissioners to consider.

I have a number of items to testify about. I've been present for all the testimony for the hearing. I take a great deal of pride in our work. And I've heard a lot of the public statements, and I've talked to a lot of business owners who are concerned about the rule, and -- and so I'm prepared, I guess, to go through my letter dated October 27th, which had some specific comments. I have a couple of exhibit items to discuss, but I'm -- I believe I'm fairly familiar with the rule, the various siting requirements. I'm prepared to do my best here.

If I could have a break or -- and get a drink of water, I would appreciate it.

CHAIRMAN FESMIRE: Ms. Foster, why don't we take a 10-minute break and reconvene at five minutes after 3:00?

(Thereupon, a recess was taken at 2:54 p.m.)

(The following proceedings had at 3:08 p.m.)

CHAIRMAN FESMIRE: Okay, let's go back on the record.

I keep thinking one of these days I'm going to

Footprint on -- I looked at a couple wells. We are currently drilling a closed-loop system well south of White City, about seven miles. It's a 12,000-foot well. It's about a mile -- it's about four or five miles, actually, from another well called the Lupine. The well that we're drilling is called the Grange.

It's -- The Lupine, and the reason why I bring it up is, it's another 12,100-foot well that we drilled in the same area that used the regular reserve pit system, as compared to the system that we're using on the Grange, and that's a closed-loop system, and that particular system is the system where we haul the cuttings continuously and you don't leave the cuttings on location at all. And I'll get into some of the cost of that and some of the footprints.

The footprint for that Lupine well, which is a conventional system -- when I'm talking -- we can talk footprints as the whole location, or just of the equivalent reserve pit area. It's easier just to -- most of the location -- outside of the reserve pit in most of our wells are about two acres.

And then you add on to that for a reserve pit, you add on -- For a regular system, for us, for a 12,000-foot well, you add about .42 acres.

For a system -- well, I'll get to the other ones as we go through.

Let's talk about the components. This little diagram that's up on the screen right now, I think a lot of you have probably seen. It came out of the World Oil article that Cimarex/M-I Swaco published, and it's a good diagram to understand what are the workings of closed-loop systems?

Again, your wellhead is over here, your pumps are here. They draw from a reservoir. In this case, it'll be coming out of these pits over here. They draw from there, pump downhole, comes back up, it returns to the steel pits or the working pits, still the same -- same name.

The way this system is set up here, they have two shale shakers to handle the volume. So they go over the shale shakers, same function as what I talked before, they take the bigger cuttings, and they drop them out here. They -- rather than dropping them into a reserve pit, they're dropping them right down here on a little pad area that they have built up underneath here.

Okay, the liquid goes down, it goes -- it flows then on down through here. It got a mud cleaner, which is the de-silter on top of a shaker. That's processed, that's dropped down here, and then the go down here.

And this is probably the one thing that most drilling systems, conventional systems, don't have, is this system here, which is what they call their dewatering unit,

in the northwest, regarding workover activity.

Q. Now in terms of the type of operations that you do, do you do highly economically -- high-economic-recovery wells or another type of well that you specialize in?

A. Unfortunately, being a smaller independent, we are challenged with working primarily on the fringes of the San Juan Basin. So our reservoir rock and our -- I guess our giftedness of Mother Nature is somewhat limited. So our reserve rates on some of our projects are less than some of the major companies.

Q. Would that make them, then, marginal wells?

A. Yes, we -- in fact, we have a number of marginal wells, and as an independent operator working up in Farmington for over 11 years now, we've acquired a number of marginal or non-core properties from major producing companies in the attempt to maintain that production for the State of New Mexico, and obviously for ourselves, to get a rate of return. We've done that with ConocoPhillips, a number of smaller operators, where we've taken over actual plugging candidates and gone out and taken that risk, reworking several wells to try to return them to production.

Q. Okay. Now Mr. Mullins, could I direct your attention and your focus to the Fruitland Coal discussion that I believe you stated you had in your letter? And we

dropped over here on this pad. And most of the water has been taken out of them and put back in here. They're still kind of wet.

And that's why in this particular system they've got this little loader, front-end loader, that they go in here -- they go in here and shovel up those cuttings that have dropped, they turn around and dump it in here.

That brings us to -- Let's see, we've got to talk about some other things that's very important, that's often neglected. The extra tanks.

Over here they've got fresh water and brine storage. These are water supply tanks. We talked about having to have enough water on a location to drill a well and to handle problems when it comes up. If you have lost circulation, which we do a lot in the shallow portions of the hole, the surface and intermediate portions of the hole, you have to be able to keep up with that loss, so you have to have some reserve water on hand.

They've got four tanks here set up. So that's always nice. If you're in an area that has much worse lost circulation, you have more than that. If you have more tanks, then it's going to require a bigger footprint.

Looking at the other end of the spectrum, you know, the water flow situation, which is a severe and critical situation in southeast New Mexico, because those

A. Yes. The -- as the Commissioners are well aware, the Fruitland Coal formation is an important resource in the San Juan Basin. Approximately 50 percent of the production in the San Juan Basin currently comes from the Fruitland Coal.

Our particular development is in Township 21 North, Range 7 West area, which is the Chaco slope area of the San Juan Basin. That would be just a little bit south of Lybrook, New Mexico. The Fruitland Coal formation is encountered at approximately between the depths -- depth range of 600 feet in depth and 900 feet in depth. In our particular project area the coal thickness is approximately 20 feet of Fruitland Coal. I've been working that southern end of the Basin, which is obviously the marginal end, for several years.

This particular exhibit is in relation to the hole-size calculations for both cement volumes, as well as drill-cutting volumes, for the anticipated costs relating to a dig-and-haul scenario and/or closed-loop calculations, as you may have it, regarding the proposed rule.

There's -- in this particular project area, we drill a 12-1/4-inch surface hole. I have two columns, basically. The left-hand column has some volume calculations for cement, which I think is an important part of the discussion.

One of the best management practices in northwest New Mexico is to try to circulate cement to surface on all of our casing strings. The rules do indicate, you know, obtaining overlap in instances where you have multiple scenarios, but operators have been trying to adopt that.

So the left-hand side of the column has a 12-1/4-inch surface hole. We're running 8-5/8 surface casing, typically three joints of that. Gets to 120 feet in depth, and then we cement that casing to surface.

Something that hasn't been talked about in the operations is how you drill a surface hole. When we go out to drill a well anywhere in New Mexico, or anywhere, you basically have to start drilling a hole in the ground.

There were a number of slides presented by the OCD that indicated improper berming or anchoring of the liner, and I respectfully disagree with that interpretation of those slides.

In many instances, there's a design channel which is a depression, which is designed to carry the fluid during the drilling of the surface hole and drain that directly into the reserve pit. And on that working side of the reserve pit, we do try to have the ability for all of the fluids to be contained that come into the pit. So the anchoring of that is typically an apron or liner that is placed underneath the working side.

The typical cementing operation that we have for surface casing is, we are protecting the shallow groundwater formations. We normally pump cement until we see cement returns coming back on the annulus and coming back into the reserve pit, at which point in time we just displace the surface casing, cement down the hole either with a wiper plug, wooden plug, or even just regular displacement mechanism, and then shut that in.

So the hole calculations for a 12-1/4 surface hole and running 8-5/8 surface casing to 120 feet in depth -- the hole calculations on the right side deal in barrels per foot of waste, or drill cuttings in this instance, that would come to surface. There's been some discussion about the multiplier dealing with -- in relation to hole volume. We can go into the specifics of that, but I used a multiplier of 10 in this system.

As with all operations, most all operations that are drilling a surface hole, it is very unusual to place those initial cuttings of drilling the surface hole back into a tank of any type. There's not typically any sort of conduit or conductor, at least in northwest New Mexico, that would conduct those fluids up into a tank. Those are normally placed into a reserve pit.

The remaining portion of the hole, we've been trying to reduce our hole size on this shallow Fruitland

Coal development. We have been drilling 7-7/8 hole, which is actual -- it indicates 7-inch hole size on the slide. It's actually 7-7/8, which is listed in the calculation, and we're running 5-1/2 production casing.

And the figures I've used are 1000-foot depth for the well. We've talked about a number of deeper wells that are 12,500 feet, 7200 feet, 7500 feet. This particular instance that I'm representing is a shallow Fruitland Coal development, and I do see quite a bit of -- from an offset operator in San Juan Basin development, that a large number of new wells are in this shallow Fruitland Coal development trend.

The major production or the overpressured envelope, the fairway area that's been testified previously, has seen reduced drilling counts in that particular area.

So I have the cement calculations which I use in normal practice again on our 1000-foot, 5-1/2-inch long string, is to cement that casing to surface. We typically pump 100-percent excess cement volume for the hole size. We do try to determine the hole size with our open hole logs, we run a caliper to try to determine that. But as a best management practice, we want to ensure the protection of groundwater and zone isolation, so we pump sufficient cement to surface, we bring that to surface.

CHAIRMAN FESMIRE: Mr. Mullins, can I ask a real quick question on that?

THE WITNESS: Yes, sir.

CHAIRMAN FESMIRE: Do you have any problem getting a cement job around your collars on the 5-1/2 in the 7-inch hole?

THE WITNESS: You know, I have not. The requirement in the current rules -- I'm not sure if I have it listed -- is, there's a certain offset or standoff distance that relates to that, and we are within the requirement of drilling actually a 6-7/8-inch hole, I believe, and running the 5-1/2. We're running centralizers on every single -- excuse me, every other joint of casing, which in this particular area, about 40, 42 feet.

We're drilling these wells, basically, with a very small rig, and there's been some discussion of the various rigs and sizes and capabilities. I'd almost call them glorified water well rigs, drilling in this particular area.

There's a number of small businesses and shallow hole drillers that, you know, perform this service, and it allows us to have a very small footprint. We've talked about footprint and area size and different things, and the siting requirements and the various equipment are of concern.

I'm not sure if I answered your question, sir.

CHAIRMAN FESMIRE: I think so.

Q. (By Ms. Foster) Mr. Mullins, talking about the rigs, why don't we move over to that issue? You mentioned that there is a lot of small rigs in the Farmington area drilling for Fruitland Coal?

A. Yes, that's correct. From my research -- I've been working in that area quite a bit -- there's a number of different -- as being on the service side and as a consultant.

The workover rig activity specifically is tracked, as well as the drilling rig activity, by some of the service companies, mainly some of the bit companies. They have some -- you can stop by their shop and they have boards and they track, you know, who's drilling what well, what bits they're running and -- you know, it's a good way to find out information if you're a little independent on what operations are going on.

But there are a number of shallow-hole-driller drilling rigs. In particular, it's a kind of a niche market for this type of development. Obviously you're not going to drill a 12,500-foot well with a water-well rig.

Q. And is there -- with these small rigs is there a height issue if a closed-loop system had to be installed?

A. Yes, the -- In our particular instance in the

shallow Fruitland Coal development, there have been some technical papers presented. Our solids control equipment is our reserve pit. We utilize Mother Nature, or gravity, basically, to separate our cuttings.

Our pit sizes are very small. We've tried to optimize that separation. Normally our pit -- our pit sizes are actually smaller than the deep-trench burials that are in the southeast New Mexico. Typically, our reserve pits are only as wide as a single 'dozer width. That depends on the 'dozer size, the particular Cat. Maybe 12 feet in width.

We typically dig that straight down, we come up the sides -- it obviously has some slope angle to it -- and then we try to partition a little bit of mounding in between the reserve pits. So basically it's -- I don't know if this is the proper term, but it's kind of like a bra for, you know, lack of a better term. It has two cups, basically.

(Laughter)

CHAIRMAN FESMIRE: Is the record going to reflect that Freudian slip?

(Laughter)

THE WITNESS: So the two segments of the reserve pit, we do use that reserve pit for our solids control, with the majority of the solids being deposited on one side

of the pit and the liquids of the mud system used on the opposite side.

When we start off our drilling operation -- I have some specifics, MSDS sheets and different things that have been submitted, but we typically use bentonite. In fact, you know, I -- being an independent, I haul it down in my pickup truck because I can put enough bags of gel in the back of my truck to drill the well.

We mix 30 sacks of that fluid and need that, typically, some gel strength along the wall for that part of the surface hole that we're drilling, to stabilize the surface hole. So those cuttings directly go into the reserve pit. We use that spud mud system as our basic constituent of our drilling fluid, moving forward.

When we drill our production hole in this particular area, we use a couple of jugs of what's called poly-cluster polymer. I have the MSDS sheets on that. That's a nonaqueous-phase liquid. It is a hydrocarbon product. If you --

Q. (By Ms. Foster) Actually, Mr. Mullins, before you start moving into the drilling mud, which we'll talk about at another time, I would like to pull you back to the rigs.

A. Okay.

Q. Okay? Is there an issue with the rig floor

height with rigs in San Juan County?

A. Yes, I apologize. The shallow-hole drilling rigs typically do not have a substructure rig floor, so rig height is a major concern. Drilling in a closed-loop operation typically requires steel tanks and circulating into those steel tanks, rather than utilizing the reserve pit. That requires an elevation of the rig floor to conduct those operations in a safe, consistent manner.

If you're breaking your connections on your drill string when you're drilling and you're trying to pump the fluid over to the tank, it will U-tube back around the hole on every single connection and splash out all over the rig floor.

And so typically what is done on a smaller rig is, they bring in a substructure or ramp, and that effectively allows some of these smaller rigs to be placed higher in order to do the drilling operation.

The problem is that many of these rigs do not have a floor. They're basically working from a table situation, and they don't really have a ramp and a floor system in place to facilitate drilling of these shallow wells.

Many of the drilling contractors that drill the shallow wells have some different size trucking capability to move the substructure and ramp, that would be designed,

basically, specifically for their shallow rigs if the proposed rule, you know, requires closed-loop in a small manner.

I have done closed-loop drilling operations, I forgot to mention. I'm familiar with all the equipment, so...

Q. Okay, moving on, in San Juan County is the term cavitation -- are you familiar with that term? Is that a type of drilling?

A. It's a -- cavitation operation has probably accounted for the majority of the Fruitland Coal production in the fairway overpressured area. There's also a term, recavitation, which is a workover operation associated with cavitated or high-rate coal wells.

A cavitation process is basically -- I guess to start off with, would be, in my opinion, nearly impossible to perform in a closed-loop manner. There were several slides presented by the OCD that indicated some tankage or a tank that would have a blooey line, which is a six-inch diverter system that goes over to these tanks to try to control some of the high-rate gas flow.

The problem in a cavitation process is, you use water and air, you pump it down the drill string into the coal formation to fracture the formation, and then you release that pressure, typically, in a large-size flow

line, not a little 2-inch standard diverter line, but a 6-inch line, and usually there's multiple blooey lines, because you don't want to have that pressure trapped.

And that -- the coal, the air, the gas, the water and fluid, is released back up to surface. I guess the best way to describe it would be to look upon the picture that's hanging on the wall behind the heads of the Commissioners that has the flare in the background. That is a cavitation completion operation going on in northwest New Mexico.

That blooey line facilitates the release of coal chunks, which can be, you know, as large as my water bottle. I've seen that, coming down that 6-inch blooey line.

You can attempt to try to conduct some of these operations without a flare or fire into some of the tanks that are represented there. The difficult -- or that were represented in the -- a couple of the OCD slides on -- in the 106-slide montage that started our -- the hearing.

The difficulty is, when you need to ignite or flare this particular operation with the coal, I'm not sure how to safely handle the gas flow, gas volumes and concentrations that come out. It's attempted and performed in certain wells, but they're lower volume. They don't have the higher gas volumes, and they're not at a

sufficient level to be -- with the natural gas flow that's coming out near the rig, would be a safety concern.

Q. Now Mr. Mullins, on the cavitation process, would you find yourself as a small operator in a situation where you'd be 50 -- less than 50 feet to groundwater and wanting to do a cavitation operation?

A. Yes, I believe so. I think there's a number of operational requirements when you look at a cavitation or a recavitation operation. There is a difference between northwest New Mexico and southeast New Mexico. I think that's evident in some of the testimony.

But the siting criteria when you do a cavitation or workover operation -- recavitation, excuse me -- there is typically existing equipment, production tank battery, separator, on those well sites that take up some of the additional room. And that would be the case in any workover operation that's performed.

Siting some of the -- the pit in addition to the flow lines, a number of other operations, and then meeting all of the siting criteria may cause a number of recavitation operations, which are basically existing production of a high-rate coal well that could not be performed, primarily due to the siting requirements of the rule.

Many of those existing locations, based upon my

review of the rule, would not meet all of the requirements, and would require dig-and-haul of large percentages of the soil in the area.

Q. All right, but the 50 foot to groundwater is the closed-loop -- is one of the closed-loop requirements?

A. Yes.

Q. And if you're testifying that you can't do cavitation, if you're -- in a closed-loop system, then what would you do as an operator?

A. I don't know of a specific answer to that. Probably have to brainstorm some ideas on performing a recavitation operation.

Q. Okay, could you come to Santa Fe and ask for an exception?

A. I suppose we could always discuss with the Division protection of correlative rights and prevention of waste.

Q. Now based on your experience as a consultant and as a small operator, how many of these Fruitland Coal wells do you think will have to come to Santa Fe for an exception for cavitation?

A. I can't even guess the number. You know, to put a guess on that would also make me make a guess on the number of applications that the OCD receives on a daily basis for workover operations in general, not even just

tying that number specifically to cavitations.

You know, the primary focus of our discussion has been, you know, drilling. We've tossed around numbers, 1000 wells or 1200 wells a year, and breaking out those numbers.

Based upon my experience in following the rig activity, there's currently, I think, 127 workover rigs operating in northwest New Mexico. And pick a percentage of those that are requiring a temporary lined pit for their particular operation, whether that be remedial cement work, repair work, trying to handle the stripping operation.

And then put in all the hydrologic report requirements and everything that's proposed in the rule is just, you know, beyond -- from my common sense -- you know, from the application.

When you go to do a workover, half the time you don't -- each rig, operational rig, is different. It comes with different equipment. You typically perform a one-call analysis to identify all the flow lines in the area from the operator and the pipeline company, and many times you're limited on your siting.

Safety is a major issue dealing with gas wells. We typically try to have the flow tanks or pits outside of the guidelines.

Q. Okay, Mr. Mullins, can we just stay within the

focus of cavitation, please?

A. Okay.

Q. Okay? I want to try and get through all this material, because we have quite a bit here.

Moving on from cavitation to air drilling and gas drilling, is that something we generally do in the Fruitland Coal area in northwest?

A. Yes, the completion operation of cavitation utilizes air drilling operations.

Q. Okay, what exactly is air drilling, for the record? Or gas- -- air drilling, gas drilling?

A. Air drilling or gas drilling was referenced as a pollution prevention item that the industry has been practicing in northwest New Mexico for, I believe, almost 40, 45 years. That operation entailed drilling with an air or air mist fluid, underbalanced drilling fluid, and drilling a hole through lower-pressured formations or formations that have high lost-circulation potential.

It has been proven in the northwest in certain areas to be the cost-effective and proper manner to develop both Mesaverde and Dakota production zones, in addition to the Fruitland Coal completion activity.

Q. All right. And can you complete air drilling or gas drilling, what you just described, in a closed-loop system?

A. Again, handling the cuttings volumes and the flow rates that may naturally occur in a particular well in a closed-loop fashion would be extremely difficult. You would need to utilize a non-flared operation to handle that, and I believe we'll encounter that, I guess, as we move forward in the proposed rule. I don't have an answer.

Q. If you use a non-flared operation, does that mean that you have gases all around the location, then?

A. You can build potential quantities of natural gas. Again, it depends on the particular formation. You can utilize tanks, steel tanks and lines in certain conditions, but in an air drilling operation that's typically what you see referenced with the pictures that were presented by the OCD of some steel tanks that had the 6-inch blooey line connection on that.

Q. Okay, and what about the use of the tanks that Mr. Foutz testified to, that he actually didn't have to end up using? Could you use one of those, a choke line --

A. No.

Q. -- a flowback tank with a choke line?

A. No, that tank would not be appropriate. You know, the siting requirements in northwest New Mexico, we try to reduce our footprint.

But when you are drilling with an air system you need to ensure that you have sufficient distance from the

wellhead, from a safety standpoint, to place your -- the earthen or back-bermed part of the pit that would drain into -- drain into the reserve pit.

So typically you try to run that about 90 feet -- 60 -- depends again on the operation. If you're working for -- some operators have a different safety policy than others. But the normal operation is to have approximately 90 feet from the wellhead to that exit point of air or gas drilling.

Q. Okay, so you couldn't do that in a closed-loop system because of the distance requirements?

A. Not because of the distance requirements, I just believe it would be -- under the current rule, the way I've read the rule, lining the bermed portion of the pit would be difficult if under a flaring operation. But from an air operation it could be done, but you would need to drain that fluid again back to a reserve pit. I'm not sure how you can put that material into a tank and then somehow go to clean out the tank every so often.

Just -- normally drilling is a continuous occurrence, especially with air drilling, and you need to proceed forward and -- you know, to your -- to the total depth of the well.

Q. Okay. Now I believe that segues into the next topic of conversation, which is the size of your well

locations in New Mexico?

A. Yes.

Q. Generally, how large are they? Obviously it varies, but --

A. Well, that brings me to a couple points. I'm trying not to digress too far.

Q. Thank you.

A. The -- Normally when we drill a well, we file an application to drill. I believe the document has a surveyor's plat. Under the current rule we identify where the reserve pit or the blow pit would be on an operation, to drill a well.

The APD documentation gives an idea of the location of the reserve pits. I'm not sure of the actual date when that went into effect in New Mexico with the BLM, but I believe the majority of the records of the OCD would have that identifier.

And I apologize for digressing, but I remember there was a statement about unknown number of pits, and I wanted to reference back that I -- typically, when I've done my research, looking at things, go back to the records and identify, you know, where the reserve pits were located.

And I apologize, I forgot your question.

(Laughter)

Q. Okay, the size of well locations in the northwest.

A. The size of well locations in the northwest.

The -- as the Commissioners may be aware, the Farmington field office for the BLM put in a resource management plan a few years back, trying to reduce the distance between well locations to collocate or twin well locations, and I believe approximately 65 percent of the locations drilled in northwest New Mexico are drilled on a collocated or twinned well location.

I forgot our question.

(Laughter)

Q. Okay, discussing the pad size for all --

A. Yes, the pad size is a major concern. We have been trying to reduce the pad size in northwest New Mexico typically down to a distance just outside of the rig anchors. I believe our current pad size in the majority of the operations is approximately 1.5 acres in size. That includes the entire well pad and pit area. In our particular shallow Fruitland Coal operation, our pad size is much smaller, though.

Q. Okay, so what is it that dictates the pad size, then?

A. The pad size is typically dictated by the rig, in particular, and the amount of equipment and the actual

drilling operation, for instance, if you're going to be drilling with air or gas.

You also need to consider the completion that's designed or planned for the particular well, as well as the surface facilities.

Q. Okay. And the pad size, will that change, in your expertise, with closed-loop drilling?

A. Yes.

Q. How will it change?

A. I have looked at the rule and the documentation and testimony, and I believe that the pad size will have to be increased in northwest New Mexico from its current standard in order to conduct drilling operations in a safe manner.

Q. Okay. And when you say in order to conduct in a safe manner, what do you mean by that?

A. There's been testimony regarding the amount of equipment, tankage, reserve fluids, to conduct a closed-loop operation. And I believe in northwest New Mexico, given some of its specifics on the drilling operations, particularly underbalanced operations, you need to have a distance between the equipment to allow access and safe handling of the materials.

You know, one of the discussion items was the deep-trench, you know, burial option. In siting a deep-

trench burial on a collocated pad, trying to minimize your footprint and distance, I'm not sure how that would function in northwest New Mexico. I'm not aware of any deep-trench burial, exact name, operation in the northwest.

Q. Okay, so how do you do closure methods in the northwest now, then?

A. Well, I've been on location when the reserve pit's been constructed as well as when it's been closed out.

The closure operation? I apologize, I'm --

Q. Current methods of closure if you're not --

A. Current --

Q. -- if you're not using deep trench.

A. Current methods of closure on site in northwest New Mexico differ significantly from the proposed rule. The BLM has the gold book standards that were mentioned. There's also been actual re-vegetation efforts that have been significant in the northwest.

Mr. Meador testified to his testimony regarding closing a pit. You basically cut the liner above the mud line, typically 6 or 8 inches above the mud line, all the way around the pit. You remove that liner apron and that material and haul that off, then you close the pit out by stabilizing the soil, by placing native soil in the area in on top of the pit, as well as rolling that material in with

a -- at least the operations that I've been involved with were done with a backhoe, typically.

I guess there's been a lot of discussion about the burrito, and -- in the hearing. And at least since I've been working in northwest New Mexico, the actual menu item would probably be a taco rather than a burrito, because the --

(Laughter)

-- we don't close in the top of the pit. That hasn't been the best management practice that the BLM currently utilizes. It has a benefit from the standpoint of the -- some of the volatile entities that are listed in the constituents are not impeded by the top liner. And the vegetation, at least from the information that I'm aware of, has performed much better in northwest New Mexico by not placing that top liner on top of the -- top of the pit in that area.

Q. So how is it that you top off your tacos, then, in the northwest?

A. Well, we typically place the -- initially when we build a location, we take the first foot of topsoil off of the well site, stockpile that in an area that will not be impacted by the activities on the well site, and we place that material back on top of the reserve pit area, re-seed and drill-seed that area to be re-vegetated, based upon a

prescribed vegetative cover.

There's been a lot of meetings with the cattle growers and ranchers up in northwest New Mexico in trying to improve the seed mixes and re-vegetation in that area, and I think that's worked really well. I think some of the seed mixes that had been used in the past were not as beneficial, but the current practices, I think all the parties have come to the table, concerned stakeholders and ranchers and -- to try to improve the rehabilitation of the reserve pit and pad area.

Q. Okay. So under the proposed rule, the on-site closure method that you're using now is not available, correct?

A. Yes, we -- at least under the proposed rule, the way I read the proposed rule, any sort of on-site burial option would require a burrito, rather than a taco. And I'm not aware of the Oil Conservation Division has visited with the Bureau of Land Management on that, specifically in northwest New Mexico, on the re-vegetation.

Q. Okay, but the burrito for the deep trench is actually picked up from a pit and put into a secondary pit?

A. That's my understanding, yes.

Q. Okay. And again, is that a possibility for you as a northwest operator?

A. You know, I -- given -- I don't see that as a

possibility, given some of the siting requirements. I'm not aware -- Mr. Foutz testified to some, you know, drying-pad areas and hauling that off, so obviously, you know, it was done in that instance.

But deep-trenching, I think, is basically going to be utilized in the same area that the reserve pit would be placed in currently from a footprint standpoint.

I'm not sure, but -- from the pictures that have been shown even in the southeast New Mexico, where the actual deep-trench burial goes. I mean, the only thing I've seen are drying pad areas, and if the deep -- you know, I -- Mr. Chavez had some slides that related to the size of the deep-trench burial pits. Most of those figures, from what I had looked at, were actually larger than the reserve pit sizes in northwest New Mexico.

Q. Okay, giving you a hypothetical, if you're an operator that has -- due to siting requirements, the availability of doing an earthen pit, but you want to leave it on-site in northwest New Mexico, under the proposed rule what would you have to do?

A. I'd have to meet all of the requirements of the -- I guess I would use the term, it's a confusing rule. Without having it right in front of me to cite the specifics, I'd have to meet the 50 feet to groundwater, and there's several siting distances that would be required.

I'd have to have surface owner approval, which would now be in effect on even workover operations.

It would be -- it would be challenging. And I'd probably be requesting an exemption on a form that I'm not sure exists, to obtain these exemptions and submit them.

Q. Would you have to expand your footprint?

A. I believe so. I mean, in order to handle the equipment, if we're going to use a drying pad area and then deep-trench burial it on site, I think it's going to require an additional disturbance of the wellsites in northwest New Mexico.

Q. Okay. Now currently do you do what's called stabilization of your pits when you're closing them?

A. Yes, and I know there's been some discussion about stabilization and additives in relation to landfills.

A couple of items. The -- couple of main constituents in our reserve pits, and they're -- not to get off the subject, but bentonite is one, and cement materials are the other portion. Those items help stabilize some of the cutting material. We typically just use the native soil in the area, mixed with the concentration of the solids.

And I believe, at least historically from what I've looked at in northwest New Mexico, that's been an appropriate method.

Q. Okay, and we'll get into that a little bit later.

Now you've been present for the whole hearing?

A. Yes, I have.

Q. And I believe at the beginning of the hearing there was a statement that there have been instances of groundwater contamination due to drilling pits, and I believe it was Mr. van Gonten's testimony or Mr. Price's testimony?

A. Yes, I was here.

Q. In fact, there were 10 examples in the testimony, I guess, that have come up a couple times?

A. Yes, that's correct.

Q. Okay, do you have a -- can you address those statements?

A. Well, I guess I have a few statements. It appears from the testimony that I've been present for that there are 10 cases in southeast New Mexico of potential groundwater contamination. I believe those cases were under investigation.

There were also a reference to a number of cases that were on Mr. Price's floor, and I'm not sure if it was Mr. Jones's floor also, that related to potential contamination cases.

I have reviewed all of the publicly available data that I can get access to, to try to determine if a

lined workover or reserve pit in northwest New Mexico has had impact to groundwater, let alone a contamination, and I've not identified any.

Q. Now I believe that as it pertains to those 10 examples, that there was a statement made that those were all operator-reported.

A. I believe that's correct.

Q. Okay. Now contamination to groundwater, what does that mean to you as an operator?

A. Well, it's probably more appropriate what it means to the Oil Conservation Division --

Q. But you're not them, so I'm asking you as an operator.

A. Contamination to groundwater would mean, in my mind, placing a contaminant into the groundwater. That would be my definition for contaminating the groundwater.

Q. Okay. And would it mean placing contaminant on soils with no water present?

A. No, that would not be my -- my interpretation of that.

Q. How about spilling a contaminant in a dry watercourse?

A. Well, I suppose if the water was running it would be a problem. But if you could remove the material prior to contacting fluid, that would not be a contamination

case.

Q. Okay. In other words, that you as an operator were to clean that up under the spill rule, correct?

A. Absolutely, yes.

Q. Now you say you're familiar with closed-loop equipment.

A. Yes.

Q. And in your experience as Synergy operator, do you ever have an opportunity to buy or look at the cost of the actual specific piece of equipment?

A. Yes, I have. The -- I actually researched this in depth the last time the pit rule was in place, and I have a number of cost items dated, a couple of years, obviously.

But to put together a single -- it would be a mud-cleaner system, which is by Derrick Systems, D-e-r-r-i-c-k, Derrick Flowline Systems. They provide some of the best operational equipment on the market.

Acquiring a triple-screen shaker -- they have three screens stacked on a particular deck, and then it has a 10-cone mud-cleaning system on top of that, and then a centrifuge -- single-centrifuge system.

And then placing that material on a tank -- I had several options on that; they do have some slight upgrades -- but it's approximately $400,000 for that equipment from

what I remember.

Q. Okay, and that's for a single shale shaker?

A. That would be for the -- a single, you know, mud-cleaner system, which is a triple-deck shaker underneath a cone system, and then a single centrifuge. And they do make some different sizes of centrifuges, you know, to handle different flow rates.

Q. And is there a mud-dewatering system with that?

A. That is -- I tried to put all that together. I was assuming that putting that system together I would also rely upon the existing shaker system and cone system if the particular rig had that.

Q. Okay, and that $400,000 is just for the equipment, the hardware?

A. That's correct. That did include, I think, the steel tank. That did not include the electrical wiring, powering. There's a lot of specifics that deal with explosion-proof wiring out on some of the rig operations that would have to be conducted. But yes, that's my figure. I believe that's correct.

And I guess the biggest issue was, I was trying to convince my partners that maybe we needed to get into the closed-loop drilling business and what a great idea this would be. They didn't bite on that, and especially didn't bite on it from the standpoint that we would have

had to pay the money up front, and it was approximately nine months before delivery of the items, the centrifuge in particular. I think it was approximately three months for delivery of the mud-cleaner system.

Q. Okay. Now as a small operator, what is the availability of closed-loop equipment now?

A. You know, I have not called recently. You know, as with the oil and gas business, if you need to get something from Wyoming, as Mr. Foutz stated, to meet your purpose, you -- in that instance he went and got that.

I'm not exactly aware of the current availability of closed-loop systems in the northwest.

Q. All right, and how about the availability of personnel? If you were looking to buy one of those systems, you must have looked at that as well.

A. Labor is a major issue in our business, finding qualified people. The particular individuals that I've worked with on closed-loop systems take their work very seriously and take pride in their work because it's challenging. If you have barite material, lost-circulation material in the drilling fluids, getting that to actually function within the closed-loop equipment is a challenge.

So labor -- I don't know from a skilled-labor standpoint. It would be a challenge. Maybe the San Juan College energy program could start a training program in

northwest New Mexico, but that would probably need some lead time associated with that to get the people trained.

Q. How many specialized people do you need on a closed-loop location?

A. Well, you would need two. And I hope one of them isn't sick, you know, so that -- or has some other reason not to show up, which is a regular occurrence in our business, so...

Q. Okay. Now you're a small operator, I believe you stated. How many wells do you drill a year?

A. We've -- the last couple of years, I think we've drilled approximately six wells.

Q. And I believe you stated that you have an investor issue to deal with?

A. Yes. I should probably finish my exhibit that I've digressed from.

Q. Okay, Exhibit 4?

A. Exhibit 4, which was the hole calculations and the cost of the particular Fruitland Coal project that relates to our investor issue.

I've included some figures for the waste. I used a 10 multiplier on the hole volume. I calculated the solid waste to be 152 cubic yards, basically, and that includes the cement material that would be circulated.

I used a straight 20-yard dumptruck, I didn't do

as sophisticated an analysis as Mr. Small on the weight ratio. I used a 20-yard truck and didn't de-rate it for the actual weight of the material. I figured the might run heavy. I hope they don't do that on our roads.

But I came up with 7.6 20-yard dumptrucks to handle the waste material from our 1000-foot wells. At $18 a yard, I had an actual disposal cost of approximately $2800.

When this particular exhibit -- I made an estimate of the proposed rules to utilize solids equipment and the additional materials to perform closed-loop operation on our shallow project. I had a location size adjustment and liner charge for additional apron area to cover some of the proposals, of $1500.

I had trucking charges for mobilization and demobilization of $2000, and that required moving the additional equipment in and out.

I had solids equipment rental, three days, at approximately $5000 a day.

The eight trucks at $1000 a truckload to move the material, and from our particular project area, which is approximately 88 miles from Farmington.

Solid waste charges at the landfill I mentioned, $2800.

And then I had soil testing costs. I'd contacted

Trace Analysis, Inc., which performed all of the testing for the OCD in this particular matter. I though visiting with them regarding the testing analysis and procedures was appropriate for this particular hearing.

And I received a soil test -- a quote from them of $1000 to perform one sample. That included the shipping. I said he'd cover that.

I also have a backhoe or loader operator to handle the material. I moved that at approximately $1500.

So I have a drilling phase cost, additional -- and this isn't dealing with fluids, because I'm basically assuming that the fluids are being handled either way; whether they're being handled on these shallow wells, I don't anticipate less or more fluid -- of $31,800.

I also have some costs related to the completion operation handling the flowback of the sand material on our fractured project, and -- of $4000.

So I have a total estimated impact for each of our shallow Fruitland Coal wells of $35,800. I recognize that's much lower than the information presented by Mr. Small and our prior witnesses, but this is only -- this well is only 1000 feet deep.

Q. Okay. Are we done with Exhibit 4?

A. Yes, ma'am.

Q. Okay. As a small operator, do you have some

investor issues?

A. Yes, in this particular project area, these shallow Fruitland Coal wells, the drilling cost to drill the well is approximately $100,000 currently, under the existing rule. The drilling phase increase in cost is approximately $30,000, as I've testified to, which is a significant increase.

Our rate of return, there's been some dis- -- hurdle rates and economics. Our internal cost to capitalize -- I guess I shouldn't, you know, jump to that -- for Synergy's perspective is -- I guess at the moment we're currently borrowing money at approximately 9 percent interest rate. That's obviously not as effective as some people may be able to borrow money, but that's our current situation.

We are targeting -- we are targeting a higher rate of return than 9 percent, obviously, because that's our cost of capital. But this particular project on a per-well basis is demonstrating approximately a 29-percent rate of return for our forecast in this project.

If we add the additional costs that I've calculated, it brings our rate of return down to approximately 24 percent. That's a reduction of 5 percent.

We've been challenged to obtain -- obtain financing on this particular project. As I mentioned, it's

a marginal play. There's a number of risk items that are associated with our development.

Not all of our potential investors agree with all of the performance parameters of this particular coalbed operation. Some of them believe it may take significantly longer to dewater the coalbeds and that our projected model is not accurate. And it's been difficult to convince them to take the risk.

It's going to be more challenging under this particular rule if we have to adopt these cost numbers to obtain that financing. But, you know, as with any business we will do our best to -- just to develop the project, and I hope we can.

Q. Okay. Has Synergy made any investments on leases that might be impacted by the proposed rule?

A. Yes, we have -- this particular acreage is -- there's some discussion about development wells versus exploration wells. There's different reserve classifications for reserves. These reserves would basically be probable or possible reserves currently.

That's another reason for the difficulty in obtaining financing. If you have proven reserves, it's much easier to obtain financing.

Q. Okay. And do small operators have any sort of an economies-of-scale issue? I think there was a long

discussion about reuse of drilling fluid.

A. Yes, it's -- obviously if you can drill more wells at one time and have a program, it's more cost-effective. That requires additional capital.

In our particular lease situation that we have, we have a -- acquired our leases under a farm-in. We have some drilling performance obligations to drill one well every 120 days, this particular project. We would obviously like to drill a number of wells together, but unfortunately without obtaining additional financing we are at the moment drilling the minimum number of wells to maintain the farmout position. So we drill one well at a time.

So we have to basically mobilize and demobilize our equipment in this particular area, rather than coming in, for instance, and drilling an additional 10 wells, which is what we would like to do in placing the Fruitland Coal pod development on line at a much earlier occurrence.

Q. Would you consider as a small operator buying used drilling fluid from somebody else, as was suggested here in the hearing?

A. No.

Q. Why not?

A. First of all, paying for something is not typically a practice with regard to taking a recycled

product from someone else. We have utilized the -- we recycle and reuse our fluids. Right now, currently, to the best of our ability, we're trying to do our drilling program where we can move our fluids to a new reserve pit in this particular project area.

But taking the fluids from some other party, I have envisioned this nightmare scenario of somebody bringing a load that has one quart of oil on the top of it, and they place it in the reserve pit and an OCD inspector shows up the next day, and I'm suddenly in a great deal of difficulty and I haven't even drilled the well yet. But -- So that's a challenge.

Our current operation, we are trying to close out the reserve pits, remove the hydraulic head as rapidly as possible and close the pit following its use within a month on our particular shallow wells. That's what we're trying to do.

Q. Okay. How about reusing drill cuttings? Is that a possibility for you?

A. Well, we're trying to minimize our footprint, not actually have tank batteries or berms. We're trying to have central collection. So I don't even see trying to get an exception and trying to use the cuttings on the surface of the soil in our particular area. So no, I don't see use of the drill cuttings in a recycled manner.

Q. Okay --

A. No.

Q. -- were you here for Ms. Mary Ellen Denomy, her testimony?

A. Yes, I was.

Q. Okay, and have you had a chance to review her numbers?

A. I have. I've looked at her slides, and I apologize for again not having that particular exhibit right in front of me, but --

Q. Okay --

A. -- I did review that. There were a number of inconsistencies in that exhibit that concerned me.

The first major inconsistency was the 12.5-percent royalty to the federal government.

MS. FOSTER: Mr. Chairman, may I approach the witness --

CHAIRMAN FESMIRE: You may, ma'am.

THE WITNESS: I'm not certain of the exact exhibit number in this matter.

Q. (By Ms. Foster) I don't believe that that was put into evidence, but it was referred to. So if you could just tell us what page you're on.

A. Okay, this is Ms. Denomy's handout. It indicated a cost -- typical cost to drill a well, a number of items

along with a recovery of approximately a BCF of gas in her economic model. This is a nondiscounted cash flow model. It's just a straight calculation. It makes some assumptions on deliverability.

She indicates that there's a large profit from her model on her second page of her exhibit. Her third page takes some information on taxes from several operators. I believe she testified to taking that information from joint interest billing or check stub data in northwest New Mexico.

The third page of her exhibit summarizes some costs related to earthen pit costs.

And the fourth page, titled Centralized Waste Pit Costs, had some discussion about completion, water haul off cost.

And her final page was Closed-Loop System Costs.

What I remember from her testimony was extremely confusing. It appeared that there was some information taken from different references, some from the Cimarex reference in southeast New Mexico, some of her reference experience in the Piceance Basin, as well as the information in northwest New Mexico. It was kind of a hybrid mix of a number of items that she created this exhibit from.

Q. Okay. And going through and looking at her cash

numbers, is the $1.5 million for a well -- is that a reasonable cost?

A. Again, it depends on the type of well. She had indicated a well of 7200 feet to 7500 feet, and it depended on which reference she was referring. That would be a little bit high in northwest New Mexico.

I believe Mr. Byrom will be testifying to the average cost to -- drilling particular project wells.

Q. Okay, I'm looking at that table, that first one. I believe that there were some other inconsistencies that you found?

A. Well, her -- I guess to discuss operating costs, in particular she had made an assumption that this was a dry gas well. That obviously is not applicable in a coalbed project. We have produced water hauling costs to handle.

She also did not distinguish between the -- she used an operating overhead cost per month. That's actually -- in the business, we break that out into two operating costs, what's called a direct operating cost and an indirect operating cost. The direct operating costs relate to the specific items for producing that well. The indirect operating cost is the operating overhead.

Under the joint operating agreement, an operator is allowed to charge a certain percentage of contractual --

typically a COPAS agreed value; COPAS is the accounting society agreed value -- for an operator to produce the well.

In addition, she did not include any sort of compression costs. In northwest New Mexico it is typical to have a wellsite compressor as part of your operating costs in this manner.

That's -- there's a number of --

Q. So the --

A. -- issues --

Q. -- hauling cost that she did not include there was the water-hauling cost. What about her solids-hauling cost?

A. I believe that in her proposal and the discussion was that all the waste was -- the waste of the drill cuttings was left on site. It was not removed.

Q. And was there a separator included on that?

A. Yes, she discussed a separator and how a separator, I guess, is supposedly the same everywhere you go in the oil and gas business, and that is not a correct assumption. Depending upon the type of well you drill, the operating pressures, the fluid characteristics, the volumes, the separator size and capacity can differ materially. And it could also be a two-phase unit or a three-phase unit. The wells may exhibit slug flow and have

to have certain internal requirements to handle the production.

So taking a figure from one reference and utilizing it in another reference as an accountant may seem appropriate. But as a petroleum engineer preparing an AFE, you typically look at all those items on a line-by-line basis, and you utilize the correct figures for that area.

Q. Okay. And in -- as an accountant looking -- I'm sorry, as a petroleum engineer doing an AFE, do you do any discounted cash-flow analysis?

A. Yes, there was some testimony about the preparation of an AFE. Larger companies work on budget cycles, prepare their AFEs in an earlier time frame. We tend to prepare our AFEs right when we're doing the project, because the people that sign off on it are myself and two partners.

We're very interested in having the accurate costs to our joint interest partners as well, because we take pride in our costs being accurate and appropriate.

So a petroleum engineer typically prepares the right figures, breaks out the costs into tangible and intangible figures with their associated tax treatments and runs an economic analysis.

I utilized a software program called Aries to run my economics package. I've been utilizing that software

for 16 years, and it's a discounted cash-flow analysis that has worked very well. It handles all the various changes in interests and payouts and ownership and royalty, and it handles that very well.

Q. Does that program include any of the concerns that Commissioner Fesmire has expressed concerning the price per barrel for oil and the conversion factors, et cetera?

A. Yes, it does, it typically handles all the escalation parameters.

You know, just to briefly discuss pricing, at least from a financing standpoint, our bank looks at financing, and the gas price in particular in northwest New Mexico is of importance. And we utilize typically a differential off of the NYMEX strip price. It's typically listed in a one-year contract, so we use the first-year price that's listed on NYMEX, take a typical differential for that historic from the San Juan Basin.

And then also they have a second-year contract. We use that for the first two years. And then the typical bank pricing utilizes another -- a flat price, without a price escalation or a de-escalation, typically at that point.

But you can utilize a number of different escalations. But in the finance -- at least from my

experience, trying to obtain financing, doing these evaluations for estates, that's the methodology I use. We go get the current NYMEX strip price, take the appropriate discount for the particular hub or sales point where it's at. For the first year is one item, the second year is a different item, and then have a fixed price going forward from that point.

The oil obviously recently has had some volatility, but in northwest New Mexico I think the production is 98 percent natural gas and 2 percent oil. Particularly in our coalbed project, there aren't any hydrocarbon liquids that I've identified. It's just methane and ethane. So you concern yourself with that.

You also concern yourself with the BTU factor of the gas. That's an important item that needs to be considered, because many people are paid on liquids percentages from the gas stream, and various liquids may have different contract prices.

Q. Okay, Mr. Mullins, how about we talk about risk in drilling? Do you try and minimize your investment risks?

A. Yes, you try to minimize risks wherever possible.

Q. And what type of risks is an operator looking at when drilling a well?

A. There's many types of risk. To start with, you

have the geological risk of the reserves, oil and gas, being in the ground.

You have an operational risk of performing the operation. You can get a dry hole, you can have an operational problem requiring you to junk the well or plug and abandon the well during your initial phase of operation.

You have, I guess, a term I would call regulatory risk at the moment. If you're operating under a certain set of parameters and the regulatory environment should change, be that on a specific drilling basis or an operating basis, that adds additional cost to your project. And you know, specifically the operating costs related to the below-grade tank is obviously an issue where regulatory risk change as proposed in the rule -- that it's actually going to come back and not affect just new drilling operations but all the -- many existing operations.

So there's those types of risk.

Q. Okay. And looking at this regulatory risk factor, is that something that you can quantify for your AFEs year to year?

A. Well, you try to do that. You try to have a stable regulatory environment. You do technical analysis to reduce your geologic risk, and you try to do good engineering work to reduce your operational risk. And so

you try to minimize your risk in all occurrences.

But if you suddenly have a change in one of those items, it's going to impact the viability of your project.

Q. Okay, now you get to talk about spud mud.

A. Spud mud.

Q. Okay?

A. Spud mud is a bentonite clay material that's utilized to drill the surface hole in a freshwater drilling system, in northwest New Mexico in particular. Every well that I've been involved with utilizes that bentonite in freshwater drilling, at least in northwest New Mexico. That constituent is usually the first item going into the pit.

In our particular instance, in our shallow Fruitland development, since we mix that mud we mix basically the bentonite gel directly into the pit before we spud our surface hole. On the bigger operations, you know, they may start with that material in their tanks, but then it -- obviously, since there's no other containment, it's going into the reserve pit. And so that's the first material that goes into the pit.

I believe it's important, because I believe -- there have been some slides and testimony representing clay material or tighter material having a lower hydraulic conductivity or lower infiltration rate or a lower

permeability, whichever term you want to use.

And I think in -- specifically in northwest New Mexico, with regard to the lined pits, it enhances the stability of the liner. It effectively coats the liner in northwest New Mexico and adds, I guess, an added layer of containment for your fluid in the pit.

So spud mud is utilized in northwest New Mexico regularly and is the first material that is placed into the pit. And I --

Q. Okay, Mr. Mullins, moving on to Exhibit Number 5, which is the 8-1/2-by-11 -- or -14 sheet that was handed out earlier, do you have a copy of that?

A. Yes, I do. Exhibit 5, which was originally cut off in the submittal -- it was missing the left-hand column in the original submittal. I've spent a great deal of time analyzing the data and being present at the pit hearing.

I, like Mr. von Gonten, made my attempt to go through all of the OCD sample data and to manually place mainly constituents of concern that I had identified. That does not mean there are not other constituents, but this basic summary slide I broke out for northwest New Mexico the soils on the left-hand side and the fluids or liquids on the right-hand side.

I tried to reference the particular sample number, and the column that was cut off but is on your new,

revised version of Exhibit 5, the left-hand column details some of the specific constituents that I had identified and were also listed on -- as being of concern or above the -- above Water Quality Control Commission standards, 3103 constituents, for groundwater.

There's a --

Q. Let's look at the chloride line.

A. Right.

Q. Do you want to talk about that, please?

A. Yeah, there's -- the data that's been presented regarding northwest New Mexico versus southeast New Mexico, northwest New Mexico is significantly different in the fluids and materials than from the southeast. The chloride has been discussed as an indicator of salt contamination, or potential salt contamination.

The data indicates from the soils -- I'm going to try to focus on the soils and not go to the liquids because the liquids, I believe -- barring an unusual occurrence, we're dealing with the solids that are in northwest New Mexico pits.

The readings are -- in a production pit, the first sample was 1990 in chloride. The soil sample in the Elmridge example is 5290. The remaining three samples, one was 417 in the Devon reserve pit, one was 962 in the XTO reserve pit, and the other was 927. Those were the

chloride figures.

I did discuss this data in detail with the analyst at Trace Analysis. I was trying to understand the methodology and performance characteristics of the sampling that was performed.

I believe the -- those figures are much lower than southeast New Mexico. Mr. Foutz testified to the sampling in the closed-loop operations that he utilized as coming in at approximately 450. He didn't remember the units, but you can -- in a solid sample it would be milligrams per kilogram, and then assuming a 1 density of water you change that out to milligrams per liter.

The important item from my discussion regarding the chlorides, in particular, was that no dissolved leachate analysis was performed on any of the OCD samples on the solid material. And I think that's important because it doesn't demonstrate, at least to me, that if you detect a chloride or you have some salts in the system, that those salts would actually be mobile or into the leachate.

My understanding is that that type of test, which I have listed at the bottom of the sheet under soils, was not performed for calcium, magnesium, potassium or sodium, the normal salts.

That test can be performed fairly easily. In

effect it would be comparable to the SPLP leachate discussion that was presented earlier in testimony. If you take the figures that are being utilized in the soil and divide them by 20, you have a much reduced leachate.

In fact, if you utilize even the highest soil sample in northwest New Mexico from the OCD, 5290, and divide that by 20, I believe you'll get a leachate of 265 milligrams per liter, which is approximately four times smaller than any of the modeling that was representing northwest New Mexico.

The smallest modeling in the groundwater modeling for the MULTIMED portion was utilizing a leachate of 1000 milligrams per liter. That 1000 milligrams per liter leachate would correspond to 20,000 milligrams per liter in the chloride fraction.

So it's significantly, basically, the soil data, at least in northwest New Mexico, from the data that's been taken here, as well as the data presented by Mr. Foutz. Unfortunately, the scheduling did not allow for the industry committee to present their information on that. Some of the information is presented in Mr. von Gonten's testimony.

But if you take that leachate, it's significantly lower, almost four times lower. In fact, 265 milligrams per liter is very close to the groundwater chloride

standard in the proposed rule, basically in all the pits as they sit in northwest New Mexico.

Q. Okay. Now how about by the standards of the current rule, what does this sampling tell you?

A. Under the current rule I don't believe there's any sampling requirements in northwest New Mexico, currently.

Q. Okay. But does -- but the levels that came out on these pits, are you still protected under the current rule?

A. Yes, I believe that the operations that have been ongoing for the past 50 years utilizing reserve pits in northwest New Mexico have been protective of public health and the environment, and the particular OCD sampling in northwest New Mexico specifically regarding chlorides is -- indicates that.

Q. Okay, and the OCD sampling, was that taken out of stabilized pits?

A. I don't believe so. Those were taken directly from the cuttings material. There wasn't any sort of mixture between -- or stabilization that had been placed into the drill cuttings.

Q. Okay, but the --

A. So -- It would be a very high concentration, there was no 1-to-1, 1-to-2, 1-to-4 soil dilution factor in

the waste material.

Q. Okay, but does the stabilization affect the solubility or the saturation levels of the constituents?

A. It can. I -- And again, it depends on the material that would be utilized to stabilize the --

Q. Okay.

A. -- material.

Q. Now, were you present at the hearing for Mr. Ed Hansen's testimony?

A. Yes, I was.

Q. Okay. And do you have any experience using the HELP/MULTIMED -- or MULTIMED models?

A. You know, I do, unfortunately. I have unfortunately had to look at some of this modeling material, because I wasn't aware of who else was going to be looking at it. I had a short period of time to do it.

I've downloaded the HELP model and MULTIMED model, the HELP model from the Army Corps of Engineers website. And the MULTIMED model I can't remember the website that I downloaded it. It had a reference.

But I've gone through and reviewed Mr. Hansen's testimony and all of the input parameters that relate to the model.

Q. Okay. Did you have any discussion pertaining to the input parameters in the model?

A. I do. I think in particular -- In northwest New Mexico, I had mentioned the bentonite clay layer. That material would assist the liner material.

There were some assumptions made regarding the liner materials in particular with regard to the HELP model, as the liner's being of poor quality or having certain numbers of failures, and there were some input parameters that were selected by the OCD for that.

I don't believe that their selection that having a poor liner would be appropriate in northwest New Mexico, based upon the use of bentonite and spud mud, and I think that would enhance the liner's durability and capability, and that not only should the liner be in better condition, but the actual thickness of the liner in the bottom of the reserve pit for the HELP model should be increased, and it should have an infiltration rate or hydraulic conductivity, you know, maybe of bentonite clay, which is very low. I'd have to reference some other slides from the Division regarding that specific conductivity.

There were some assumptions made regarding the precipitation and infiltration rate. There was discussion of having Mr. Hansen's model be representative of real-world, realistic northwest New Mexico conditions. And then he also -- there was some discussion of worst case.

With regard to realistic conditions, Dulce, New

Mexico, was utilized as the selection criteria for the climatological data. Dulce, New Mexico, is not even on -- within the three primary aquifers of the San Juan Basin that were listed in Mr. von Gonten's testimony, being the Animas and Ojo Alamo -- I think the other one was the San Jose formation -- that I'm aware of; it actually lies outside of that.

There are some significant differences between Dulce, New Mexico, and the rest of the San Juan Basin. In particular from the data sets I looked at, there were three to four additional data sets that would be applicable for real world examples in northwest New Mexico for the HELP model. Those in particular would relate to Farmington, New Mexico; Aztec, New Mexico; Lybrook, New Mexico. There's multiple points in Farmington. In those cases, from my review, the precipitation is approximately half of the precipitation in Dulce, New Mexico.

Dulce, New Mexico also has a different growing season for the vegetation from what Farmington, Aztec and Lybrook have. It has a shorter -- they use a Julian calendar year that's different in the modeling parameters. Soil humidity is different.

To go to a -- to leave Dulce alone for a moment, there are no wells within five -- producing oil and gas wells within five miles of Dulce, New Mexico. There's

approximately 1000 wells within five mile of Farmington, New Mexico. I think it's appropriate for the Oil Conservation Division to utilize in their modeling parameters that would be applicable to the San Juan Basin.

With regard to the vegetative cover, we talked about stabilizing the pits and the amount of cover on the pit. The modeling that was presented was for an unlined pit or a poorly lined pit with two feet of cover, was one of the modeling examples. And the other modeling example was a deep-trench burial option, which had four feet of cover.

Based upon my experience in northwest New Mexico, there's at least four feet of cover in the reserve pits that we currently have in place. Utilizing two feet was not -- I believe does not allow sufficient evapotranspiration to occur, especially in an arid environment. And given our current activities of vegetating the soil under the gold book standards and BLM best practices, we are actively striving to re-vegetate the model.

When you combine those factors in Mr. Hansen's modeling, it changes the input to the second portion of his model, which is the vadose zone model of the MULTIMED system. And from what I can determine and from prior testimony, it appears that the infiltration rate utilized

by the NMOCD was 12.5 millimeters per year infiltration rate, effectively, is the input to the MULTIMED model.

The industry witness -- I apologize for not remembering his name at the moment --

Q. Dr. Stephens?

A. Dr. Stephens, that's correct. -- utilized an input of 2.5 millimeters per year on his effective input for the vadose zone model.

I was also present for Dr. Neeper's input parameter testimony, and it's on the higher end of the input figures.

You basically take that information, Mr. Hansen's modeling, going through the input parameters, there's a number of criteria or coefficients that can be changed or adjusted in the model. There's a number of degradation coefficients that allow contaminants, whether you're modeling chlorides or you're modeling other constituents, to have adsorption or being attached to the soils.

One of the big concerns I have is, especially regarding the hydrocarbons and the volatiles that were listed in the testing, by placing the liner on top of the -- and at least from a reserve pit standpoint, it doesn't allow the volatilization of some of those constituents of concern by the Division and the public to occur and, in reality, probably makes it more likely for those to reside

underneath the top liner material, rather than being dissipated.

Q. How about using transevaporation [*sic*]?

A. I believe that that -- in the model that Mr. Hansen utilized, because of the vegetative cover, of the difference in the growing season -- I forgot to mention the solar radiation factor. Part of the growing season relates to solar radiation, and in Mr. Hansen's model they utilized Pueblo, Colorado, as the solar radiation input parameter. They did make an adjustment for latitude to try to bring that parameter to Dulce, New Mexico.

The other point, which I believe would be a more representative point for solar radiation, is Albuquerque, New Mexico. The difference in solar radiation, based upon my review, is over 20 percent on the solar radiation inputs.

So taking Pueblo, Colorado, and adjusting it down to Dulce, New Mexico, would be one method of determining solar radiation. But I believe a more accurate method, based upon elevation and climate, would be to take Albuquerque, New Mexico, solar radiation data and move that north to Farmington, and that that would be a more appropriate solar data.

So you combine all these factors again, and I think that's the realistic, real-world model for what would

be appropriate for the HELP model.

And that affects the input to the MULTIMED model, which -- the main concern in the MULTIMED model that I believe relates to the mixing zone. I believe Dr. Stephens testified, and it's evident that there's approximately a four-inch mixing zone in a 50-foot aquifer in Mr. Hansen's modeling.

If you look at the input parameters in the normal function of the MULTIMED model, from my understanding is, it actually will calculate what the mixing depth should be for -- or an estimated mixing depth for coming into the MULTIMED model.

So using four inches in the top of the MULTIMED model would increase the concentration.

If you dilute it -- Let's say you picked, not 50 feet, which is what Dr. Stephens utilized, but something less than 50 feet. If you want to pick one foot, you know, mixing zone, it would be three times more dilution in the aquifer.

When you factor all of these constituents together with regard to the -- specifically northwest New Mexico on the modeling, it appears to me that the practices that have been utilized, lined or unlined pits, earth -- reserve pits -- I want to say reserve pits that deal with the drilling operations, that have not had a continuous

source of a hydraulic head placed on them over time, have not impacted groundwater, have not harmed the public, have not harmed the environment in northwest New Mexico.

I believe the data that's been presented by the Division and industry does not demonstrate that case.

Q. Okay. Then move on --

CHAIRMAN FESMIRE: Ms. Foster, would this be a good place to ask for comments and break for the day?

MS. FOSTER: Yes, please. Thank you.

CHAIRMAN FESMIRE: Okay. Is there anyone in the audience who would like to make a comment on the record?

Let the record reflect that we saw none.

With that, we will adjourn for the day to reconvene Friday morning in this room at nine o'clock.

(Thereupon, evening recess was taken at 4:43 p.m.)

* * *

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 Commission 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 January 23rd, 2008.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 16th, 2010